UNIVERSITY OF OKLAHOMA

GRADUATE COLLEGE

"DRAIN THE SWAMPS FOR HEALTH AND HOME": WETLANDS DRAINAGE, LAND CONSERVATION, AND NATIONALWATER POLICY, 1850-1917

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

ANTHONY E. CARLSON
Norman, Oklahoma
2010

“DRAIN THE SWAMPS FOR HEALTH AND HOME”: WETLANDS DRAINAGE, LAND CONSERVATION, AND NATIONAL WATER POLICY, 1850-1917

A DISSERTATION APPROVED FOR THE DEPARTMENT OF HISTORY

BY

_____
Dr. Donald J. Pisani, Chair

_____
Dr. Albert L. Hurtado

_____
Dr. Judith S. Lewis

_____
Dr. Joshua A. Piker

_____
Dr. Zev Trachtenberg

For Tera

Acknowledgements

The successful completion of this dissertation would not have been possible without the support and encouragement of several family members. First and foremost, the debt of gratitude that I owe to my wife, Tera, for her love, patience, and friendship during the past six years can never be repaid. Meeting Tera was the best thing that has happened in my life, and her kindness and sense of humor made graduate school a rewarding experience. I love Tera dearly, and dedicate this dissertation to her. Second, my parents, Dennis and Charlotte Carlson, have always encouraged me to pursue my dreams and encouraged me from a young age to appreciate the value of education. I am grateful for their steadfast support. Third, my relationship and friendship with my sister, Andrea, has enriched my life. Andrea never hesitated in pulling me away from research and writing to discuss football and other related topics and, as this dissertation nears completion, I appreciate these welcome diversions and her kindheartedness. Finally, the birth of Eden Jo, my first child and daughter, one year ago opened my eyes to the most important things in life: innocence, gentleness, and unconditional joy.

Generous financial support for this project was provided by several institutions. The Forest History Society (Duke University), American Heritage Center (University of Wyoming), Charles Redd Center for Western Studies (Brigham Young University), and James Jerome Hill Reference Library in St. Paul, Minnesota, contributed to this dissertation with grant and fellowship money. At the University of Oklahoma, I received funding from the Department of History, Graduate College, and College of Arts and Sciences. I am particularly thankful for the generosity of H. Wayne Morgan and Anne Hodges Morgan.

I am indebted to archivists and reference staff at libraries and manuscript repositories throughout the United States. Staff at the Forest History Society Archives, Northeast Minnesota Historical Center at the University of Minnesota-Duluth, University of Florida Special Collections, Minnesota Historical Society, North Dakota Institute for Regional Studies, University of North Carolina Special Collections, Northwest Minnesota Historical Center at Minnesota State University-Moorhead, Norwegian-American Historical Association Archives, Smithsonian Institution Archives, Library of Congress, Clay County Historical Society (Minnesota), and National Archives and Records Administration repositories in Washington, D. C., Denver, and College Park provided knowledgeable and insightful assistance. Steve Nielsen, Nick Duncan, Mark Peihl, Pat Maus, Molly MacGregor, W. Thomas White, Eileen McCormack, Korella Selzler, and J. Bonnie Rehder deserve special thanks.

I have benefitted from the instruction of many excellent teachers in my life, but none of them have inspired me to look at the past with such humility and enthusiasm as Professor Donald J. Pisani, the director of this dissertation. Professor Pisani's track record as a scholar speaks for itself, but his unselfishness, generosity, and dedication to his graduate students rivals his scholarly accomplishments. He has purchased countless meals at conferences for me, given away books and other supplies, arranged for me to meet other scholars, and, most importantly, selflessly given his time so we could discuss complex research questions and historical methodology. Professor Pisani has a meticulous eye for detail and demands that his students demonstrate diligence and rigor in research and writing. In addition to teaching me the historian's craft, he made graduate school enjoyable, exhilarating, and intellectually stimulating. Some of my

fondest memories in life are of sitting in Professor Pisani's office and talking about water resource history and, of course, contemporary politics. I will miss those office visits.

Table of Contents

List of Tables

List of Figures

Abstract

Wetlands drainage is one of the oldest and commonest forms of land modification in American history. Colonists and later Americans perceived wetlands as a threat to progress and prosperity. Wetlands impeded travel, depressed property values, harbored dangerous predators, segregated otherwise arable land from cultivation, and were thought to discharge miasmas and miasmata into the atmosphere that caused a variety of febrile illnesses. In response to these fears, local communities and the national government implemented policies and created institutions to drain wetlands for health and agricultural purposes. By 1900, Americans identified wetlands drainage as a form of enlightened land stewardship that rivaled forest preservation, the protection of migratory waterfowl, western irrigation, flood control, and the regulation of grazing and mineral extraction on public lands in importance. Surface water removal was a paramount public policy objective in United States history and shaped Americans' relationship to their physical environment and one another.

INTRODUCTION: WETLANDS DRAINAGE, HISTORIANS, AND THE HISTORY OF WATER IN THE UNITED STATES: A REAPPRAISAL

In the United States, as in other countries, intensive agriculture required the control of water. Since the colonial period, rural Americans have diverted and stored water to convert Atlantic coastal wetlands into rice fields, maximize hay output in New England meadows, transform riparian and interior swamps into crop fields, and irrigate western deserts. The history of rural America is one of people creating political institutions and adopting technologies that enabled them to harness watercourses, wetlands, and underground aquifers for cultivation. The managerial relationship of people towards water, which predominated in every community that practiced a form of monoculture, shaped much of the history of the rural United States.

Over the past half century, historians have begun to study the contested and contentious history of water in the United States. There have been many excellent studies that evaluate the role of irrigation in overcoming the arid climate of the American West. In the eastern half of the country, however, the history of water has been ignored and marginalized.[1] As a result, the hundredth meridian, the north-south axis running

[1] There is a voluminous literature on western irrigation and the federal reclamation program, which Congress established in 1902. Some of the most important works include Wallace Stegner, *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West* (Boston: Houghton Mifflin Company, 1954); Donald Worster, *Rivers of Empire: Water, Aridity, and the Growth of the American West* (New York: Pantheon Books, 1985); Marc Reisner, *Cadillac Desert: The American West and its Disappearing Water* (New York: Viking, 1986); Donald J. Pisani, *To Reclaim A Divided West: Water, Law, and Public Policy, 1848-1902* (Albuquerque: University of New Mexico Press, 1992); and Pisani, *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* (Berkeley: University of California Press, 2002). For a concise and insightful introduction to the literature's major interpretative themes, see William D. Rowley, "Introduction," *Agricultural History* 76 (Spring 2002): 137-41. There are a small number of studies that evaluate the role of state legislatures and Congress in developing water resources in the eastern United States before World War I. The manipulation of New England's rivers by textile mills and dams beginning in the late eighteenth century has attracted scholarly attention. See Morton J. Horwitz, *The Transformation of American Law, 1780-1860*

from Manitoba and North Dakota through Texas, which roughly divides North America into arid and humid halves, constitutes a significant historiographical boundary. West of the famous line, precipitation seldom exceeds 20 inches each year, reaches the ground mostly in the form of snowfall, and is insufficient to raise crops during the growing season. In the humid half of the continent, rainfall is abundant in all seasons and sometimes surpasses 40 inches each year. Yet since irrigation required the construction of large dams and diversion canals that could be captured in photographs and artwork as visible symbols of progress, modernity, and technological prowess, agricultural and environmental historians identified aridity as the primary water-related problem in rural United States history. Nonetheless, vast stretches of wetlands and flood-prone riparian lands concentrated east of the hundredth meridian invited intensive human management no less than arid lands. Despite the tremendous amount of scholarly ink spilled on the subject of western irrigation, the 53 million acres of American farmland improved by drainage in 1919 dwarfed the 19 million acres improved by irrigation despite the latter's massive federal subsidization.[2] The digging of drainage ditches, construction of underground clay tile networks, channelization and straightening of creeks and streams, and erection of levees in the eastern United States did not capture the public's

---

(Cambridge, Mass.: Harvard University Press, 1977), 34-42; and Theodore Steinberg, *Nature Incorporated: Industrialization and the Waters of New England* (Cambridge: Cambridge University Press, 1991). Furthermore, Martin Reuss and Karen O'Neill have written excellent studies on the historical development of federal flood control and drainage policies. Reuss, *Designing the Bayous: The Control of Water in the Atchafalaya Basin, 1800-1995* (College Station: Texas A&M Press, 2004); and Karen O'Neill, *Rivers by Design: State Power and the Origins of U. S. Flood Control* (Durham: Duke University Press, 2006). In another recent study, Paul F. Paskoff argues that the national government aided antebellum steamboat transportation by removing hazards from rivers in the county's humid half. Paskoff, *Troubled Waters: Steamboat Disasters, River Improvements, and American Public Policy, 1821-1860* (Baton Rogue: Louisiana State University Press, 2007).

[2] These drainage and irrigation statistics are drawn from *Fourteenth Census of the United States Taken in the Year 1920*, vol. VII, "Irrigation and Drainage," (Washington: Government Printing Office, 1922), 14, 365.

imagination in the same way as towering western dams, but they were just as instrumental in shaping the modern American landscape before World War I.[3]

The western orientation of water scholarship reflects broader shortcomings in the traditional story of American land conservation. Since the 1959 publication of Samuel P. Hays's seminal *Conservation and the Gospel of Efficiency*, a formidable body of scholarship insisted that American land conservation between the Civil War and World War I focused primarily on public lands management in the American West. According to most interpretations, a conservation ethos evolved during the late nineteenth century in response to rapid industrialization, urbanization, the growth of big businesses, nostalgia for the frontier, and the gradual breakdown of the myth that natural resources were inexhaustible. Hays argued that during the 1890s an emergent bureaucratic and scientific class in Washington confronted these fears by shifting control over natural resource management from local communities to the federal government. Appalled by the waste, inefficiency, and overexploitation of the public domain, conservationists imposed policies regulating grazing, hunting, and mineral extraction on federal lands, created national forests, and assumed responsibility for irrigating the arid half of the country. The flurry of administrative activity created the illusion that land conservation was limited in scope and objectives to public land administration in the western United States. It would be difficult to overstate the influence of Hays's pioneering study on the field of

[3] Widespread efforts to drain, and later to preserve, wetlands are completely ignored in surveys of American environmental history. Benjamin Kline, *First Along the River: A Brief History of the U. S. Environmental Movement*, 3d ed. (Lanham: Rowman & Littlefield Publishers, Inc., 2007); Philip Shabecoff, *A Fierce Green Fire: The American Environmental Movement*, rev. ed. (Washington: Island Press, 2003); and Ted Steinberg, *Down to Earth: Nature's Role in American History*, 2nd ed. (New York: Oxford University Press, 2009). Despite the tremendous quantity of American wetlands converted into crop fields by nineteenth- and twentieth-century farmers, agricultural historians also overlook the importance of drainage in favor of irrigation. R. Douglas Hurt, *American Agriculture: A Brief History*, rev. ed. (West Lafayette: Purdue University Press, 2002); and David B. Danbom, *Born in the Country: A History of Rural America*, 2nd ed. (Baltimore: Johns Hopkins University Press, 2006).

environmental history. Although recent scholars take a more circumspect view of the concentration of political power in the early twentieth-century, they follow in Hays's footsteps in interpreting the genesis, evolution, and trajectory of conservation from the prism of natural resource management in the American West.[4]

The time has arrived to nationalize the history of water in the United States. As the historian Donald J. Pisani recently argued, "water in the humid half of the nation posed as much of a challenge to those who would reorder nature as water in the arid and semi-arid region … There are more reasons for erasing the 100th meridian as a scholarly demarcation than for maintaining it."[5] The historical neglect of drainage is troubling for two specific reasons. First, few American landscapes have historically been more feared, reviled, and stigmatized than wetlands. During the nineteenth and early twentieth

[4] Samuel P. Hays's seminal study of the Progressive Era conservation movement devoted only 3 pages to wetlands drainage. See Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920* (Cambridge, Mass.: Harvard University Press, 1959), 222-25. The generation of historians who followed Hays, as well as a handful of earlier scholars, also completely overlook the importance of land conservation by drainage to nineteenth- and early twentieth-century Americans. See Charles Richard Van Hise, *The Conservation of Natural Resources in the United States* (New York: The Macmillan Company, 1921), 344-48; Loomis Havemeyer, ed., *Conservation of Our Natural Resources* (New York: The Macmillan Company, 1930), 342-46; Ray Lyman Wilbur and William Atherton Du Puy, *Conservation in the Department of the Interior* (Washington: Government Printing Office, 1931); Ian Burton and Robert W. Kates, eds., *Readings in Resource Management and Conservation* (Chicago: University of Chicago Press, 1960); Donald C. Swain, *Federal Conservation Policy, 1921-1933* (Berkeley: University of California Press, 1963); James Penick, Jr.,"The Progressives and the Environment: Three Themes from the First Conservation Movement," in *The Progressive Era*, ed. Lewis L. Gould (Syracuse: Syracuse University Press, 1974), 115-31; Stephen Fox, *The American Conservation Movement: John Muir and His Legacy* (Madison: University of Wisconsin Press, 1981); Clayton R. Koppes, "Efficiency/Equity/Esthetics: Towards a Reinterpretation of American Conservation," *Environmental Review* 11 (Summer 1987): 127-46; Louis S. Warren, *The Hunter's Game: Poachers nad Conservationists in Twentieth-Century America* (New Haven: Yale University Press, 1997); Karl Jacoby, *Crimes Against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation* (Berkeley: University of California Press, 2001); John F. Reiger, *American Sportsmen and the Origins of Conservation*, 3d ed. (Corvallis: Oregon State University Press, 2001); and Thomas R. Wellock, *Preserving the Nation: The Conservation and Environmental Movements: 1870-2000* (Wheeling, IL: Harlan Davidson, 2007).

[5] Donald J. Pisani, "Beyond the Hundredth Meridian: Nationalizing the History of Water in the United States," *Environmental History* 5 (October 2000): 466-82, quotes at 466, 478. Shannon Stunden Bower argues that Canadian scholars, like their American counterparts, have also demonstrated a bias towards arid land reclamation in Canadian water historiography. Bower, "Watersheds: Conceptualizing Manitoba's Drained Landscape, 1895-1950," *Environmental History* 12 (October 2007): 796-819, esp. 797.

centuries, Americans who took up farms in Midwestern, southern, and Mississippi Valley states considered the coterminous United States' 221 million acres of wetlands (11% of the surface area) as a threat to progress, prosperity, and human health. Wetlands impeded travel, depressed property values, segregated otherwise arable land from agricultural production, provided sanctuary for dangerous reptiles and predators, and were thought to release dangerous "miasmas" or "miasmata" into the atmosphere attributed to a host of febrile illnesses in people, livestock, and barnyard fowl. The only good wetland, Americans reasoned, was one which had been drained, cleared, and cultivated. By the start of World War I, ordinary Americans and natural resource planners identified wetlands drainage as a form of environmental stewardship that rivaled the importance of forest preservation, the protection of migratory waterfowl, the regulation of grazing and mineral extraction on public lands, and western irrigation. Since so many people lived, traveled, raised crops, and breathed air in or near landscapes characterized by an abundance of surface water, wetlands decisively shaped Americans' understanding of the physical world they inhabited.

Second, water scholarship's western focus suggests that Congress, at least prior to World War I, was so preoccupied with reclaiming western deserts that it ignored other water resource management issues. Yet Congress never perceived national water policy as a program limited to the American West. Although many scholars have interpreted the passage of the Reclamation Act of 1902, which nationalized irrigation in the seventeen western states, as evidence that arid land development was the primary focus of national water policy, the law actually attracted broad support outside of the West. Supporting the Reclamation Act by a margin of 4:1, southern Democrats expected that the law's passage

heralded a more comprehensive national water policy that included wetlands drainage in the Midwest and south. As this dissertation will argue, Congress took a keen interest in the development of wetlands. In the mid nineteenth-century, Congress subsidized the drainage of wetlands in fifteen public land states and, between 1906 and World War I, tried to nationalize wetlands drainage on several different occasions. Unfortunately, scholars of American wetlands have not bridged the sectional divide in U. S. water scholarship or studied the relationship of drainage and irrigation at the state or national policy levels after 1900. Portraying surface water removal as a profoundly local event dominated by drainage districts and county governments, Ann Vileisis, Hugh Prince, and John Thompson reinforce the misperception that Congress avoided helping communities overcome water problems that did not involve irrigation. This dissertation, then, has two major goals. First, it will seek to evaluate the historical circumstances that led Americans to develop an intense antipathy towards wetlands. Second, it will argue that drainage constituted a centerpiece of national water policy before World War I.[6]

"Drain the Swamps for Health and Home" is divided into five roughly chronological chapters. The opening chapter surveys American attitudes towards wetlands beginning in the mid eighteenth century. Drawing heavily on recent works by historians of science and medicine, it shows how a flurry of medical, meteorological, and pneumatic chemistry discoveries in Enlightenment Europe and the United States stigmatized wetlands as a pestilential landscape inimical to progress and prosperity. Inspired by the eighteenth-century revival of Hippocratic medical theories, physicians

[6] Ann Vileisis, *Discovering the Unknown Landscape: A History of America's Wetlands* (Washington: Island Press, 1997); Hugh Prince, *Wetlands and the American Midwest: A Historical Geography of Changing Attitudes* (Chicago: Chicago University Press, 1997); and John Thompson, *Wetlands Drainage, River Modification, and Sectoral Conflict in the Lower Illinois Valley, 1890-1930* (Carbondale: Southern Illinois University Press, 2002).

identified swamps, marshes, bogs, and other landscapes characterized by an abundance of stagnant surface water as insidious sources of atmospheric contamination. According to physicians, the decomposing vegetable and animal matter in wetlands released dangerous "miasmas" or "miasmata" into the atmosphere which, once inhaled or absorbed by people's skin, caused a variety of fevers. Benjamin Rush, Charles Caldwell, and other leading American physicians called for farmers to participate in a general campaign of atmospheric reform. They argued that a broad program of swamp drainage, deforestation, cultivation, and flood control would decontaminate North America's miasmatic atmosphere. Agricultural progress begot atmospheric reform. In sum, land drainage during the early republic focused as much on improving public health as opening up new farmland.

Chapter 2 studies how the medical and environmental ideas articulated by atmospheric reformers reached a wider audience. Beginning in 1819, the rural press, which exploded in circulation and readership before the Civil War, began to disseminate Hippocratic medical theories to American farmers. Agricultural journalists instructed farmers to drain their waterlogged fields to protect their families, livestock, and barnyard fowl from miasmatic diseases and malaria. In addition to decontaminating the rural atmosphere, drainage improved the soil's ability to support crop life, elevated crop yields, and also enhanced the overall quality of rural life. By repeatedly emphasizing the health and wealth benefits of wetlands drainage, the rural press turned the idea of land conservation by drainage into an enlightened form of land stewardship. Editors and contributors contended that farmers had an ethical responsibility to drain because wetlands were illegitimate landforms that served no useful purpose other than generating

telluric miasmas. Adopting the logic of atmospheric reformers, editors clamored that water properly belonged in circulating watercourses where it could not intermingle with vegetable and animal matter and poison the atmosphere, drive down property values, or impede agriculture. Farmers who drained their fields practiced a form of land stewardship because wetlands were unnatural collections of surface water that represented one of nature's shortcomings. Wetlands had no intrinsic or aesthetic value.

The third chapter surveys the evolution of national wetlands policy before the Civil War. Early in the eighteenth century, colonial legislatures formally adopted Medieval English institutions known as "commissions of sewers" or "courts of sewers" to initiate, manage, and fund land drainage projects. As settlers crossed the Appalachians and fanned out across the vast wet prairies of Ohio, Indiana, and Illinois after 1800, many western states followed colonial precedent and authorized the creation of commissions of sewers or similar ditch associations. After meeting a set of preconditions, the laws empowered neighboring farmers to petition a local court or the state legislature for permission to form a commission that possessed the authority to impose land assessments, build drainage projects, and, if necessary, condemn land. Problems abounded with land drainage west of the Appalachians. Residents from public land states discovered that the creation of the public domain (land owned and distributed by the federal government) after the American Revolution undermined the effectiveness of colonial drainage institutions. Unlike private land, federal property could not be taxed by state or local governments, condemned, or forcibly included in ditch or sewer commissions. The federal government's dilatoriness in disposing the public domain, which was attributable to the fact that it dumped too much land onto the market too

quickly, and the ineffectiveness of local drainage institutions infuriated communities in public land states. In the late 1830s and 1840s, western communities, state legislatures, individual citizens, and local drainage conventions flooded Congress with petitions demanding that the national government cede public wetlands to the states so they could drain them, create a national drainage program, or authorize local communities to drain the public domain. In 1849, 1850, and 1860, Congress acquiesced by passing three Swamp Land Acts that ceded all of the federal governments "swamp and overflowed" lands to fifteen Midwestern, southern, and Pacific coast states on the condition they sell the lands and invest the revenue in draining other wetlands.

The Swamp Land Acts made drainage a state priority and represented a large giveaway. With the possible exceptions of Louisiana and Arkansas, however, participating states flagrantly subverted the law, using their land grants for every purpose but drainage. The failure of state administration compelled the states to devolve authority for land drainage back to local communities by authorizing the formation of drainage districts and county drainage projects. During the last decades of the nineteenth century, drainage districts and county drainage projects proliferated around the country. Local institutions generally were capable of handing drainage independent of federal and state intervention and converted a respectable quantity of wetlands into cultivated fields before 1900.

Lingering public health fears regarding wetlands constituted a second reason for the passage of the Swamp Land Acts. New studies about the bodily experiences of nineteenth-century Americans living near certain landforms suggest why people despised wetlands. Settlers living near wetlands attributed the recurrent and debilitating bouts of

fever and ague that they experienced to miasmas released into the air by stagnant waters. In the late eighteenth and nineteenth centuries, land conservation had as much to do with promoting the efficiency of the human body as turning marginal lands into commodities. For too long scholars have indicted a capitalist ethos for the vast exploitation and degradation of the American environment. Such a crude economic determinism does not account for the fact that many Americans' bodies told them that certain landscapes, such as wetlands, could maim or kill. The cultural mandate to drain had as much to do with improving people's health as padding their pocketbooks.

Chapter 4 provides a case study of the failure of national wetlands policy under the Swamp Land Acts. In the early 1880s, the Valley of the Red River of the North, which forms the present-day boundary of Minnesota and North Dakota, eclipsed Kansas and Nebraska as the epicenter of western settlement. Settlers quickly discovered that springtime snowmelt and late summer thunderstorms transformed their wheat and oat fields into a patchwork of marshes, sloughs, and wet prairies. The Valley's flat topography, paucity of natural outlets, and meandering watercourses, which regularly overflowed their banks and created sprawling marshes, frustrated the best efforts of ordinary settlers and local institutions to drain the land. At first, desperate settlers asked the St. Paul, Minneapolis & Manitoba Railroad (SPM&M), the predecessor of the Great Northern Railway, to provide drainage outlets for farmers. The SPM&M's system of drainage ditches failed abysmally, flooding the homes, pastures, and fields of several dozen farmers. As a result, the SPM&M disavowed future responsibility for drainage and dismantled many of its ditches. Finally, Valley farmers and regional business leaders led a grassroots uprising, which the SPM&M later assisted, demanding that the state of

Minnesota live up to its responsibilities under the Swamp Land Acts by appropriating state funds for drainage. In 1893, the lobbying campaign yielded results and the state created the Red River Valley Board of Audit to channelize and improve the Valley's watercourses and help drain the land. The grassroots campaign illustrates that Midwestern farmers deemed land drainage just as important of a state function as the regulation of transportation and financial corporations. Just as the late nineteenth and early twentieth century national state expanded to accommodate farmers' demands for the regulation of railroads and financial houses, so, too, did state and local governments grow to accommodate their demands for a drained landscape.

Chapter 5 looks at the one of the most significant, yet overlooked, events of the Progressive conservation movement. By the early 1900s, Americans concluded that enlightened land stewardship included draining wetlands in addition to irrigating western deserts, curtailing the destruction of forests, and regulating private economic activities on western public lands. By 1904, southern and Midwestern congressmen openly questioned why Congress had subsidized western irrigation using public land revenue but not wetlands drainage. Wetlands presented a public health menace and economic threat no less troubling than irrigation. They demanded that Congress divert money from the fund dedicated to building western irrigation projects to wetlands drainage. Fearful that the proposals would jeopardize the completion of unfinished western irrigation projects, western farmers and communities fiercely opposed the diversions. Proponents of the nationalization of drainage responded by rallying around the proposals of Congressman Halvor Steenerson, a second-term Republican from Minnesota who, in the 1880s, participated in the Red River Valley drainage movement, and Senator Frank P. Flint, a

one-term Republican from California. The proposal sought to put drainage on the same footing as western irrigation. In 1908, the campaign for drainage faltered due to bureaucratic rivalries, partisan politics, sectionalism, and American federalism. The setback dealt a crippling blow to the movement for a national drainage program. Supporters of nationalized irrigation never recovered from this defeat and, prior to World War I, could not recapture enough momentum to bring another nationalization bill to the floor of either the House or Senate.

By 1912, Frederick H. Newell, the second director of the Reclamation Service (1907-1914), harbored misgivings about the wisdom of the irrigation-centered model of federal reclamation. Newell slowly came to believe that federal reclamation should have started with Midwestern and southern swamps and then moved on to western irrigation only as population pressures demanded. Settling American land seekers on drained swamps was cheaper than building mammoth dams and might have alleviated many of the problems that reclamation project farmers encountered. Wetlands were closer to major population centers, transportation hubs, and existing social institutions such as churches and schools. Newell's disillusionment symbolized the shattered dreams and hopes of the nation's first generation of federal environmental reformers who had invested so much time, energy, and hope in making the reality of cheap irrigated farms available to Americans. As Newell reluctantly admitted, irrigation had failed as a panacea for the nation's social ills while drainage might have succeeded.

* * * * *

For the sake of clarity, it is worth making a couple of general comments about the terminology employed in this study. First, it preserves the original historical context of

the word “drainage.” Nineteenth- and early twentieth-century Americans used the term to describe any action that modified the land with the goal of eliminating noncirculating surface waters such as draining swamps, drying out waterlogged soils, straightening and channelizing watercourses to prevent overflows, and building levees to prevent floods. Although Americans historically used the terms drainage and “reclamation” interchangeably, this study will use “drainage” to differentiate the action of draining wetlands from irrigation, which was often described as the reclamation of arid lands. Second, since the 1950s, scientists have lumped different landscapes characterized by a seasonal or permanent abundance of surface water, hydric soils, and hydrophytic vegetation under the general heading of “wetland.” Swamps, bogs, marshes, wet prairies, prairie potholes, everglades, tule lands, estuaries, and so forth are examples of specific wetland ecosystems. Historically, Americans preferred “swamp” or “marsh” to describe any number of wetlands and rarely used the term “wetland.” The fact that Americans regarded wetlands as wastelands that served no redeeming purpose other than poisoning the atmosphere and inhibiting agriculture made it easy for Americans to describe such landscapes with imprecision and ambiguity.

CHAPTER 1: "VAST FACTORIES OF THIS FEBRILE POISON": AMERICAN WETLANDS AND EIGHTEENTH-CENTURY ATMOSPHERIC REFORM, 1750-1820

In the history of Western Civilization, few landscapes have inspired more fear, abhorrence, and distrust than wetlands. Until very recently, people have blamed wetlands of all forms and varieties—bogs, coastal estuaries, fens, marshes, peat lands, prairie potholes, sloughs, swamps, tule lands, and wet prairies to name just a few—for causing fevers, poisoning the atmosphere with "miasmas," and disrupting commerce and agriculture. Europeans from antiquity forward despised wetlands for impeding travel, depressing property values, locking otherwise productive land out of cultivation, facilitating the growth of strange and noxious weeds, and providing sanctuary for harmful predators, reptiles, and stinging microorganisms.

Medieval Christians popularized the myth that wetlands were evil, sinister, and forbidding. In Medieval Christian literature, stagnant water, oozing mud, darkness, humidity, and the putrid smells associated with swamps and bogs were part of the iconography of hell. The seventeenth-century English poet John Milton embraced this tradition by imagining swamps as Satan's personal stomping ground. In contrast, the freshness, limpidity, and sweet aroma of flowing springs and gentle brooks symbolized God's goodness and grace. By demonizing swamps as the den of reprobate sinners and Lucifer himself, Medieval Europeans implied that honorable and lawful Christians should avoid the corruption of fetid stagnant waters.[1]

[1]Piero Camporesi, *The Fear of Hell: Images of Damnation and Salvation in Early Modern Europe*, trans. Lucinda Byatt (University Park: Pennsylvania State University Press, 1991), 15-6; and Kate

This chapter will show how the vilification of wetlands reached a fever pitch during the age of Enlightenment and eventually shaped American environmental thinking. During the eighteenth century, European physicians revived the ancient Hippocratic medical tradition attributing the onset of certain diseases to marshes and poorly-drained lowlands. According to physicians, decomposing vegetable and animal matter in swamps and marshes released miasmas into the atmosphere which, after being inhaled or absorbed by the skin, disrupted or weakened the body's normal functioning, prompting fevers, other physical maladies, and possibly even death. At the same time, a growing number of European physicians, chemists, and natural historians studied the association between air, weather, and disease using new apparatuses such as the barometer, hygrometer, thermometer, and eudiometer. Their discoveries legitimized the idea that the elimination of miasmatic sources could improve public health. Inspired by the Enlightenment's confidence and optimism, physicians recommended draining marshes, filling lowlands, culling forests, and cleaning up the rot and filth of cities to reform the atmosphere. The result of these efforts, atmospheric reformers concluded, would be less suffering, an increase in life expectancy, and fewer epidemics.

North American wetlands, which are the focus of this study, were at the center of this unfolding epidemiological drama. During the eighteenth century, the celebrated French naturalist Georges-Louis Leclerc, Comte de Buffon, theorized that miasmatic marshes dominated North America's geography. The continent's pervasive wetness, which he attributed to a recent transcontinental flood, produced biological and atmospheric oddities: North American quadrupeds were smaller than their Old World

---

Rigby, *Topographies of the Sacred: The Poetics of Place in European Romanticism* (Charlottesville: University of Virginia Press, 2004), 202-3.

counterparts, imported animals atrophied and degenerated, insects and unwanted reptiles proliferated, and unwholesome miasmas saturated the air. Coinciding with the revival of ancient medical theories originally articulated by the Greek physician Hippocrates, the critique stigmatized North America as a pathogenic continent unfit for human habitation.

Americans met the challenge of Buffon's disparaging remarks by launching their own campaign for atmospheric reform. Influenced by the Hippocratic revival and breakthroughs in pneumatic chemistry, North American physicians assimilated the latest European scientific discoveries into a public discourse emphasizing the nexus between bad air and endemic disease. Physicians celebrated how intensive European-style land use helped purify the air. As settlers drained wetlands, chopped down forests, eliminated the native vegetation, and cultivated land, the soil dried out and the atmosphere was decontaminated. Thomas Jefferson's cherished yeomen farmers were more than the vanguard of western settlement and source of the young nation's virtue and republican values: they redeemed America's atmosphere from its wretched, brutish, and unhealthy condition. Wetlands drainage evolved into a patriotic obligation designed to establish the country's habitability and repudiate Buffon's wrongheaded theories.

Environmental historians have offered many theories about why Americans developed such an intense hostility towards wetlands. In most cases, they interpret wetlands from the perspective of economics, commerce, and agrarianism. Wetlands hindered crop production on otherwise arable lands, disrupted travel, depressed property values, impeded the distribution of commodities, provided habitat for predators that preyed on livestock, and occasionally overflowed adjacent farms and plantations. As the United States' population grew during the nineteenth and early twentieth centuries,

historians argue, drainage became an important social tool to open up more farmland, revive the nation's agrarian heritage, and offset problems related to industrialized urban life. Yet the impetus to drain wetlands *initially* took form in response to collective fears about the deleterious impact of wetlands (and the miasmas they produced) on public health. Other factors dealing with commerce and social anxieties emerged much later and only served to reinforce prejudices inherited from Europe. Scholars of American wetlands have largely ignored how the eighteenth-century revival of Hippocratic medical theories and revolution in pneumatic chemistry established the destruction of wetlands as an essential element of enlightened environmental management. Like their European counterparts, American physicians identified wetlands as a pestilential landscape and the primary source of rural atmospheric contamination. In a country afflicted by endemic malaria and recurrent yellow fever outbreaks, miasmatic explanations of disease held a powerful sway on the public imagination. By 1820, Americans sought to eliminate wetlands because they were the only landscapes capable of sickening or killing by the simple virtue of their existence.[2]

The Hippocratic Corpus

Eighteenth-century theories of disease etiology had their historical roots in ancient Greece. The Hippocratic Corpus, a series of works attributed to the Greek healer

[2] The best historical surveys of American wetlands provide only a superficial and cursory discussion of how neo-Hippocratic physicians and miasma shaped national attitudes towards wetlands: Hugh Prince, *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes* (Chicago: University of Chicago Press, 1997); Jeffrey K. Stine, *America's Forested Wetlands: From Wasteland to Valued Resource* (Durham: Forest History Society, 2008); and Ann Vileisis, *Discovering the Unknown Landscape: A History of America's Wetlands* (Washington: Island press, 1997). William B. Meyer correctly argues that by "far and the away the most important reason for the widespread dislike and fear of wetland in 17th-, 18th-, and 19th-century North America was their association with disease." See Meyer, "From Past to Present: A Historical Perspective on Wetlands," in *Wetlands*, eds. Shareon L. Spray and Karen L. McGlothlin (Rowman & Littlefield Publishers, Inc., 2004), 91.

Hippocrates of Cos (circa 460-377 B. C. E.) and his followers, correlated the onset of fevers and epidemics with specific environmental conditions, personal habits, and physical constitutions. Many of the Corpus's seminal works—*Air, Waters, Places*, the first and third books of *Epidemics*, the *Regimen*, *On Humors*, *Internal Affections*, and *On the Nature of Man*— emphasized the association between pure air and good health, which depended on maintaining a proper balance of the body's four humors. Early Hippocratic practitioners believed that an amalgam of four humors (blood, phlegm, black bile, and yellow bile) constituted the human body. Illness and disease resulted when impure airs, such as "miasmas" or "miasmatas," disrupted the humors' equilibrium. The precise nature and composition of miasma is hard to define. In general, miasma referred to contaminating or polluting substances released into the atmosphere through various sources: stagnant waters, putrefying vegetable and animal matter in swamps and marshes, human excrement, decaying corpses, and subterranean gases discharged through openings on earth's surface. Hippocratic practitioners speculated that offensive odors indicated the presence of miasmatic concentrations.[3]

The Hippocratic tradition elevated disease avoidance and treatment above prevention. Since diseases stemmed from particular locations, traveling Greek physicians were expected to learn the topographical features and prevailing wind patterns of the communities they visited. Elevation, offensive odors, fog, heat, humidity, moisture, soil composition, sunlight, winds, and *especially* the fetid waters of marshes, swamps, and

[3] There is a voluminous literature on Hippocrates and the Hippocratic Corpus. I have relied on Clarence J. Glacken, *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century* (Berkeley: University of California, 1967), 80-8; Caroline Hannaway, "Environment and Miasmata," in *Companion Encyclopedia of the History of Medicine*, eds. W. F. Bynum and Roy Porter (London: Routledge, 1993), 1:292-95; and Roy Porter, *The Greatest Benefit to Mankind: A Medical History of Humanity* (W. W. Norton and Company, 1997), 55-62.

fens determined a place's epidemiological qualities. Proximity to swamps, sodden soils, and torpid waters, for instance, triggered humoral disruptions and fevers. Distant from wet lowlands and serviced by flowing springs, elevated villages enjoyed wholesome airs uncorrupted by miasma. James C. Riley observes that the Hippocratic tradition suffered from a pessimistic "fatalism." Although Greek physicians treated fevers by administering barley water, hydromel (a mixture of water and honey), or oxymel (vinegar and honey), they considered themselves powerless to eliminate the environmental sources of disease. Humans were the captives of their environments. Within the Hippocratic tradition, the avoidance of miasmatic sources remained the best technique for eluding seasonal fevers.[4]

The Hippocratic Corpus stigmatized wet landscapes as uninhabitable wastelands. As early as the second century B. C. E., Roman writers and architects invoked Hippocratic theories to encourage the isolation of towns and villages from marshes and fens. Varro warned against erecting structures adjacent to marshes because they provided habitat for tiny, invisible creatures which, after being ingested by people, prompted febrile symptoms. To preserve the health and longevity of Roman citizens, Vitruvius encouraged their segregation from miasmatic marshes. According to Columella, marshy areas imperiled health, prosperity, and agriculture since they corrupted the atmosphere and encouraged the proliferation of dangerous snakes, reptiles, and stinging insects. Columella blamed the moisture, humidity, and molds associated with marshes for ruining nearby crops and agricultural equipment. Strabo judged it foolish to build cities near lakes since high summer temperatures usually dropped water levels, leaving a patchwork

[4] On the "fatalism" of Hippocratic medicine, see James C. Riley, *The Eighteenth-Century Campaign to Avoid Disease* (London: Macmillan, 1987), ix-x. On Hippocratic treatments, see Porter, *The Greatest Benefit to Mankind*, 60-1.

of miasmatic marshes at the lake's edge. By portraying wetlands as the incubators of potent miasmas, hostile reptiles, harmful microorganisms, and suffocating humidity, Roman writers cast them as pestilential and forbidding wastelands.[5]

Ancient Greek and Roman writers established a powerful set of dichotomies about water's role in nature and society. Circulating waters in watercourses symbolized life, hope, longevity, and refreshment. Stagnant waters in fens and marshes represented death, despair, and decay. Rivers signified health and purity while marshes denoted sickness and contamination. The limpid waters of brooks and streams were invigorating and therapeutic while turbid fen waters were enervating and foul. As "liminal zones" where water and land intermingled and surrounding airs were defiled, wetlands indicated nature's imperfection and flaws. Water properly belonged in circulating streams, creeks, and brooks where movement precluded the formation of miasma. Greco-Roman authors thus forged a stark dualism between humanity and noncirculating waters that later Europeans (and Americans) appropriated for their own purposes.[6]

The 18th-Century Hippocratic Revival

In the late seventeenth century, European physicians began to revive the Hippocratic concept of an environment-disease nexus while abolishing the premise that illnesses could not be prevented. By the 1750s, confident physicians boasted that enlightened societies could liberate themselves from disease by identifying and

[5] Frederico Borca, "Towns and Marshes in the Ancient World," in *Death and Disease in the Ancient World*, eds. Valerie M. Hope and Eireann Marshall (London: Routledge, 2000), 74-84.

[6] Frederico Borca, "*Palus Omni Modo Vitanda:* A Liminal Space in Ancient Roman Culture," *The Classical Bulletin* 73 (1997): 3-12, esp. 7; and Borca, "Towns and Marshes in the Ancient World," 74, 78, and 81.

eliminating miasmatic sources. Humans could become the masters of their environment. Disease prevention emerged as the hallmark of a "new Hippocratism" which flourished in eighteenth-century Europe (and especially the British Isles).[7]

Renewed curiosity about the influence of air and weather on human health, character, and physical development encouraged the Hippocratic renaissance. Beginning in the late 1600s, English physicians, natural philosophers, and other intellectuals, influenced by the "New Science's" experimental methodology, encouraged the systematic observation and recording of atmospheric phenomena for largely medical purposes. Physician Thomas Sydenham's (1624-1689) inquiry into the relationship between seasonal diseases and weather changes in London in the 1660s-70s using climatic observations jumpstarted the Hippocratic project. Other Englishmen followed Sydenham's lead. In 1666, John Locke (1632-1674) started a weather diary, recording atmospheric pressure, rain, temperature, and wind. Christopher Wren (1632-1723), one of the Royal Society of London's founding members, instructed society physicians to submit annual reports describing prevailing diseases and meteorological conditions. In 1723, James Jurin (1684-1750), a physician and secretary of the Royal Society, invited men of learning to submit meteorological observations to the society and to chart the seasonal rhythms of disease. In 1731, physician Francis Clifton touted the usefulness of quantitative tables in cataloguing local weather and disease variations. Probing the relationship between the atmosphere and human health, physicians believed, would shed

[7] Mary Lindemann, *Medicine and Society in Early Modern Europe* (Cambridge: Cambridge University Press, 1999), 179-80.

new light into the etiology of disease and push medicine beyond its hitherto speculative and theoretical footing.[8]

The growing availability of weather instruments and the Royal Society's patronage spurred on the Hippocratic project. Eighteenth-century British citizens enjoyed unprecedented access to new apparatuses including barometers, hygrometers, thermometers, and wind and rain gauges. Standardized instrumentation facilitated the measurement of meteorological events with the precision demanded by Enlightenment standards. Dedicated to the pursuit of natural philosophy, the Royal Society encouraged the meticulous documentation of barometric pressure, humidity, temperatures, wind patterns, and precipitation levels. The Society disseminated measurements from domestic and overseas weather diarists in its influential journal, the *Philosophical Transactions*, thereby enlisting meteorology as medicine's servant. From 1735-80 surgeons and physicians comprised 25% of the Royal Society's membership and several held the prestigious secretaryship: Jurin (1721-1727), William Rutty (1728-1730), Cromwell Mortimer (1730-1752), and Matthew Maty (1765-1784).[9]

Pneumatic chemistry made invaluable contributions to physicians' quest to catalog the environmental sources of disease. Until the third quarter of the eighteenth century, most men of learning believed that the atmosphere was a single substance instead of an assortment of gases. Cracks emerged in this theory with the 1766, 1772, and 1774 discoveries of nitrogen, hydrogen, and "dephlogisticated air" (oxygen). The

[8] James H. Cassedy, "Meteorology and Medicine in Colonial America: Beginnings of the Experimental Approach," *Journal of the History of Medicine and Allied Sciences* 24 (1969): 193-204, esp. 194-6; Jan Golinski, *British Weather and the Climate of Enlightenment* (Chicago: University of Chicago Press, 2007), 140-50; and Hannaway, "Environment and Miasmata," 296-8.

[9] Golinski, *British Weather and the Climate of Enlightenment*; and Andrea Rusnock, "Hippocrates, Bacon, and Medical Meteorology at the Royal Society, 1700-1750," in *Reinventing Hippocrates,* ed. David Cantor (Aldershot, Hampshire: Ashgate Press, 2002), 136-53.

identification of oxygen was especially meaningful because of its classification as a gas of remarkable purity. Prior to mid-century, European chemists had subscribed to a theory of combustion pioneered by Johann Joachim Becher (1635-1682) and elaborated by Georg Ernst Stahl (1660-1734). The Phlogiston theory held that combustible substances were made up of three kinds of earth: *terra lapidea* (vitreous), *terra mercurialis* (mercurial), and *terra pinguis* (fatty). According to Becher, inflammable substances contained large portions of *terra pinguis*, which Stahl later renamed "phlogiston." When fire consumed a substance like charcoal, phlogiston was released into the air, leaving behind only ash residue. Phlogistonists located the principal of combustion (as well as calcination and respiration) in the chemical composition of objects, and not air. In 1774, the English chemist Joseph Priestley (1733-1804) uncovered that heating the red calx of mercury produced an unadulterated kind of air bereft of phlogiston. Priestley's "deflogisticated air" was pure, light, and produced a refreshing feeling in his lungs. One year later the French chemist Antoine-Laurent Lavoisier (1743-1794) identified deflogisticated air as oxygen.[10]

Knowledge that the atmosphere contained gases of varying wholesomeness had obvious medical implications. Quantifying aerial purity levels promised to help unravel the mysteries surrounding air's role in promoting the onset of certain diseases. Until the development of effective instrumentation, however, physicians had to rely on their sense of smell to discern the presence of undesirable airs (such as miasma). The invention of the eudiometer (Greek for "measure of good air"), an apparatus designed to measure air

[10] Thomas L. Hankins, *Science and the Enlightenment* (Cambridge: Cambridge University Press, 1985), 94-5; Aaron J. Ihde, *The Development of Modern Chemistry* (New York: Harper & Row, 1964), 29-30; Porter, *The Greatest Benefit to Mankind*, 254; and Peter J. Bowler and Iwan Rhys Morus, *Making Modern Science: A Historical Survey* (Chicago: University of Chicago Press, 2005), 61-71.

purity, equipped physicians with the scientific means to measure atmospheric quality. As one historian of science puts it, "medical and chemical traditions converge in eudiometry."[11] In the 1770s, Italians Marsilio Landriani and Felice Fontana developed marketable eudiometers that administered a nitrous air test originally formulated by Priestly to measure an air sample's purity. The test measured the wholesomeness of a given air sample by combining it with nitrous air in an enclosed container over water. After combining the sample and nitrous air, the mixture was shaken until brown fumes filled the container and were absorbed by the water. At this point, the chemist measured the volume of the remaining air and then subtracted it from the volume of the air mixture before the chemical reaction. The original sample's wholesomeness was proportional to the degree it diminished in volume: the greater the volumetric decrease, the purer the air. Pure air samples contained low phlogiston levels and better supported combustion and respiration. Eudiometry reinforced physicians' belief that elevated phlogiston levels constituted a public health menace no less hazardous than miasma. In the 1770s, physicians in Italy and England carried out "eudiometrical tours" in the countryside, measuring and comparing the aerial goodness of different locations.[12]

English Atmospheric Reform and the Control of Nature

The Hippocratic revival's central premise was that any given society's destiny was related to the purity of its atmosphere. Citizens of countries burdened by adulterated

[11] Trevor H. Levere, "Measuring Gases and Measuring Goodness," in *Instruments and Experimentation in the History of Chemistry*, eds. Frederic L. Holmes and Trevor H. Levere (Cambridge, Mass.: Massachusetts Institute of Technology Press, 2000), 105.

[12] Jan Golinski, *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760-1820* (Cambridge: Cambridge University Press, 1992), 86, 93, 117-20.

air might be subject to perpetual illnesses, display uneven temperaments, and suffer from torpor. It logically followed that civilized societies move beyond simply observing nature to controlling and imposing order on it. Atmospheric reform, which intended to achieve a disease-free society through the eradication of miasmatic sources, was a precursor to nineteenth-century sanitary and public health movements. It owed its origin to the renaissance of Greek medical theories, the dissemination of meteorological observations, the proliferation of new scientific apparatuses, breakthroughs in pneumatic chemistry, and an unwavering faith in man's ability to shape his own destiny.

Eliminating the incubators of miasma and other chemically undesirable airs was atmospheric reform's chief objective. Eighteenth-century English physicians identified common urban and rural sources of miasma. Unventilated homes, cellars, cemeteries, crowded prisons, narrow city streets, tanneries, butcher shops, hospitals, barracks, markets, slaughter houses, and open sewers poisoned the atmosphere of cities with effluviums. The unimproved countryside was an even more potent generator of the deadly poisons. Decomposing vegetable matter and stagnating water in swamps, fens, marshes, floodplains, sodden soils, and slow-moving streams discharged miasmas. Dense forests aggravated the problem by shielding damp soils from sunlight, blocking winds from dispersing miasmatic concentrations, and facilitating the buildup of humidity and moisture. Neo-Hippocratic physicians touted several ameliorative strategies: widening city streets, razing dilapidated buildings, properly disposing of human and animal waste, erecting spacious courtyards for air to circulate, providing cities with fresh water, draining marshes, and thinning forests.[13]

[13] Mary J. Dobson, *Contours of Death and Disease in Early Modern England* (Cambridge: Cambridge University Press, 1997), 16-7; James Rodger Fleming, *Historical Perspectives on Climate*

The preponderance of historical evidence and eudiometrical experiments suggested to physicians that marshes were the primary rural source of atmospheric contamination. Thomas Short, a Sheffield physician who compiled four decades worth of meteorological observations, singled out marsh drainage as a critical step civilized nations should take to "mend the air." In his seminal *A Comparative History of the Increase and Decrease of Mankind* (1767), Short studied bills of morality to determine which geographic locations had the purest airs. He concluded that lightly-timbered mountains and hills, situated on well-drained soils, constituted the healthiest locations. Short was less sanguine about:

> Fenny, marshy, low, wet, and long-flooded Situations; spungy, ouzing, soft, springy Ground, always wet, near to uninclosed, dry, great Woods or Forests, are all unhealthy Habitations, which often bury more than are born.[14]

In 1778, the York physician William White published his eudiometrical findings. Confirming Short's conclusions, White's eudiometer measured higher proportions of impure air in the vicinity of marshes than most other landscapes. According to the York resident, the solution was unambiguous and straightforward: "It is evident, that bogs and marshy grounds, when dry, or perfectly drained of their moisture, become healthy, and emit no noxious exhalations."[15]

Change (New York: Oxford University Press, 1998), 11-32; Golinski, *British Weather and the Climate of Enlightenment*, 139-40, 155, 158-9, 168, 185; and Riley, *The Eighteenth-Century Campaign to Avoid Disease*, ix-xiii, 89-112.

[14] Thomas Short, *A Comparative History of the Increase and Decrease of Mankind in England, and Several Countries Abroad, according to the Different Soils, Situations, Business of Life, Use of the Non-Naturals, &c. Faithfully Collected from, and Attested by, above Three Hundred Vouchers, and Many of Them for a Long Course of Years, in Two Different Periods. To which is Added, a Syllabus of the General States of Health, Air, Season, and Food for the Last Three Hundred Years; and also a Meteorological Discourse*, (London: W. Nicoll, 1767), 57. See Golinski, *British Weather and the Climate of Enlightenment*, 63, 158.

[15] William White, "Experiments upon Air, and the Effects of Different Kinds of Effluvia upon it; Made at York," *Philosophical Transactions of the Royal Society of London* 68 (1778): 214.

Two factors lent urgency to English atmospheric reform. First, during the 1700s, the "culture of sensibility" transformed British middle-class life as individuals developed polished manners, refined tastes, and a heightened awareness of their feelings. As the middle classes adorned themselves in lavish clothing, indulged in tea and coffee, took extravagant carriage rides, and played indoor card games, physicians worried that they might become too "soft" or effeminate, unwittingly increasing their susceptibility to miasmas. Loose and luxurious living threatened to make the middle classes just as vulnerable to bad airs as the urban poor wallowing in squalor and overcrowded slums. Should modern conveniences prove too alluring for people to resist, atmospheric reform would become indispensable to society's welfare.[16]

Second, overseas imperialism increasingly brought British subjects into contact with different climates and supposedly unhygienic atmospheres. For several decades scholars have described the transoceanic transmission of disease during the age of imperialism as a one-way phenomenon, with Europeans introducing maladies as diverse as bubonic plague, chickenpox, cholera, diphtheria, dysentery, influenza, malaria, measles, scarlet fever, smallpox, trachoma, and whooping cough to New World indigenous populations. The demographic consequences of the introduction of Old World diseases were indisputably tragic and irrevocable. "Virgin soil epidemics" decimated New World Indian communities and aided Europeans in expropriating their land. Indeed, as seventeenth-century English colonists witnessed Indians succumb to one virgin soil epidemic after another, they concluded that English bodies were stronger and

[16] Golinski, *British Weather and the Climate of Enlightenment*, 138-9, 152-7. On the specific association in Britain of fevers and epidemics with the urban poor, see John V. Pickstone, "Dearth, Dirt and Fever Epidemics: Rewriting the History of British "Public Health," 1780-1850," in *Epidemics and Ideas: Essays on the Historical Perception of Pestilence,* eds. Terrence Ranger and Paul Slack (Cambridge: Cambridge University Press, 1992), 125-48.

more robust than their Indian counterparts. The Hippocratic revival chipped away at the belief in English corporeal superiority by emphasizing that Europeans' susceptibility to exotic diseases increased in proportion to the distance they strayed from their home climates (which were understood as constant across latitudes) and in their proximity to certain undeveloped landscapes. The Hippocratic renaissance thus taught colonial administrators, Creole physicians, and colonists that purifying colonial atmospheres by introducing European land use techniques was the only way to ensure that the bodies of English soldiers and colonists overseas retained their epidemiological superiority.[17]

Soggy and Miasmatic North America

North America's allegedly unwholesome atmosphere made the continent an ideal laboratory to test the effectiveness of atmospheric reform. The Hippocratic revival coincided with a scholarly dialogue in Europe about North America's environment. During the third quarter of the eighteenth century, the French naturalist Georges-Louis Leclerc, Comte de Buffon, popularized the idea that miasmatic marshes dominated the continent's topography. In his verbose 44-volume *Histoire naturelle*, Buffon insisted that

[17] The best study of the application of British atmospheric reform to overseas colonies is Alan Bewell, *Romanticism and Colonial Disease* (Baltimore: Johns Hopkins University Press, 1999). For an analysis of English colonists' fears of settling in a different latitudinal zone, see, for instance, Karen Ordahl Kupperman, "Hot Climates in the Anglo-American Colonial Experience," *William and Mary Quarterly*, 3rd series, 41 (April 1984): 213-40; and Kupperman, "The Puzzle of the American Climate in the Early Colonial Period," *American Historical Review* 87 (December 1982): 1262-89. There is a large literature on the demographic consequences of the introduction of European diseases in the New World. Important works include Alfred W. Crosby, Jr., *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*, 2nd ed. (Cambridge: Cambridge University Press, 2004), chapter 9; Crosby, "Virgin Soil Epidemics as a Factor in the Aboriginal Depopulation of America," *William and Mary Quarterly*, 3rd series 33 (April 1976): 289-99; Jared Diamond, *Guns, Germs, and Steel: The Fate of Human Societies* (New York: W. W. Norton & Co., 2005); and Russell Thornton, *American Indian Holocaust and Survival: A Population History Since 1492* (Norman: University of Oklahoma Press, 1987). On the perceived superiority of English bodies during the seventeenth century, see Joyce E. Chaplin, *Subject Matter: Technology, the Body, and Science on the Anglo-American Frontier, 1500-1676* (Cambridge, Mass.: Harvard University Press, 2001), 9, 15, 157-98.

North America, just prior to its discovery, began to recover from a transcontinental flood. As a result, long stretches of marshes and swamps, towering forests, impenetrable undergrowth, and a frigid and miasmatic atmosphere predominated. Buffon hypothesized that the deluge had a degenerative impact on North America's flora and fauna. The continent had fewer large quadrupeds than the Old World, little species diversity, sluggish and slothful small animals, and swarms of insects and reptiles, which thrived in marshy and cool conditions. Viewing large quadrupeds as a yardstick for nature's vitality, Buffon deplored that camels, dromedaries, giraffes, hippopotamuses, and lions were nowhere to be found in North America. The chilly and wet climate produced an indolent, sickly, and unimpressive natural order:

> In this state of abandon, everything languishes, decays, stifles. The air and the earth, weighed down by the moist and poisonous vapors, cannot purify themselves nor profit from the influence of the star of life. The sun vainly pours down its liveliest rays on this cold mass, which is incapable of responding to its warmth; it will never produce anything but humid creatures, plants, reptiles, and insects; and cold men and feeble animals are all that it will ever nurture.[18]

European intellectuals embraced the eminent naturalist's critique. In his *Recherches philosophiques sur les Américains*, the Dutchman Cornelius de Pauw ridiculed North America as an uninterrupted marsh plagued by a "fetid and boggy terrain."[19] British natural philosophers eagerly contrasted their country's salubrious climate with that of North America. In 1767, Adam Ferguson explained that "the climates of America … are observed to differ from those of Europe. There, extensive marshes, great lakes, aged, decayed, and crowded forests, with the other circumstances

---

[18] Antonello Gerbi, *The Dispute of the new World: The History of a Polemic, 1750-1900*, trans. Jeremy Moyle (Pittsburgh: University of Pittsburgh Press, 1973), 3-14, quote on 7-8; and Glacken, *Traces on the Rhodian Shore*, 680.

[19] Quoted in Philippe Roger, *The American Enemy: A Story of French Anti-Americanism*, trans. Sharon Bowman (Chicago: University of Chicago Press, 2005), 7.

that mark an uncultivated country … replenish the air with heavy and noxious vapours [sic.]."[20] William Robertson's popular *History of America* captured the mood by insisting that "prodigious marshes overspread the [North American] plains."[21]

The Hippocratic tradition stigmatized marshes as unhealthy, unnatural, and pestilential—the rural equivalent of crowded urban slums littered with human and animal excrement. Heirs to this tradition, English North American colonists gloomily recognized the implications of Buffon's thesis: living in North America was akin to living in a crowded, filthy, and pestiferous European city. As an unavoidable reality of human existence, air for the first time in history became regarded as a vital natural resource. Colonists (and later Americans) naturally developed a profound anxiety about the quality of the air surrounding their cities, homes, and farms. Unless human action reformed the atmosphere, questions would linger about the long-term potential of European settlement in North America. What if the stigma of North America's miasmatic atmosphere disrupted the tide of European emigration? What if prolonged exposure to bad air sapped Americans' industriousness, returning them into a state of nature? What if recurrent fever outbreaks and other atmospheric marvels—such as hurricanes, tornadoes, intense lightning storms, and waterspouts—were the products of aerial contamination? Benjamin Franklin's iconic experiments with lightning lent credibility to some Europeans' suggestions that America's atmosphere was as electrically

[20] Quoted in Ralph N. Miller, "American Nationalism as a Theory of Nature," *William and Mary Quarterly*, 3rd series, vol. 12 (January 1955): 79.

[21] Quoted in Gilbert Chinard, "Eighteenth Century Theories on America as a Human Habitat," *Proceedings of the American Philosophical Society* 91 (February 1947): 38.

supercharged as it was miasmatic. Fortunately for colonists, Europe's Hippocratic revival offered strategies and methods for reforming contaminated atmospheres.[22]

American Atmospheric Reform

During the second half of the eighteenth century, Americans developed a program of atmospheric reform modeled after its British predecessor but tailored to New World circumstances. Unlike its British counterpart, which emphasized protecting an increasingly vulnerable middle class from adulterated airs, American reform intended to allay European anxieties about North America's atmosphere, publicize strategies for improvement, and develop a compelling narrative explaining why the continent suffered from bad air. Carried out in the pages of learned journals, medical discourses, and in the halls of learned institutions such as the American Philosophical Society, American atmospheric reform constituted an elite-directed crusade carried out at the grassroots. Optimistic and forward looking, the program sought to establish that ordinary settlers and farmers, through clearing the land, draining marshes, and cultivating the soil, had already improved the atmosphere's quality. The cumulative impact of thousands of unaffiliated farmers and local communities working towards a single goal—atmospheric improvement—would, in time, provide all Americans with universal access to pure air.

Physicians spearheaded the campaign of atmospheric reform.[23] They used two justifications. First, breakthroughs in European medicine and pneumatic chemistry were

[22] For an insightful discussion of early Americans' anxiety about their natural environment, see Gordon Wood, *The Rising Glory of America, 1760-1820*, rev. ed. (Boston: Northeastern University Press, 1990), 15-20. On the atmospheric wonders of the New World, see James Delbourgo, *A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America* (Cambridge, Mass.: Harvard University Press, 2006), 50-1, 237-8; and Peter Eisenstadt, "The Weather and Weather Forecasting in Colonial America," (PhD diss., New York University, 1990), 41-55.

useless unless accessible to the wider public. Promoting themselves as the purveyors of scientific knowledge, physicians educated the public about the medical dangers of leaving the continent unexploited and its marshes undrained. Second, physicians explained why North America's airs were so befouled. The only problem with North America's atmosphere, the narrative insisted, was that Indians, and not industrious and enlightened Europeans, had inhabited the continent during the past few centuries. The narrative invoked the usual litany of disparaging and racist criticisms of Indians' character, work ethic, and aversion towards economic progress in vogue since the seventeenth century. According to this critique, the refusal of Indians to heed the Christian injunction to "subdue the earth"—broadly interpreted as practicing sedentary agriculture, owning property, raising livestock, and selling natural resources like timber or furs for a profit—made them unworthy of possessing the land. Clothing an old argument in new clothes, physicians argued that human consumption constituted the most enlightened use of natural resources. Culpability for North America's miasmatic atmosphere thus rested with the inherent shortcomings of the continent's previous occupants and not the air itself. After 1750 physicians claimed that the wholesomeness of air increased in proportion to the degree people cultivated the land, drained off surface

[23] The goal of this chapter is not to provide a historical analysis of the role of physicians in early American society, their social status, or the professionalization of medicine. My purpose is to evaluate how North American physicians weaved European medical and scientific knowledge into a public discourse vilifying marshes and deeming their destruction a prerequisite for the maintenance of public health. For those interested in a broader account of medicine's role in early American society, see Lester S. King, *Transformations in American Medicine: Benjamin Rush to William Osler* (Baltimore: Johns Hopkins University Press, 1990).

water, and cut down timber for sale on the market economy. Capitalism and atmospheric reform thus went hand in hand.[24]

A Narrative of Progress

In order to prove that North America's pathogenic condition was not beyond repair, physicians sought to demonstrate, first, that local outbreaks of fevers were due to a lack of human activity and, second, that aerial improvement was inevitable and inexorable. Cadwallader Colden was the first North American physician to use neo-Hippocratic medical theories to explain a local disease outbreak. Born in 1688 in Ireland to Scottish parents, Colden received the Edinburgh baccalaureate in 1705 and then studied anatomy, botany, and chemistry for three years in London. In 1710, Colden moved to Philadelphia and practiced medicine for a decade before becoming New York's surveyor general. In 1721, he accepted an appointment into the governor's council, a position he held for 55 years.[25] In 1743, Colden attributed a series of "epidemical distemper" outbreaks in New York City to "noxious vapors" arising from the "moist slimy ground" of undeveloped marshes. "Stagnating waters," Colden maintained, "have been infamous from all antiquity for their noxious quality, and for that reason by the ancient poets described under the representation of the hydra, throwing out a poisonous

[24] The medical and religious basis of English colonists' belief in the superiority of European land exploitation are explained in David Armitage, *The Ideological Origins of the British Empire* (Cambridge: Cambridge University Press, 2000), chap. 3; Bewell, *Romanticism and Colonial Disease*; William Cronon, *Changes in the Land: Indians, Colonists, and the Ecology of New England* (New York: Hill and Wang, 1983); and Carolyn Merchant, *Ecological Revolutions: Nature, Gender, and Science in New England* (Chapel Hill: University of North Carolina Press, 1989).

[25] See Saul Jarcho, "Cadwallader Colden as a Student of Infectious Disease," *Bulletin of the History of Medicine* 29 (March-April 1955): 99-115.

deadly breath."[26] Preventing future epidemics required decisive action. First, Colden recommended draining all undeveloped marshes, swamps, and stagnant ponds within city limits. In support of his argument, he cited the resourcefulness of Bristol, Pennsylvania, residents. Located northeast of Philadelphia on the Delaware River, Bristol's founders built the town near a large swamp. During its formative years, town residents complained of recurrent annual fevers until they drained the swamp. If New York drained its marshes, cleaned up the filth littered around riverfront docks, and constructed public drains to convey street waste into nearby rivers, it would purify its atmosphere and reduce the incidences of fevers.[27]

Deforestation constituted the other half of Colden's formula for atmospheric improvement. Lands stripped of timber promoted the circulation of refreshing sea breezes and diluted miasmatic concentrations. Colden's suggestion anticipated later eudiometrical experiments that measured sea breezes to be of a higher quality than airs in the vicinity of crowded urban streets or marshes. According to Colden, long-time residents supported his theory that the settler's axe had moderated atmospheric conditions. "The climate grows every day better as the country is cleared of the woods, and more healthy, as all the people that have lived long here testify. …I therefore doubt

[26] Cadwallader Colden, "Observations on the Fever which prevailed in the City of New-York in 1741 and 2, written in 1743, by the late Hon. Cadwallader Colden. Communicated to Dr. David Hosack by C. D. Colden, Esp.," *The American Medical and Philosophical Register; or, Annals of Medicine, natural history, agriculture, and the arts* (July 1810): 324, 320.

[27] Ibid., 323, 325-6.

not but it will in time become one of the most agreeable and healthy climates on the face of the earth."[28]

Over the next few decades, physicians and other colonists marveled at how the spread of European-style land exploitation across the colonies slowly decontaminated the atmosphere. In 1769, New Jersey's Edward Antill informed the American Philosophical Society that land drainage, deforestation, and cultivation had improved the quality of the air. "Whoever compares the present state of the air," Antill explained, "with what i[t] was formerly, before the country was opened, cleared and drained, will find that, we are every year fast advancing to that pure and perfect temperament of air."[29] In a 1770 paper read before the Society, physician Hugh Williamson identified deforestation and wetlands drainage as the principle catalysts in reducing diseases. According to Williamson, "tall timber greatly impedes the circulation of air," making it difficult for "fresh" ocean breezes to disperse miasmatic concentrations. Before the beginning of European colonization, "the face of this country was clad with woods, and every valley afforded a swamp or stagnant marsh … and [because of] a general exhalation from the surface of ponds and marshes, the air was constantly charged with a gross putrefcent [sic.] fluid."[30]

---

[28] Colden, "Account of the Climate and Diseases of New-York," *The American Medical and Philosophical Register; or, Annals of Medicine, natural history, agriculture, and the arts* (July 1810): 310. On sea breezes perceived purity, see Golinski, *British Weather and the Climate of Enlightenment*, 162-3.

[29] Edward Antill, "An Essay on the Cultivation of the Vine, and the Making and Preserving of Wine, Suited to the Different Climates in North-America," *Transactions of the American Philosophical Society* 1 (January 1769): 120.

[30] Hugh Williamson, "An Attempt to Account for the Change of Climate, Which has been observed in the Middle Colonies in North-America," *Transactions of the American Philosophical Society* 1 (January 1770): 272-80, quotes at 278, 279, and 280.

Having established that poor air quality was but a normal, and temporary, stage in the civilizing process of a new territory, colonists next attacked Buffon's theory of degeneration. The most famous and persuasive of these rebuttals came from the pen of Thomas Jefferson. In *Notes on the State of Virginia* (1785), Jefferson ridiculed the suggestion that the continent's frigid temperatures and abundance of aerial and surface moisture reduced the size and diversity of animal species. Without disputing Buffon's allegation that North America had "more waters … spread over its surface by nature, and fewer of these drained off by the hand of man," Jefferson demonstrated that the continent's animal species, as a whole, were more impressive in size, stature, and diversity than their Old World counterparts through a side-by-side comparison.[31] Jefferson also refuted Buffon's contention that North America had a cooler climate than European countries of similar latitudes. Endorsing the findings of his countrymen, Jefferson unoriginally argued that during the previous generation the climate had warmed, annual snow accumulation had decreased, and river overflows had occurred less frequently. Keeping watercourses confined within their banks was a critical strategy of atmospheric reform since it prevented floodwaters from recharging marshes and saturating dry soil, prompting the decomposition of vegetable and animal matter.[32]

Jefferson and Buffon's other American detractors always ignored that the renowned Frenchman tempered his statements about the New World's environmental

---

[31] Thomas Jefferson, *Notes on the State of Virginia*, ed. William Peden (Chapel Hill: University of North Carolina Press, 1982), 47. On Jefferson's rebuttal of Buffon's theory of degeneration, see Claudine Colden, *The Fate of the Mammoth: Fossils, Myth and History*, trans. William Rodarmor (Chicago: University of Chicago Press, 2002), chapter 5; Gerbi, *The Dispute of the New World*, 252-8; Charles A. Miller, *Jefferson and Nature: An Interpretation* (Baltimore: Johns Hopkins University Press, 1988), 61-3; and Anthony Wilson, *Shadow and Shelter: The Swamp in Southern Culture* (Jackson: University Press of Mississippi, 2005), 7-8.

[32] Jefferson, *Notes on the State of Virginia*, esp. 80.

inferiority later in life. The naturalist admitted that the industry of Englishmen was at least transforming North America from a miasmatic and frigid wasteland into a productive Eden:

> All the evidence seems to point toward the greater part of the American continent being a new land, still untouched by men, in which nature had not had time to carry out all her plans, to develop herself to the full; the men are cold and the animals small, because the ardor of the men and the size of the animals are dependent on the healthiness and the warmth of the air; in several centuries, when the earth has been tilled, the forests cut down, the rivers controlled and the waters contained, this same land will become the most fruitful, healthy, and rich of all, as it is seen to be already in parts that man has cultivated.[33]

Buffon's statement captured the cultural biases, spirit, and aspirations of atmospheric reform. Living in a state of nature, Indians had neglected the control of water and thereby condemned the air to its current pathogenic condition. Once the Indians were swept aside and replaced by a civilized and enlightened race, however, nature could reach a state of perfection.

Manmade Contamination

The pageant of atmospheric progress extolled by physicians and national elites overlooked a serious problem. By the late 1770s, a few physicians began to question whether certain modes of agriculture and economic development were themselves contributing to miasmatic contamination. In 1776, Lionel Chalmers, a Scottish physician living in Charlestown, South Carolina, singled out three economic enterprises responsible for reversing the progress of atmospheric reform: rice cultivation, indigo extraction, and milling. In a passage worthy of quoting at length, Chalmers elucidated the process by

[33] Quoted in Gerbi, *Dispute of the New World*, 14. On Buffon's optimism later in life, see Durand Echeverria, *Mirage in the West: A History of the French Image of American Society to 1815* (Princeton: Princeton University Press, 1957), 8.

which diverted and impounded waters contaminated the air. Capitalism itself was now a chief contributor to atmospheric contamination:

> In almost every settlement, much land is designedly overflowed, by stopping the water courses with strong banks of earth; whereby *reservoirs* of a good depth and extent are formed, in order to be let into the rice fields, when the plant is of a fit growth for receiving the water; for extracting the dye from the plant which yields indico [sic.]; or for mills of various forts. And, whenever these collections of water are expended in the above purposes, or they are exhaled by the sun or swept away by winds, such multitudes of fish and reptiles of various kinds perish, that, for a long time after the air is tainted, with the putrid *effluvia* that arise as well from the numberless bodies of animals, which are in the highest state of putreaction [sic.], as the muddy soil. But these pools are dangerous to health on another score: for the surfaces being but little agitated by the gentle winds that commonly blow in the summer, and no motion or fresh air being communicated to the waters at bottom, whilst the sun daily acts on them with great power, they necessarily must acquire some degree of *mephitism*. But noxious exhalations will abound still more, when the waters are nearly or quite expended—For then the sun's rays penetrating the miry soil, those vapours [sic.] that had been pent up for a long continuance of time, which, therefore, may be supposed to have contracted vicious qualities, are now set at liberty, and mix with the air we breathe.[34]

The recognition that economic progress sometimes came at an environmental cost—in this case, impure air and dead fish and reptiles—was revolutionary and threatened to throw atmospheric reform into disarray. Chalmers' somber admission that capitalism might actually threaten human welfare by contaminating the atmosphere with unwholesome substances threatened to overwhelm atmospheric reformers' initial uncritical and triumphal narrative of progress.

Like their southern counterparts, northern physicians probed the connections between economic development and impure air. Benjamin Rush, a professor of Chemistry at the University of Pennsylvania, eminent Philadelphia physician, and signatory of the Declaration of Independence, speculated that the proliferation of millponds and counterproductive strategies of atmospheric reform had *increased* the

[34] Emphases in original. Lionel Chalmers, *An Account of the Weather and Disease of South-Carolina* (London: Edward and Charles Dilly, 1776): 1:6.

incidences of bilious and intermitting fevers in Pennsylvania. In a December 1785 speech delivered at the American Philosophical Society, Rush blamed the erection of millponds, which artificially impounded running water for various economic purposes, for producing "miasmata." Embracing the Hippocratic tradition, Rush used circulation as a barometer for judging water's wholesomeness. Circulating and free flowing waters, such as those found in unobstructed rivers, creeks, and streams, posed little risk since motion inhibited the formation of miasma. Stagnant waters, such as swamps, marshes, flood waters, and lakes lacking an outlet, were unhealthy because they promoted the decomposition of vegetable and animal matter. Impounded and deprived of movement, millpond water fell into the second category and posed a risk to nearby communities.[35]

Second, Rush emphasized that physicians had overstated deforestation's capacity to purify the air. Acting as natural buffers, forests appropriated space around the perimeters of swamps, marshes, flood plains, and millponds and confined miasmatic contamination to a limited area. Before settlers cleared the forest adjacent to the Susquehanna River, Rush explained, fevers seldom afflicted people more than half a mile away. As settlers cut down the riparian trees, they unwittingly removed an obstacle to the diffusion of miasmas. As Rush wrote, settlers as far away as ten miles complained of seasonal ailments.[36] Rush contended that deforestation was only effective if it was included in a broader program:

> I beg a distinction to be made here between *clearing* and *cultivating* a country. While clearing a country makes it sickly … *cultivating* a country, that is, draining swamps, destroying weeds, burning brush, and exhaling the unwholesome or

[35] Benjamin Rush, "An Enquiry into the Cause of the Increase of Bilious and Intermitting Fevers in Pennsylvania, with Hints for Preventing Them," Transactions of the American Philosophical Society 2 (1786): 206-212, esp. 206.

[36] Ibid., 206-7.

> superfluous moisture of the earth, by means of frequent crops or grain, grasses, or vegetables of all kinds, render it healthy.[37]

The fact that the Hippocratic revival's medical theories put economic progress in conflict with public health pushed atmospheric reformers into an uncomfortable position. Physicians had the choice of either alienating emergent capitalists (millpond owners and millers) and plantation owners (southern rice and indigo producers) by demanding that they cease operations for the good of public health or offending ordinary Americans by demanding no reform. Not surprisingly, physicians resolved the tension by straddling a middle course that emphasized the mitigation of environmental hazards. As a result, Rush appropriated the recent findings of pneumatic chemistry to propose methods of reducing, rather than eliminating, the damage inflicted by manmade industries. Seizing on the 1779 discovery of Dutch physician/botanist Jan Ingenhousz that plants, during exposure to sunlight, gave off dephlogisticated air (the process now known as photosynthesis), Rush proposed encircling every millpond with trees. After reaching maturity, the trees would shield the water from sunlight, confine miasmatic contamination to a limited area, and render the air wholesome by absorbing, purifying, and then releasing "unhealthy air[s]" in a "deflogisticated" state. Willow trees were the ideal species to plant around ponds since they "purif[ied] the air the most rapidly of any tree [Ingenhousz] subjected to his experiments."[38] Tree planting was a pragmatic solution since it promoted better air quality without offending either capitalists or ordinary Americans. Indeed, for a brief time the notion that trees were the allies of atmospheric reform replaced the earlier idea of the usefulness of deforestation. In 1792,

[37] Emphasis in original. Ibid., 207.

[38] Ibid., 208-9, quotes on 209.

for instance, Jeremy Belknap boasted that the air in New Hampshire's forests was "remarkably pure. The tall and luxuriant growth which an European might call 'rank vegetation,' not only indicates strength and fertility of soil; but conduces to absorb noxious vapors."[39]

Progress Averted: The Return of Yellow Fever

In the summer of 1793, yellow fever returned to the United States after a 28 year absence. The deadliest epidemic struck Philadelphia, then the nation's political and intellectual capitol. By the time of the first frost, when the epidemic faded, more than 4,000 people—almost 10% of Philadelphia's population—were dead. The epidemic commenced a new wave of outbreaks up and down the coast mocking the progress of atmospheric reform. Every year from 1793 to 1805, yellow fever killed scores in coastal cities ranging from Portland, Maine, to Charleston, South Carolina. From 1693-1799 yellow fever claimed at least 17,088 lives in cities along the eastern seaboard and probably many more.[40]

Ordinary Americans embraced the prevailing etiological explanations for disease. Philadelphians accepted Rush's theory that the 1793 epidemic owed its origins to a "noxious miasma" produced by marshes and urban filth, waging a futile battle against the ambiguous and invisible substance. Philadelphians lit bonfires on street corners to decontaminate the air. They fired musket volleys at the elusive miasmas. They placed

[39] Jeremy Belknap, *The History of New-Hampshire,* vol. 3 *Containing a Geographical Description of the State; with Sketches of its Natural History, Productions, Improvements and Manners, Laws and Government.* (Boston: Belknap and Your, 1792), 230.

[40] K. David Patterson, "Yellow Fever Epidemics and Mortality in the United States, 1693-1905," *Social Science and Medicine* 34 (April 1992): 855-59.

tar ropes in their homes, doused floors and walls with vinegar, wore camphor bags around their necks, chain-smoked cigars, and gnawed on garlic in a desperate attempt to ward off bad airs. Affluent Philadelphians simply fled. In some communities, the new cycle of epidemics pitted local residents against millpond owners. In January 1799, for instance, Elijah Boardman and a group of New Milford, Connecticut, residents tore down part of Joseph Ruggles' dam across the Housatonic River. Boardman and his coconspirators alleged that since 1796, when Ruggles' elevated the dam ten inches, 300 New Milford citizens had fallen sick due to a mysterious fever. Blaming stagnant waters impounded by the dam for poisoning New Milford's air, angry residents justified the dam's destruction on the grounds it constituted a public health nuisance.[41]

Yellow fever's resurgence led some physicians to reevaluate marshes' pestilential nature. In a 1795 paper read before the American Philosophical Society and later published, physician William Currie suggested that the decomposition of vegetable and animal matter in marshes triggered a chemical reaction diminishing atmospheric oxygen levels. According to Curry, the eudiometrical experiments of Dutch physician Jacob Van Breda confirmed that the 18:48 ratio of oxygen to "azote" found in the vicinity of marshes was far below the normal atmospheric level of 1:3. "The causes of the unwholesomeness of low and moist situations," Currie asserted, "is not owing to any invisible miasmata or noxious effluvia, which issue from the soil and lurk in the air, but to a very different cause, viz. to a deficiency of the oxygenous [sic.] portion of the

[41] The standard account of the 1793 Philadelphia yellow fever epidemic is J. H. Powell, *Bring Out Your Dead: The Great Plague of Yellow Fever in Philadelphia in 1793* (Philadelphia: University of Pennsylvania Press, 1949). See also Alyn Brodsky, *Benjamin Rush: Patriot and Physician* (New York: Truman Talley Books, 2004), 323-33. On the events surrounding the New Milford incident, see Oliver Wendell Holmes, *Boylston Prize Dissertations for the Years 1836 and 1837* (Boston: Charles C. Little and James Brown, 1838), 55-6.

atmosphere in such situations."[42] Breakthroughs in medicine, pneumatic chemistry, and human anatomy during the previous two centuries demonstrated oxygen's centrality to cardiovascular and pulmonary functions. Starved of oxygen, bodily functions performed "imperfectly and languidly." As Currie explained, oxygen deprivation rendered the "vessels on the surface of the body powerless, and atonic [sic.]."[43] The cardiovascular system's weakened constitution made the body more susceptible to insalubrious airs. "It appears more than probable," Currie concluded, that "febrile contagion … is rendered virulent and powerful in proportion to the absence or defect of the oxygen and the degree of heat to which the living body has been exposed."[44]

Boosting oxygen levels around marshes could enhance people's resistance to febrile illnesses. Enhancing oxygen levels depended on the construction of a system of "drains, deep trenches, and wells" through marshes that conveyed stagnant surface water into running watercourses. Currie instructed physicians to encourage farmers to fill low, miry spots with clay, sand, or lime; set fire to dead and decomposing weeds, grass, and trees; and sow grasses, "plants of vigorous growth," and vegetables for the purpose of "replenish[ing] the atmosphere with oxygen."[45] Finally, farmers living near millponds or

[42] William Currie, "An Enquiry into the Causes of the Insalubrity of Flat and Marshy Situations: And Directions for Preventing or Correcting the Effects Thereof," *Transactions of the American Philosophical Society* 4 (1799): 128, 135. On Van Breda's eudiometrical experimentation, see Huib J. Zuidervaart, "An Eighteenth-Century Medical-Meteorological Society in the Netherlands, Instrumentation and Quantification. Part 2," *British Journal for the History of Science* 39 (March 2006): 55-8.

[43] Currie, "An Enquiry," 135.

[44] Ibid., 138-9.

[45] Ibid., 141.

marshes which could not be drained should plant trees to "intercept … the moisture in its progress … [and] furnish a constant supply of oxygen to the atmosphere."[46]

Disagreement over whether marshes caused febrile illnesses mirrored a larger debate within the medical community between proponents of the miasmatic theory of disease (atmospheric causation) and those of contagion (person-to-person transmission). This debate raged until the latter nineteenth century, when scientists demonstrated that mosquitoes, and not miasmas, were the true vectors of yellow fever and malaria, but most physicians and Americans accepted the miasmatic model as the predominant etiological theory of disease. In the early republic, however, the debate was inconsequential in terms of public perceptions of marshes since they were viewed as pestilential regardless of whether they (and the miasmas they produced) constituted a primary cause of disease or something that predisposed people to physical maladies.[47]

Currie's theory of oxygen starvation attracted little support. In the late 1790s, the idea that deforestation offered an effective tool of aerial reform stubbornly lingered. After visiting North America, Thomas Wright, an Irish surgeon and anatomy instructor, decided that the flat topography of the area sandwiched between the Appalachian Mountains and Atlantic seaboard precluded comprehensive drainage, leaving "evaporation" as the only alternative for destroying wetlands. According to Wright, culling the primeval forest would allow prevailing winds to "sweep the bare bottom of

---

[46] Ibid., 142.

[47] On etiological theory before the Civil War, see Erwin H. Ackerknecht, "Anticontagionism Between 1821 and 1867," *Bulletin of the History of Medicine* 22 (1954): 562-93; Phyllis Allen, "Etiological Theory in America Prior to the Civil War," *Journal of the History of Medicine and Allied Sciences* 2 (1947): 489-520; Christopher Hamlin, "Predisposing Causes and Public Health in Early Nineteenth-Century Medical Thought," *Social History of Medicine* 5 (1992): 43-70; Margaret Pelling, "Contagion/Germ Theory/Specificity," in *Companion Encyclopedia of the History of Medicine*, eds. Bynum and Porter, 309-34; and Porter, *The Greatest Benefit to Mankind*, 259, 262. Ordinary Americans' understanding of disease etiology will be discussed in later chapters.

the earth, and bear away the combining moisture."[48] He invoked Irish history to support his theory. Before English colonists introduced intensive land exploitation, Ireland, like pre-Columbian America, languished as an impenetrable, miry, and miasmatic forest. Since the United States was a "new country," its atmosphere would remain pathogenic until enough industrious Americans cultivated the soil and fanned out across the country.[49]

After the turn of the century, southern physicians decided that rhetoric had been in insufficient in reforming Georgia's miasmatic atmosphere. Organized in 1804, the Georgia Medical Society took the unprecedented step of enlisting direct government aid to curb the practice of wet rice cultivation. "With a semi-tropical climate, such as ours," the Society's charter explained, "there could be no worse or more malignant incidental cause of disease than the stagnant water, which remains on a rice field exposed to an ardent summer's sun, and the saturated soil which is next exposed, when the water is drained off."[50] In 1810, the Georgia Medical Society encouraged the Savannah city council to implement a program aimed at eliminating wet rice cultivation on the outskirts of town. In 1817, the city approved the plan, imposing taxes on white city residents to raise revenue to pay nearby rice planters to drain their property and convert to dry rice culture. The program enjoyed limited success since most cultivators, despite the subsidies, found it too costly to drain their land or convert to dry cultivation. Three years after the program's approval a yellow fever epidemic struck Savannah, killing 907

---

[48] Thomas Wright, "On the Mode Most Easily and Effectually Practicable of Drying up the Marshes of the Maritime Parts of North America," *Transactions of the American Philosophical Society* 4 (1799): 243-5, quote on 245.

[49] Ibid., 245.

[50] Quoted in Megan Kate Nelson, "The Landscape of Disease: Swamps and Medical Discourse in the American Southeast, 1800-1880," *Mississippi Quarterly* 55 (Fall 2002): 557-8.

people. The Georgia Medical Society blamed planters' dilatoriness in converting to dry culture, the slow pace of swamp drainage in the hinterland, and the absence of tree barriers outside of Savannah for the epidemic.[51]

For the first few decades of the nineteenth century, the uneven pace of wetlands drainage remained physicians' primary explanation for North America's pathogenic atmosphere. In 1802, Charles Caldwell, a student of Benjamin Rush and later founder of Louisville University's medical school, published the period's defining study on the nexus between American marshes and disease. Caldwell explained that "powerful" diseases visited the U. S. more "frequent[ly]" than Europe because of North America's "super-abundance of *marsh miasma*."[52] He recognized that the Creator had imposed undue burdens on Americans. The nation's flat topography, abundance of precipitation, suffocating heat, and raging rivers, which regularly overflowed their banks, produced long stretches of stagnant and diffused surface waters. From the coastal salt marshes along the Atlantic seaboard to the Mississippi River's riparian floodplains the United States was home to "vast factories of this febrile poison."[53]

Caldwell reasoned that the "halfway state of our agricultural improvements" explained the nation's elevated miasmatic levels.[54] Residing on low and flat sections of land, many farmers, like those outside Savannah, found it unnecessary to drain and cultivate every square foot of their property. The rural press sometimes defended farmers

---

[51] Ibid., 558-9.

[52] Emphasis in original. Charles Caldwell, *An Oration on the Causes of the Difference, in Point of Frequency and Force, Between the Endemic Disease of the United States of America, and those of the Countries of Europe, Delivered, by Appointment, to the Philadelphia Medical Society, on the Fifth Day of February, 1802* (Philadelphia: T. and William Bradford, 1802), 14, 9.

[53] Ibid., 13-9, quote on 14.

[54] Ibid., 15.

against unrealistic expectations regarding the cultural mandate of drainage. In 1820, the Baltimore-based *American Farmer* editorialized that selective house location was a viable disease prevention measure. Escaping "autumnal diseases of the agueish [sic.] and febrile character," editors insisted, required farmers to wisely position their homes, barns, and stables—rather than laying out costly drainage ditches. Healthy farm families did not reside in homes or work in barnyards downwind from "wet and watery places, particularly stagnant pools, ponds, mill dams, marshes, swamps, meadows, &c. &c. Every physician will confirm this simple advice."[55]

The problem with the *Farmer's* advice was that it resembled the fatalistic medical doctrines espoused in ancient Greece rather than the confident, instrumental, and assertive theories of eighteenth-century medicine and pneumatic chemistry. Neo-Hippocratic physicians likened nature to a ball of unformed clay that civilized people could and should mold to benefit themselves and posterity. In the opinion of Rush, Currie, the Georgia Medical Society, and especially Caldwell, farmers who forsook marsh drainage were little better than the continent's previous occupants, American Indians, whose neglect of intensive, market-oriented land exploitation allegedly condemned the atmosphere to its current miasmatic condition. "The most unlettered husbandman," Caldwell lectured, understood "that the only method of rendering [marshes] innoxious [sic.] to health, and useful in agriculture, is to circumscribe and intersect it with a number of ditches sufficient to carry off its redundant waters." "A neglect of this rational, salutary, and lucrative practice, subjects thousands in the United States to the malignant action of marsh miasma, who would otherwise escape this

[55] "The Health of the Planters and Farmers, and of Their Families," *American Farmer* 2 (June 23, 1820): 100.

deleterious poison."[56] The medical community's jubilant, optimistic, and cocksure belief that all that was necessary to alter the atmosphere's chemical composition was a commitment to land drainage at the grassroots had serious consequences for the fate of American wetlands. The only good wetland, physicians instructed Americans time and again, was one which had been cleared, drained, and cultivated.[57]

American atmospheric reform had important implications for the national state's role in natural resource development. According to physicians, responsibility for improving the air fell to themselves and ordinary farmers. In the first place, physicians with access to the latest medical and scientific findings would propose a plan of action. Farmers and local communities, acting independently and for the common good, would then carry out those recommendations. Physicians hoped to fulfill their neo-Hippocartic obligations to wipe out disease, enhance the medical community's prestige, and demonstrate their indispensability to society. Farmers hoped to shield themselves and families from pestilential airs. Detaching national and state governments from the business of land drainage, the public discourse of atmospheric reform unofficially devolved responsibility for the destruction of marshes to local communities and individual farmers who understood that land drainage was a pillar of proper environmental stewardship.

---

[56] Caldwell, "An Oration," 20, 21.

[57] See, for instance, Jan Golinski, "American Climate and the Civilization of Nature," in *Science and Empire in the Atlantic World*, eds. James Delbourgo and Nicholas Drew (New York: Routledge, 2008), 153-174, esp. 169-70; and John Opie, *Nature's Nation: An Environmental History of the United States* (Fort Worth: Harcourt Brace College Publishers, 1998), 187-8.

CHAPTER 2: "THE FOUNDATION OF ALL CORRECT TILLAGE": DRAINAGE, THE RURAL PRESS, AND THE IDEA OF ENLIGHTENED LAND STEWARDSHIP

The eighteenth- and early nineteenth-century campaign for atmospheric reform unfolded in the pages of academic journals and the lecture halls of scientific institutions. Inspired by the revival of ancient Hippocratic medical theories, atmospheric reformers sought to deny the European claims that North America was uninhabitable by arguing that intensive cultivation, deforestation, and *especially* land drainage had improved the continent's atmosphere. In the early republic, support for wetlands drainage was elitist and restricted to Americans engaged in nonagricultural pursuits. Physicians, pneumatic chemists, and politicians promoted drainage as the best means to improve the atmosphere's wholesomeness and reduce the incidences of miasmatic illnesses. Beginning in the 1820s, however, popular support for drainage broadened as farm journals took up the issue and Americans ventured west of the Appalachian Mountains, an area notorious for its marshiness and miasmatic condition. Vilifying wetlands as a pestilential landscape inimical to the health of farm families, livestock, and barnyard fowl, the rural press, for the first time, made the findings of atmospheric reformers accessible to the broader public.

In publicizing the agenda of atmospheric reformers, the antebellum rural press emerged as the primary clearinghouse for drainage-related information. Its interest in wetlands reclamation, however, did not begin and end with public health issues. Dedicated to disseminating useful knowledge about agriculture and rural living, the rural

press celebrated drainage as "the foundation of all correct tillage" and the "first great lesson of agricultural improvement."[1] Farm journals touted drainage as the first step in carving a farm out of the marshy American wilderness because other improvements intended to enhance crop production, such as deep plowing, crop rotation, manuring, and the adoption of new technologies, proved useless if the soil languished in a saturated state. By publishing the minutes of local agricultural society meetings devoted to drainage, reprinting county and state fair speeches dedicated to the subject, reporting the success of farmers who transformed miasmatic marshlands into profitable fields, and providing a forum for farmers to exchange ideas about the benefits of drainage, the rural press pieced together a compelling narrative about agricultural progress in which the pace of wetlands destruction served as a barometer of rural prosperity.

Environmental historians have described American land conservation as a post-Civil War movement dedicated to preserving forests, protecting the integrity of common resources, saving desirable bird and big game species from wanton slaughter, establishing national parks, and irrigating the far western deserts. Yet it is impossible to understand the genesis, evolution, and trajectory of American conservationist thinking without acknowledging the medical ideas that shaped antebellum Americans' understanding of their relationship with nature and inspired their land use patterns. Eighteenth-century atmospheric reformers, who constituted North America's *first* proponents of land conservation, envisioned conservation as a program to eliminate unhygienic landscapes. In this preliminary phase of land conservation, medical values represented the primary calculus used to evaluate a landscape's usefulness. Borrowing liberally from atmospheric

[1] W. P., "Drainage and Irrigation," *Cultivator* 8 (June 1851): 201; and J. R. S., "Importance of Underdraining," *Cultivator* 13 (September 1865): 274.

reformers, antebellum farm journalists popularized the medical advantages of eliminating unhygienic landscapes, which they defined as any topographical landform that discharged miasmas to the detriment of people and animals. The rural press maintained that water rightly belonged in rivers, ponds, or oceans where it could not interact with vegetable or animal matter and generate telluric miasmas. When water escaped from the banks of creeks, streams, and rivers or fell to the ground as precipitation but failed to reach an outlet, agricultural literature identified the presence of noncirculating surface water as evidence of an environmental "defect." The message was clear: wetlands were unnatural landscapes that had no justification for existing. Farmers had a responsibility to conserve the land, as well as the air, by building drainage ditches and burying underground tiles to convey surface water back into circulating watercourses.

This chapter takes a fresh look at what the antebellum rural press said about land drainage. Drawing on a broad geographic sampling of farm journals published before the Civil War, it argues that the rural press popularized land conservation by drainage by introducing Hippocratic environmental ideas into the mainstream of agricultural thought. Largely overlooked by environmental historians, farm journals are a treasure trove of historical information about the environment and agricultural progress. As Lake Douglas recently put it, "agricultural literature contains first-person accounts of issues and experiences that influenced nineteenth-century American economic, social, political, educational, and cultural attitudes about the land and its stewardship. Often, those who contributed to agricultural periodicals were ordinary men (rarely women) who reported

on individual experiences. Their observations are eyewitness accounts of American attitudes towards the land and its uses."[2]

Virtue, Health, and Agricultural Literature in the Nineteenth Century

The Hippocratic revival emphasized that unexploited territories were deleterious to human health. Until enlightened and industrious people thinned the virgin forests, drained fetid marshes, cultivated the soil, and burned off decaying underbrush, miasmatic and insalubrious atmospheres would afflict "vacant" regions. Beginning in the second quarter of the 1800s, concern over the state of North America's atmosphere shifted from the eastern seaboard to the block of territory sandwiched between the Appalachian Mountains and the Mississippi River (and later California's Central Valley). The shift followed the admission of several new states to the Union, their "official" opening for settlement, the securing of navigation rights on the Mississippi River, the gradual breakdown of Indian resistance following General Anthony Wayne's 1794 victory over the Western Indian Confederacy at Fallen Timbers, Ohio, and the defeat of Tecumseh's Indian alliance. In a few short decades following independence, ten states west of the Appalachians entered the union: Kentucky (1792), Tennessee (1796), Ohio (1803), Louisiana (1812), Indiana (1816), Mississippi (1817), Illinois (1818), Alabama (1819), Maine (1820), and Missouri (1821).

Western expansion was a strategy to preserve the young republic's virtue. Influenced by the philosophical ponderings of French physiocrats and Scottish political economists, leaders of the revolutionary generation perceived history as a process in

[2] Lake Douglas, " 'To Improve the Soil and the Mind': Content and Context of Nineteenth-Century Agricultural Literature," *Landscape Journal* 25 (2006): 67.

which societies, like biological organisms, were conceived, matured, grew old, and died. According to this theory, social development unfolded in four consecutive stages: hunting, pasturage, agriculture, and commerce. When societies became commercialized, densely populated, urbanized, or embraced mercantilist policies privileging a favored few, they entered the fourth stage of historical development and teetered on the verge of "old age" and death. American leaders such as Benjamin Franklin and Thomas Jefferson hypothesized that the United States, unlike its European counterparts, could escape the inexorable march towards social decay/death by remaining suspended in the agricultural phase, which was the preferred stage of social development. Franklin and Jefferson contended that the United States' abundance of "vacant" land enabled its society to expand across space rather than time. As long as western lands attracted settlers, the population density of the United States would remain low and its people would prosper as independent farmers—not wage earners in bondage to the caprices of the economic market and venal factory bosses. "Our governments will remain virtuous for many centuries," Jefferson explained, "as long as they are chiefly agricultural; and this will be as long as there shall be vacant lands in any part of America." "While we have land to labour [sic.] then, let us never wish to see our citizens occupied at a work-bench."[3] Nonetheless, in the first few decades after independence, westward emigration symbolized a trickle rather than a flood. The 1810 census counted a national population

[3] Thomas Jefferson, *Notes on the State of Virginia*, ed. William Peden (Chapel Hill: University of North Carolina Press, 1982), 165. On the political economy of the early republic, see Drew R. McCoy, *The Elusive Republic: Political Economy in Jeffersonian America* (Chapel Hill: University of North Carolina Press, 1980), see esp. 18-9, 33, 62-3, 131-2, and 186.

of 7.23 million people, but only 1 million of them lived in the new territories and states carved out of the trans-Appalachian West.[4]

Unfortunately for national leaders, many westerners discovered the trans-Appalachian West to be an impenetrable, marshy, and pestilential death trap rather than a laboratory of republican agrarianism. As settlers fanned out across the vast wet prairie states of Ohio, Indiana, Illinois, and the swampy states bordering the Lower Mississippi River watershed, the region entered the public imagination as a prolific incubator of miasmatic poisons. Westerners employed a host of terms to describe the febrile illnesses they attributed to miasmas or miasmata discharged by western marshes, swamps, and seasonal floods: "Arkansaw chills," "autumnal fever," "bilbous fever," "black swamp fever," "intermittent fever," "malaria," "remittent fever," "seasoning," and "swamp fever." Modern epidemiologists recognize that endemic malaria spread by the bite of the female anopheles mosquito—not miasmas—triggered many of the eruptions of "shakes," "fevers," and "chills and ague" that afflicted settlers living near swamps, bogs, and shallow lakes, the anopheles' preferred breeding habitats, during humid summer months. Despite this etiological misunderstanding, westerners had good reason to associate miasmas with death: by 1850, for instance, malaria killed more people in Illinois than anything else. Annual bouts of "shakes" and "fevers" were so prevalent that mid-century Midwesterners accepted them as a routine, though dreaded and despised, part of everyday rural life. As one Pike County, Illinois, resident explained in 1821: "An illness native in

[4] The population statistics are drawn from Daniel Walker Howe, *What Hath God Wrought: The Transformation of America, 1815-1848* (New York: Oxford University Press, 2007), 41.

the prairie country was fever and ague. There was burning fever following chills which left the patient so weak he could not work. It came with perfect regularity."[5]

So unnerved were many western land seekers about succumbing to miasmatic diseases that they uprooted their families and retreated back to the east coast. In 1818, Thomas Nuttall happened upon several individuals near Georgetown, Pennsylvania, who left the West "in search of a situation which might afford them health." The next year William Faux met half a dozen wagons hauling a group of families and their belongings from Missouri to Kentucky since they had been "scared out of Missouri by sickness." Journeying to Indiana in 1821, William Forster observed as many people returning east due to "sickness" as he saw heading west.[6] Government explorer Stephen H. Long, a Major in the U. S. Army, disparaged Ohio's wet prairies as a barren and mosquito-ridden wasteland. After traversing the 24 miles between Fort Wayne and the Indiana-Ohio boundary, Long judged that "the country is so wet that we scarcely saw an acre of land upon which a settlement could be made. We travelled for a couple of miles with our horses wading through water, sometimes to the girth … We attempted to stop and pasture

[5] Quoted in Lucinda McCray Beier, *Health Culture in the Heartland, 1880-1980: An Oral History* (Urbana: University of Illinois Press, 2008), 4. For an exceptional study of western settlers' understanding of miasmatic diseases and their relation to marshes and other stagnant waters, see Conevery Bolton Valencius, *The Health of the Country: How American Settlers Understood Themselves and Their Land* (New York: Basic Books, 2002), 79-84, 109-10, 114-32, 137-52. Another important work that focuses on California is Linda Nash, *Inescapable Ecologies: A History of Environment, Disease, and Knowledge* (Berkeley: University of California Press, 2006). Also useful are Michael A. Urban, "An Uninhabited Waste: Transforming the Grand Prairie in Nineteenth Century Illinois, USA," *Journal of Historical Geography* 31 (October 2005): 647-665; Peter C. Baldwin, "How Night Air Became Good Air, 1776-1930," *Environmental History* 8 (July 2003): 412-429; and Lillian Krueger, "Motherhood on the Wisconsin Frontier (II)," *Wisconsin Magazine of History* 29 (March 1946): 333-35. The best historical study of malaria in the United States is Margaret Humphreys, *Malaria: Poverty, Race, and Public Health in the United States* (Baltimore: Johns Hopkins University Press, 2001).

[6] Quoted in Reese, Ronald. "Under the Weather: Climate and Disease, 1700-1900." *History Today* 46 (January 1996): 39.

our horses, but this was quite impossible on account of the immense swarms of mosquitoes and horse flies."[7]

Civic leaders from Atlantic states denigrated the West's pathogenic reputation to discourage the increasing tide of emigration. At the 1843 meeting of the Berkshire Agricultural Society in Massachusetts, Henry W. Bishop warned audience members "that it was part of wisdom for New-Englanders, instead of emigrating to the 'fertile prairies' of the Far West, and falling before the miasma of those regions, to remain at home, improve their pleasant places, and 'make two blades of grass grow where only one grew before.'"[8] Irritated by the "one-sided" accounts of western boosters, who portrayed their region as a bucolic and healthy paradise, the *Philadelphia Inquirer* in the same year compared western migration to a death sentence.

> It is a well ascertained fact, that in most new countries, especially where the lands are low and the streams are numerous, fevers of various kinds prevail. And yet, thousands and tens of thousands annually wend their way westward, build their mud huts or log cabins in the vicinity of swamps, by the side of rivers, where agues and aches have their origin… [Boosters] say little of the overflows, the epidemics, the disease and the death which are so frequent and common.[9]

Neither newspaper warnings nor the occasional retreat of disheartened westerners to the east coast disrupted westward emigration over the long run. Spectacular national population growth led a growing number of antebellum land seekers to pursue opportunities on western lands and *also* in undeveloped lowlands and valleys in the Atlantic states. By 1840, the United States achieved population equality with Great Britain when the census counted 17 million Americans. Within ten years, natural

---

[7] Quoted in Michael Williams, "Agricultural Impacts in Temperate Wetlands," in *Wetlands: A Threatened Landscape*, ed. Michael Williams (Oxford: Basil Blackwell, 1990), 204.

[8] "The Farmer's Holiday," *Pittsfield (Mass.) Sun*, October 12, 1843.

[9] "The Air We Breathe: Exercise and Health," *Philadelphia Inquirer*, May 16, 1843.

increase and European immigration pushed the number of people living in the United States above 23 million. If the United States hoped to remain suspended in the third state of historical development, committed to the principles of republican agrarianism, Americans would have to transform undeveloped wetlands into new farms or children would continue to forsake the country for the city. The destruction of unhygienic landscapes had acquired a particular urgency.[10]

Settling the mushrooming population on farms, instead of rapidly industrializing cities, became a cherished objective of the incipient rural press. Evolving from humble origins as the organs of local agricultural and horticultural societies, agricultural journals exploded in circulation and readership between 1819 and 1860 as more than 400 periodicals sprung up across the nation. On the eve of the Civil War, 60 farm newspapers were published and distributed in the United States. In 1880, circulation eclipsed the 1-million threshold. Dedicated to "book farming," the rural press promoted a form of agriculture in which farmers implemented the technological and scientific farming methods described in printed sources. Among the most successful early agricultural periodicals was John Stuart Skinner's Baltimore-based *American Farmer*, which began publishing in 1819 and continued its operations until 1897. The *Genesee Farmer*, first published in Rochester, New York, in 1831, and the *Cultivator*, the official publication of the New York Agricultural Society beginning in 1834, exemplified the northeastern dominance of early publications. Within a few years, however, agricultural journals were

[10] Howe, *What Hath God Wrought*, 538, 562.

published and printed in every region of the United States although many were short-lived, attracted small readerships, and were consolidated into other publications.[11]

The important question of who read the antebellum farm journals has attracted intense scholarly scrutiny. In one of the topic's best studies, the historian Sally McMurry compares subscribers' lists, census data, atlases, and manuscript sources between 1839-1865 to determine the socioeconomic status of subscribers to *The Cultivator* in Chenango County, New York. McMurry finds that subscribers were "well-off … but generally not rich— [they] consistently occupied a position between the two extremes" and practiced "a moderate 'book farming' that mixed cautious experimentation with tradition."[12] Nonetheless, McMurry is careful to emphasize that a number of variables complicate drawing anything but a tentative conclusion: "That someone *subscribed* to a journal does not necessarily mean that he or she *read* it; on the other hand, it is safe to assume that copies of the journal reached more potential readers than the individual subscriber alone … Finally, Oxford [in Chenango County] represents just one agricultural community in a large and diverse geographical region."[13] For the purposes of this study the debate over the rural press's readership is less important than how those journals provided a forum for editors and ordinary farmers to express their opinions about the importance of land conservation by drainage and diffuse the findings of the previous century's Hippocratic revivalists. As one Ohio farmer described this process, "an agricultural paper is the most

[11] For concise introductions to the origins, evolution, and growth of the rural press, see Douglas, "'To Improve the Soil and the Mind,'" 69-76; and Donald B. Marti, "Agricultural Journalism and the Diffusion of Knowledge: The First Half-Century in America," *Agricultural History* 54 (January 1980): 28-37.

[12] Sally McMurry, "Who Read the Agricultural Journals? Evidence from Chenango County, New York, 1839-1865," *Agricultural History* 63 (Autumn 1989): 3.

[13] Ibid., 4.

convenient and appropriate medium through which the farmers can converse with each other, concerning the improvements they have made."[14] And between 1819 and the start of the Civil War, agricultural journals in every section of the country were replete with articles, letters, medical treatises, reprinted state and county fair lectures, and editorial propaganda about the medical and agricultural advantages of conserving the land by eradicating unhygienic landscapes.

Draining for Health

Nothing disturbed the rural press's editors and contributors more about swamps, bogs, sodden lowlands, and other wet landscapes than their baneful impact on human health. Miasmas triggered febrile illnesses, invited prolonged periods of torpor, and hastened premature death. Sick or dead farmers could not cultivate the land or provide for their families. As a result, the primary reasons farm journals championed drainage was to protect farm families from unhygienic landscapes. They turned Americans' feelings of ambiguity about wetlands into abhorrence by arguing that responsible cultivators eliminated every possible source of marsh miasmata—or "malaria" (literally translated "bad air"), as antebellum Americans increasingly referred to atmospheric poisons discharged by wetlands—before their families suffered sickness or death.[15]

The influence of ancient Hippocratic medical theories on agricultural journalists was clear and unambiguous. American farm journals accepted without reservation the

[14] John Foster, "Extensive and Profitable Improvements," *Ohio Cultivator* 6 (March 15, 1850): 81.

[15] As the *Cincinnati Weekly Herald and Philanthropist* explained the evolving medical terminology, malaria "consists in certain invisible effluvia or emanations from the surface of the earth, which were formerly called Marsh Miasmata, but to which it has of late years become fashionable to apply the foreign term Malaria." See "An Important Article to Sufferers of Fever and Ague," *Cincinnati Weekly Herald and Philanthropist*, November 27, 1844.

claim that febrile illnesses owed their origins to the malarias and miasmas produced by wet landscapes. Yet providing readers with a precise description of the form, substance, and chemical composition of malaria/miasma remained a task fraught with difficulty. Malaria's nebulous nature was due to the medical community's confusion and lack of consensus on the topic. In 1837, "R. B. J****" explained malaria's "modus operandi" for subscribers of the Petersburg, Virginia-based *Farmer's Register*. According to R. B. J****, "the effluvium arising from marshes, is a subtle, highly attenuated and undefined substance, the nature of which is unknown, and by no principles of analysis or synthesis have the medical part of the community been able to arrive at any satisfactory conclusion in relation to the thing itself." The only thing certain about the physical nature of miasma was that it remained uncertain. "Theory succeeding theory has been exploded without arriving at any thing [sic.] like certainty about the substance of miasm [sic.] itself."[16]

While contributors struggled to explain what malaria or miasma constituted, they agreed about its origins and impact on human and animal health. Writing in 1823, for instance, "Rusticus" explained to readers of *The American Farmer* that inland swamps released "nothing but the most pestilential miasma, thereby contaminating the otherwise wholesome atmosphere, and spreading disease and death through a whole region of a fine fertile country."[17] Little changed over the next half century as letters, speeches, and medical treatises reprinted in farm journals reinforced the wetland-malaria nexus. In 1870, a "Medical Man" felt compelled to elucidate for subscribers of the *New England Farmer* how miasmas took shape. "By [miasma] is meant the effluvia, exhalations, [etc.], which emanate from vegetable and animal matter while undergoing

[16] R. B. J****, "Remarks on Marsh Effluvia," *Farmer's Register* 5 (July 1, 1837): 142.

[17] Rusticus, "Inland Swamps," *American Farmer* 5 (June 20, 1823): 100.

decomposition" in swamps and marshes.[18] As always, stagnant, noncirculating surface waters served as the primary rural source of unwholesome airs. Speeches delivered at antebellum county fairs, which agricultural journals often published, drew on the prevailing wisdom that farmers who neglected drainage increased their susceptibility to malaria. In a mid-century lecture at Ohio's Lucas and Fulton County fairs, Lewis Lambert argued that "stagnant" surface waters and "deadly" marshes "prevent[ed] the growth of useful vegetation, sending forth their poisonous vapors, their death bearing miasma; spreading disease and destroying human life, decimating our population, and frightening the emigrant to other lands, a stench and curse to the neighborhood, and a sickening scene of disgust to the traveller [sic.]."[19]

Malaria was no less harmful to livestock. Contrary to the assertion of one historian, nineteenth-century Americans did not easily forget about European accusations regarding the degenerative influence of their country's climate and atmosphere.[20] Farm journals worried that the presence of wetlands near grazing lands, stables, and barnyards sapped the health, vigor, and vitality of livestock in three ways. In the first place, wetlands promoted the growth of aquatic plants and "watery succulent herbage" that

---

[18] A Medical Man, "Medical Tropics," *New England Farmer* 4 (July 1870): 338.

[19] "Drainage of Wet Lands," *Ohio Cultivator* 7 (April 1, 1851): 103.

[20] Gordon S. Wood erroneously argues that antebellum Americans' participation in the market economy somehow made them forget about the physical environment in which they lived, farmed, and raised livestock and the well-known association between fevers and certain landscapes: "In time, of course, Buffon's charges and the problems of America's climate were largely forgotten. America's bumptious political and cultural environment, especially with the growth of a market economy, tended to overwhelm the geographical environment. The busyness of Americans, their search for the almighty dollar, seemed to dominate everything, making the physical environment appear inconsequential by nature." Antebellum westward expansion actually heightened Americans' anxieties about the environment by bringing more and more of them into contact with undeveloped landscapes characterized by stagnant surface water. See Wood, "Environmental Hazards, Eighteenth-Century Style," in *Old World, New World: American and Europe in the Age of Jefferson*, eds. Leonard J. Sadosky, Peter Nicolaisen, Peter S. Onuf, and Andrew O'Shaughnessy (Charlottesville: University of Virginia Press, 2010), 15-31, quote at 28.

contained fewer fortifying nutrients and vitamins than grasses sown on dry lands. The *Cultivator* editorialized that the "loss of flesh" that occurred in livestock when they grazed on aquatic plants "is evidence of [their] want of nutrient."[21] Second, poor soil drainage stunted the growth of most plant, hay, and grass species. In 1856, E. Woolverton, an Ohio farmer, warned subscribers of the *Genesee Farmer* that surface water rendered the soil unproductive. "The growth of the plants [on wet soils] is retarded—the health of that plant which is to be used for man or beast, is materially injured, and the health of the *consumer* is injured accordingly. Thus by [the] neglect [of drainage], the health, strength, vigor, and even life of plants may be extinguished."[22] Finally, malaria increased livestock's vulnerability to a special class of bovine diseases that mimicked the symptoms of their human counterparts. According to the *Cultivator*, cattle that inhaled malaria and foraged on nutrient-deficient aquatic plants degenerated into weak, sickly, and scrawny creatures. "Several diseases of domestic animals, such as 'liver-complaint' in cattle, and 'rot' in sheep, are known to be connected with the same causes which produce the diseases in man," the journal editorialized in 1849. "The effects of malaria and watery succulent herbage, in producing the rot, have long been known."[23] D. A. A. Nichols wrote in a St. Louis-based journal eleven years later that it was unwise to raise sheep near Mississippi Valley swamps since they "are subject to

[21] "Drainage of Land," *Cultivator* (June 1849): 175.

[22] Emphasis in original. E. Woolverton, "Draining Prairie Land," *Genesee Farmer* 17 (May 1856): 141.

[23] "Drainage of Land," *Cultivator* (June 1849): 175. In 1819, the *American Farmer* similarly editorialized that livestock who foraged on dry lands were "superior in size and quality, and less subject to disease" than those which consumed aquatic plants. See "On Draining," *American Farmer* 1 (May 7, 1819): 43.

miasma—my own opinion would be, that it would not be very healthy for sheep or the shepherd, and would hardly be profitable to undertake raising wool in such sections."[24]

Returning surface water to natural watercourses was the primary solution for containing malaria. Conveying stagnant water off the land, insisted Alabama's N. T. Sorsby in 1849, "destroys the noxious miasmata that wet soils and decomposing vegetable matter so rapidly generates during the summer and fall, to [farmers'] great annoyance and danger." Yet Sorsby cautioned that proper drainage involved more than digging drainage ditches or burying U-shaped clay tiles underground to channel water into natural outlets. "By *Draining*," Sorsby expounded, "is meant not only the construction of artificial channels for water in wet soils, but also includes the operations of plowing, digging, and working soils reputed *dry*, which effects drainage by opening passages for the descent of water from the superficial to the lower strata."[25] Farm journals pointed to the reduction of human and livestock fatalities in formerly fenny and swampy sections of England as evidence that drainage improved human *and* animal health. In 1849, *The Cultivator* reminded subscribers that "the rural population of drained districts in England have often remarked [on] the favorable effects of drainage on the health and improvement of animals, by which losses of stock have been prevented to a great extent … As might be expected, the health of sheep and cattle has been benefitted by drainage to an equal or greater degree than that of the human race."[26] As the only

[24] D. A. A. Nichols, "Wool Growing in Missouri," *Valley Farmer* 12 (April 1860): 112.

[25] Emphasis in original. N. T. Sorsby, "Wet Soils and Their Drainage. No. II," *Southern Cultivator* 7 (May 1849): 65.

[26] "Drainage of Land," *Cultivator* (June 1849): 175. Several authors cited improvements in English public health following the drainage of fenlands. In 1847, the *Ohio Cultivator* editorialized that "tracts of land in England, which were liable to fevers and agues, and consumptions, by a complete

landscape capable of killing or sickening people and livestock by the simple virtue of their existence, wetlands demanded immediate drainage. Delay only invited death and misery.

Yet if it were true that wetlands occasioned endemic fevers in uncultivated frontier regions, how did agricultural journals reconcile the fact that Indians, according to most credible observers, rarely suffered from malarial ailments? The paradox was the source of endless speculation. One of the most popular explanations was that Indians, by living near swamps since time immemorial, had built up an inexplicable immunity to malaria. In 1847, the physician D. Prince offered a more nuanced explanation for readers of the Chicago-based *Prairie Farmer*. Prince began his discourse by posing a rhetorical question: "The Indians formerly roamed over these plains, and were scarcely ever sick; [so] why should sickness attack the settler, and the little band whom he protects?" The answer was obvious. When Mississippi Valley settlers initially stripped the ground of vegetation in preparation for cultivation, Prince argued, they unwittingly stirred up malaria levels in the atmosphere that, prior to European contact, Indians were never forced to inhale. After removing the ground's vegetative covering, wet soil particles were exposed to the sun's powerful rays, providing optimum conditions for the generation of malaria. He continued:

> The man of the chase leaves the soil untouched—the cultivator turns it over and over again, exposing it to the sun and rain, that he may bring out its hidden resources, and extract from it sustenance and wealth. The roots of the former vegetation all die, and when, after the rainy season … the bare soil loosened by

---

drainage have become salubrious, and are now upon an average standard of longevity with other parts of the country." See "On Draining Lands," *Ohio Cultivator* 3 (January 1, 1847): 2.

> the plough is exposed to our almost tropical sun, it is not strange that some cause of disease should be developed.[27]

Depsite the initial spike in malarial complaints in frontier regions, Prince reassured farmers that intensive European-style land management promised to improve the atmosphere over the long run. Although "new countries, during their settlement, are more sickly than before they were disturbed by the hand of civilized man," Prince concluded, once "the soil is finally brought under his control, sickness … is greatly lessened or entirely removed."[28] In Prince's opinion, the only thing wrong with interior North America's atmosphere was the fact that the continent had been settled by Indians rather than supposedly enlightened and industrious Europeans. Agricultural progress produced hygienic and salubrious living environments. In sum, malarial illnesses decreased in proportion to the quantity of cleared, cultivated, and drained wetlands.

Draining for Wealth

Although the reduction of malaria was the most critical function of drainage, the rural press also publicized how the elimination of unhygienic landscapes increased farmers' wealth. Epidemiological and economic justifications for drainage went hand in hand. In this respect, agricultural journalists again borrowed from the arguments of physicians. The indefatigable Charles Caldwell, who published hundreds of articles and medical treatises before his death in 1853, favored this particular line of reasoning. In draining "a fenny or marshy tract of country," Caldwell wrote in 1831, a farmer "subserves a two-fold interest. He accumulates riches, and secures health. That from

[27] D. Prince, "Malaria, Or the Causes of Intermitting and Remitting Fevers as They Occur in the Valley of the Mississippi," *Prairie Farmer* 7 (January 1847): 19.

[28] Ibid.

which neglect would distil a poison, industry turns to gold; and the vegetation sustained by masses of pollution, renovates the atmosphere, and renders it healthful."[29]

Prosperity abounded for farmers who embraced drainage. According to most farm periodicals, drainage elevated annual crop production by making the soil more conducive to agricultural production. Indeed, the rural press identified four ways that drainage prepared the soil to produce bountiful harvests. First, drainage aerated heavier soils, making them friable. Throughout the nineteenth century, "friable" became the rural press's favorite term to describe the soil's altered composition following drainage. The process by which surface water removal broke down heavier, impervious soils into friable soil was straightforward. Once farmers conveyed surface water into natural outlets via drainage ditches or underground clay tiles systems, "a contraction of the soil soon follows, and cracks are formed." According to the *Cultivator's* editors, the "contraction" transformed the previously heavy soil "into a state which allows the water readily to pass through it, the former difficulties of [soil particles] running together and baking, are obviated; the soil remains open and friable."[30] In 1858, a writer for the same journal declared that following drainage "the soil, no longer compelled to remain saturated with water, lost its brick and mortar character, and became a live [sic.], or at least an active and productive soil, ready to reward the labor of the farmer."[31] Friable soils were ventilated soils. Since most agricultural periodicals doubted that plant roots

---

[29] Charles Caldwell, "An Essay on the Nature and Sources of the Malaria or Noxious Miasma, from which originate the Family of Diseases, usually known by the denomination of Bilious Diseases; together with the best means of Preventing the Formation of Malaria, removing the Sources, and obviating their Effects on the Human Constitution, when the Cause cannot be removed," *American Journal of the Medical Sciences* 8 (August 1831): 320.

[30] "Drainage of Land," *Cultivator* (June 1849): 175.

[31] "Draining Deepens the Soil," *Cultivator* 6 (June 1858): 179.

could multiply without access to air, aeration was essential for cultivation. In an 1849 "report on drainage," delivered to the Oberlin (Ohio) Agricultural and Horticultural Society and reprinted in the *Ohio Cultivator*, Henry Cowles, D. B. Kinney, and Henry Shipherd illustrated how drainage ventilated the soil. "A soil covered with surface-water cannot *breathe*. The pores of the soil are its nostrils and lungs. Cover them with surface-water and no air can enter. Atmospheric air is the vehicle of light and heat and of various fertilizing gases—all of which are essential to vegetation."[32] In liberating the earth's surface from excess water, drainage caused soils to dry out, shrink, and then crumble into finer pieces, promoting subterranean air circulation to the benefit of crops.

Drainage's second contribution to soil quality involved fertilizer absorption. Since the colonization of North America, farmers recognized livestock manure's importance as an indispensible crop fertilizer. Nonetheless, the nineteenth-century rural press ridiculed farmers who applied manure to fields that suffered from poor drainage. In 1858, "A. D. G." explained to subscribers of the *Cultivator* that "draining also facilitates the work of enriching land. Manure applied to the surface, instead of being washed off by the rains and lost, is carried downward, and its juices incorporated with the soil."[33] In an 1859 issue of the same periodical, "R" compared spreading manure onto undrained fields to "putting it into a pond, so far as any visible effect upon the crop is concerned."[34] By making the soil porous and friable, drainage enabled gravity to draw manure's fertilizing agents downward into the soil's root zone. Artificial drainage also enabled

[32] Henry Cowles, D. B. Kinney, and Henry Shipherd, "Report on Drainage," *Ohio Cultivator* 5 (September 15, 1849): 278.

[33] A. D. G., "Advantages of Draining," *Cultivator* 6 (July 1858): 207.

[34] R., "Advantages of Under-Drainage," *Cultivator* 7 (June 1859): 188.

fertilizers that occurred naturally in precipitation to enrich the soil. According to almost every agricultural journal published before the Civil War, rainfall contained ammonia, which was recognized as manure's principal fertilizing agent. "Rain water, as it falls from the clouds, contains a small portion of ammonia," the *Ohio Cultivator* editorialized in late 1852, so "the importance of securing this valuable substance in the soil, instead of allowing it to run off the surface, is one of the strong arguments in favor of under-draining."[35] The next year "J. H." estimated in a different journal that "rain water which falls on an acre of land in a year, is estimated to contain over 100 lbs. of ammonia, or sufficient for the growth of 17 bushels of wheat."[36] The lesson was unmistakable: drainage opened up microscopic passageways in the soil for ammonia, both from manure and rainfall, to trickle downward and infuse crops with nutrients. The result was larger annual yields and greater profits.

In addition to promoting aeration and fertilizer absorption, drainage counteracted the impact of drought. Incredulous and skeptical farmers openly doubted the rural press's assertion that crops planted on artificially-drained soils were more likely to survive prolonged droughts. In response to such disbelief, agricultural journalists felt obliged to justify and defend the claim. In 1849, *The Cultivator* editorialized that wet clay soils "run together" and resembled "mortar, which, when the water has evaporated, becomes like sun burnt bricks—unworkable, and totally unfit for the growth of plants." During periods of scarce rainfall, crops cultivated on such soils withered and died because their roots could not penetrate the mortar-like substratum to a depth where moisture was

[35] "On Draining as a Means of Improving Lands- -Ammonia in Rain Water- -Drain Pipe Machines," *Ohio Cultivator* 8 (December 15, 1852): 369.

[36] J. H., "Underdraining," *Genesee Farmer* 14 (August 1853): 235.

stored. By making stiff and impenetrable soils friable, the author concluded, drainage "increase[d] the depth of the soil, to render it more permeable to the roots of plants, and less liable to be affected by drouth [sic.]."[37] Another author compared the manner in which drainage mitigated drought conditions to the process of condensation. "During a hot day of summer you fill a tumbler with ice water, and after standing it in your room for a short time, you notice that the outer surface of the tumbler is covered with drops of water. The tumbler 'sweats.' How is this?" "R" answered his own rhetorical question by explaining that the tumbler's sweat was "the condensed vapor of the atmosphere coming in contact with a substance colder than itself … the tumbler[,] being colder than the surrounding atmosphere, condensed the vapor which it contained, and which came in contact therewith."[38] Like the tumbler, drained soils had a lower mean temperature than that of the summertime atmosphere. The influx of moisture reinvigorated parched crops at their moment of greatest need and reduced annual yield losses.

Finally, farm journals rhapsodized about the exceptional fecundity of wetlands that had been converted into crop fields. A common nineteenth-century belief held that formerly submerged swamps, marshes, wet prairies, and overflow lowlands contained topsoils that were unrivaled in fertility. The slow accumulation of decomposing animal and vegetable matter at the bottom of wetlands and lowlands, which physicians blamed for producing malaria, were remarkably rich in nutrients, minerals, and organic matter. Farmers who cleared, drained, and then cultivated a wetland, rather than a well-drained prairie or upland, were rewarded with higher crop yields and slower rates of soil

---

[37] "Drainage of Land," *Cultivator* (June 1849): 175.

[38] R., "Advantages of Under-Drainage," *Cultivator* 7 (June 1859): 188. "R" also insisted that "porous," drained soils "drink in more dew than hard, impervious ones. Hence your drained lands are more benefited by the moisture thrown back on the earth during the night, than are lands not thus improved."

exhaustion. As the *Boston Cultivator* aptly put it in 1843, "for ages and ages the vegetable matter has been washing down from the high lands to the low lands, and the vegetable growth on the low lands has been decaying there, and from these two sources there has been an accumulation of rich vegetable matter of more importance to the country than would be the mines of Golconda."[39] Cultivating crops on drained wetlands required few or no manure applications. Weary about the departure of farm children to cities and western lands, New Englanders argued that their region's abundance of undeveloped lowlands should discourage outmigration. In 1861, for instance, H. W. Lester contended that drainage would bring New England's "richest land … into cultivation, and the [former] place of the bullfrog, water snakes, bulrushes, cat-tails and wild grass, hillocks, miasmas and pestilence, will excel the western prairies in productiveness, and our young men will not be so apt to catch the Western fever."[40] Early in the twentieth century, boosters of wetlands drainage continued to cite the unsurpassed fertility of drained swamps and marshes as evidence of why Congress should provide federal subsidies for wetlands drainage.[41]

Eager to demonstrate that drainage was a wise investment, the rural press routinely published letters from farmers that testified about reaping a financial windfall by converting miasmatic swamplands into cultivated fields. In 1850, for instance, John Foster, a farmer from Guernsey County, Ohio, boasted about draining his 320-acre farm

---

[39] "Reclaiming Bogs and Swamps," *Boston Cultivator* 5 (August 5, 1843): 242.

[40] H. W. Lester, "Thorough Underdraining with Tile," *New England Farmer* 13 (May 1861): 231. For a sampling of rural press articles that praised the "inexhaustible fertility" of drained wetlands and lowlands, see Rusticus, "Inland Swamps," *American Farmer* 5 (June 20, 1823): 100; "To Improve the Soil and the Mind," *The Cultivator* 5 (April 1838): 37; and G. Major Tabor, "Draining Lands," *Southern Cultivator* 26 (June 1868): 171.

[41] See, for instance, Guy Elliott Mitchell, "To Farm America's Swamps," *The American Review of Reviews* 37 (April 1908): 533-49.

to subscribers of the *Ohio Cultivator*. As late as November 1846, Foster claimed that half of his farmland languished as uncultivable "wet bottom[land]" because of two creeks that dissected his property. Since the creeks followed meandering courses, they could not carry away rainwater quickly enough and overflowed during thunderstorms. Determined to protect his property from the periodic inundations, Foster hired a ditcher to straighten the creeks. The plan succeeded. Within five years, the ditcher shortened the distance the creeks traveled across Foster's property from 953 rods to 250 rods. As a result, Foster emphasized that following rainstorms "the water now passes off so fast in the new, short, and straight channels, that the creeks do not now overflow my land—it is all dry and of a very rich soil." Investing in drainage rewarded farmers over the long term. After paying the ditcher $750, Foster estimated that his land, which he had purchased for $20 per acre, could now be sold for $30 per acre. Furthermore, a previously uncultivable lowland section of his property measuring "13 acres and 29 rods" now supported cultivation. All in all, Foster calculated that the increased value of the land—$3,200—brought a return of $2,450 *in addition* to the grain produced on the formerly uncultivable tract.[42]

Farmers who heeded the rural press's drainage advice were rewarded with higher yields and property values. In early 1860, "A. L. H.," a Georgia farmer, thanked the editors of the *Southern Cultivator* for offering instructions and encouragement about land drainage. After reading an article describing how to improve wetlands, A. L. H. purchased, cleared, and then drained 100 acres of swampland. To A. L. H.'s astonishment, he reaped annual yields of 50 bushels per acre of corn and 20 bushels per acre of wheat each harvest. The land purchase proved a wise investment. After

[42] John Foster, "Extensive and Profitable Improvements," *Ohio Cultivator* 6 (March 15, 1850): 81.

acquiring the land for $3 per acre and investing $20 per acre in constructing the drainage system, the Georgian claimed that he could sell each acre for $50, which dwarfed the $23 initial investment. In addition to establishing that drainage led to bigger harvests and higher property values, A. L. H.'s experiences illustrated how the rural press's boosterism persuaded some farmers to initiate the work of drainage.[43]

Draining for a Better Life

The rural press also portrayed drainage as a strategy to improve farmers' quality of life. Writing to the *Prairie Farmer* in 1864, Edgar Sanders described a field south of Lake Michigan in which the owner had drained half of the land and left the remainder "wet the same as nature left it." Sanders was intrigued by the noticeable foliage variations between the property's two halves. He speculated that the drained portion probably yielded two tons of high-quality grass per acre while the unimproved section supported a crop that was "scarcely sufficient to pay for cutting."[44] In addition to fostering the growth of hardier grasses and oats, drainage aided in the cultivation of flavorful and succulent fruits. In 1855, "Sub-soil" warned readers of the *Genesee Farmer* that poor land drainage diminished fruit quality. Raspberries, cherries, currants, and strawberries grown on well-drained lands had a richer taste, brighter color, and uniformity of size. In contrast, fruits grown on a "cold or damp piece of land … are found almost without fine flavor." Sub-soil recommended that fruit growers interested in enjoying flavorful and colorful fruit "select a [farm] site, if possible, where water never

[43] A. L. H., "Drainage—Value of the Cultivator, &c.," *Southern Cultivator* 18 (February 1860): 71.

[44] Edgar Sanders, "Effects of Drainage on Swamp Land," *Prairie Farmer* 14 (July 9, 1864): 17.

lies upon or near the surface." Farmers who resided on poorly-drained farms should place "well-laid pipes [under] every sour spot" to convey water into drainage ditches.[45] For Sub-soil and many other contributors to the rural press, the corrupting influence of stagnant surface waters on fruit and hay quality rivaled their impact on atmospheric wholesomeness.

In a handful of letters to agricultural journals, farmers celebrated the aesthetic benefits of wetlands destruction. Since the European colonization of North America, settlers stigmatized wetlands as dismal, lackluster, and sinister. They harbored dangerous predators and reptiles, were overrun with impenetrable underbrush, released dangerous miasmas into the atmosphere, and provided sanctuary for exotic and noxious plants. Population growth and western expansion intensified the public's antipathy towards wetlands by bringing more and more Americans into contact with undrained ecosystems. Indeed, editors and ordinary farmers sometimes suggested that the replacement of hideous and lackluster wetlands with neatly-manicured crop fields had a favorable impact on the dispositions and attitudes of rural Americans. Writing to the *Cultivator* in 1864, for instance, a Long Island, New York, farmer marveled about how drainage had transformed his murky farm, which initially consisted of a low-lying swamp, into crop fields that were "pleasing to the eye." "Those who were familiar with this swamp in bygone years would now scarcely recognize the spot. A more forbidding spectacle could scarcely be imagined; the whole being densely covered with sumach, alders … [and] the whole landscape heretofore marred and unsightly." By stripping the ground of its native vegetation, draining away the stagnant water, and planting crops, the farmer made the

[45] Sub-Soil, "Effects of Drainage on Fruit," *The Genesee Farmer* 16 (August 1855): 250.

plot "an object of pleasurable contemplation to the admirers of the beautiful."[46] Drainage created landscapes whose aesthetic qualities matched prevailing conceptions of natural beauty and attractiveness.

The final way drainage improved rural life in ways unrelated to health and wealth involved making farm labor less arduous. As the *Cultivator* put it in 1837, bogs and marshes were "dangerous for a person to walk across" and represented an obstacle to transportation where wagons, farm implements, or livestock became stuck.[47] On a few occasions, farmers wrote to journals claiming to have discovered the "entangled and mired" carcasses of livestock in marshy areas "without any effort having been made for their recovery."[48] Dead livestock constituted a significant economic loss. Furthermore, water on or below the surface of the ground shortened the lifespan of fence posts. Erecting fences was one of the most expensive, grueling, and time-consuming of all antebellum farm chores. In 1857, the *Cultivator* editorialized that farmers should build drainage systems if for no other reason than to prevent rotting fence posts. "The importance of a good drain under every post fence, is not generally understood … Wherever post holes retain water, they are sure to be heaved by frost, and the fence thrown out of shape; and the post cannot last so long, where they are alternatively subjected to water soaking and drying."[49]

---

[46] Thos. Messenger, "Draining of Swamp Lands on Long Island," *Cultivator* 12 (February 1864): 52. In general, farm journals portrayed aquatic plants that thrived in swampy conditions as a nuisance or even an "eye sore." SeeW. W. Stark, "Drainage of the Savannah Bottoms," *Southern Cultivator* 7 (September 1849): 129; and also "Drainage of Land," *Cultivator* 6 (June 1849): 174.

[47] "Draining," *Cultivator* 4 (November 1837): 151.

[48] Thos. Messenger, "Draining of Swamp Lands on Long Island," *Cultivator* 12 (February 1864): 52.

[49] "Underdraining with Stone," *Cultivator* 5 (July 1857): 209.

Land Drainage as a Form of Enlightened Land Stewardship

To fully understand the diversity and range of ideas that shaped American conservationist thinking, one must consider the mid nineteenth-century public discourse that implored farmers to conserve the land, as well as the air, by transforming unhygienic wastelands into crop fields. During this formative period of land conservation, which gained momentum in the 1840s-50s as Hippocratic medical theories reached the rural public through farm journals, Americans took their first tentative and halting steps towards recognizing that people and the environment were interrelated. Atmospheric reformers insisted that the destiny of people was directly related to patterns of land use. Indifference to real or perceived environmental problems could no longer be tolerated without jeopardizing the welfare of the present and future generations. In blurring the age-old dichotomy between humanity and nature, agricultural journalists argued that people had a responsibility to conform their habits and practices of land use to prevailing medical, cultural, and environmental ideas for the good of themselves and larger society.

In the decades preceding the Civil War, the rural press devoted itself to disseminating Hippocratic environmental theories regarding the appropriate role of water in society. Since the rural press embraced the misconception that water rightly belonged in circulating watercourses, where it could not intermingle with vegetable and animal matter and generate malaria, editors portrayed wetlands as an environmental "defect," blemish, or imperfection. Farmers acted as enlightened stewards when they corrected nature's shortcomings by diverting stagnant waters back into rivers, streams, or creeks. In 1863, for instance, *The Cultivator* reprinted a lecture delivered by A. B. Conger at the New York State fair held in Rochester. During the presentation, Conger implored his

audience to take measures to ensure that water did not escape from the channels of creeks, streams, or rivers—where it naturally belonged— and create "defects" on earth's surface. Wherever "water courses [sic.] are deficient in number, imperfect in flow, or obstructed in their outlet," he contended, "the first essay of the drainer is to remedy these defects."[50] Conger encouraged the building of drainage ditches, straightening of watercourses, removal of obstructions from creeks and streams, or burying of U-shaped clay tiles underground to prevent the unnatural buildup of surface water. Other farm journals followed Conger's lead. In imploring farmers to tap the unbounded fertility of Louisiana's swamps, *DeBow's Review* editorialized in 1854 that swamps were a perfect candidate for "being controlled by wise legislation and agricultural energy" because they were a "great physical evil" and the "curse of our State."[51] Farmers who left wetlands undeveloped committed a grave offense against humanity by failing to grasp that the destinies of people and nature were interconnected.

Accusations about the unnaturalness of wetlands were sometimes expressed in medical terms. After emigrating from Scotland in 1821, John Johnston took up a farm near New Geneva, New York, alongside the Erie Canal. To his dismay, Johnston quickly discovered that his farm failed to produce annual yields that rivaled those of his neighbors. After applying lime and manure to his fields without results, he concluded that his farm suffered from poor subsurface drainage. The industrious Scot soon made arrangements to have clay, U-shaped tiles imported into the United States from his native Scotland. As the pioneer of American tile drainage, Johnston by mid century buried sixteen miles of tiles underneath his farm to convey surface water into nearby outlet

[50] "Benefits of Underdraining," *Cultivator* 11 (January 1863): 19.

[51] "Reclamation of Southern Swamps," *DeBow's Review* 17 (November 1854): 525.

ditches. News about Johnston's experiment reached farmers around the United States. Within decades, clay tile factories sprang up all over the country to supply farmers—especially those residing west of the Appalachians. Treating Johnston as an entrepreneurial genius, agricultural journals eagerly reprinted his letters. In an 1856 letter to *The Cultivator*, Johnston argued that drainage served as a "radical cure for all the *ills* that land or its products are *heir* to."[52] By describing wetlands as "ill" and in need of a "cure," Johnston perpetuated the myth that wet landscapes were sickly and in need of treatment.

Other contributors interpreted the presence of wetlands as a sign of an unbalanced hydrological system. In a letter to the *Southern Cultivator* in 1849, Sorsby perceived wetlands to be illegitimate collections of noncirculating water unconnected to broader watersheds. As a consequence, wetlands robbed the hydrological cycle of water and potentially increased the chances of drought conditions. Sorsby encouraged farmers to build drainage ditches and lay underground tiles to "imitate the processes of nature" and get the water stored in wetlands back into circulating watercourses.

> Though [nature] fails in her efforts to drain some soils, does she not point out the mode by which it may be done by the aid of the hands of men? Else, why does she adopt the modes of draining—of collecting the surplus water from the surface of the earth, and directing it into gullies, thence into little rippling brooks, that steal into bolder creeks, that run into dashing rivers, that charge into the angry ocean to be purified by raging tempests, and dissipated into ethereal vapor to descend again in crystal drops, refreshen [sic.] the earth and quench the thirst of dying creation?[53]

---

[52] Emphasis in original. John Johnston, "A Little More about Draining," *Cultivator* 4 (November 1856): 333. On Johnston's life and experimentation with clay tiling, see Thomas R. Biebighauser, *Wetland Drainage, Restoration, and Repair* (Lexington: University Press of Kentucky, 2007), 4; and Ann Vileisis, *Discovering the Unknown Landscape: A History of America's Wetlands* (Washington: Island Press, 1997), 122-4.

[53] N. T. Sorsby, "Wet Soils and their Drainage," *Southern Cultivator* 7 (July 1849): 98.

Farmers had a duty to reestablish and then maintain the hydrological cycle's equilibrium when nature "failed" to return water to watercourses to avert the onset of drought.

Since agricultural journalists defended drainage as an appropriate form of land stewardship, it logically followed that they would denigrate farmers who left unhygienic landscapes undisturbed. In 1858, *The Cultivator* chided the "majority" of American farmers who understood but refused to heed the cultural mandate to drain. "On the one hand we see or hear of farmers who eagerly avail themselves of every opportunity of extending the drainage of their farms … [but] on the other hand, we behold the spectacle of hundreds and thousands—the great majority, indeed—shaking their heads and turning away, seemingly unconvinced or determined not even to try, when the most satisfactory and irrefutable proofs and demonstrations are placed before them … that draining is always a paying and highly advantageous operation."[54] Agricultural journals heaped special scorn on westerners. Writing to *The Cultivator* in 1853, the Iowa farmer W. G. Edmundson reproached his Mississippi Valley counterparts for being poor land stewards. "Little or no attention is given to the drainage of the land; well formed ridges are rarely made; no pains are taken to drain the soil by the use of the plow, and underdraining, even on the most retentive soils, is never practiced." Instead of draining and cultivating a small parcel, as the rural press recommended, Valley farmers adopted the "careless" and "unwarrantable" practice of cultivating large acreages bereft of improvements.[55] As a result, crop yields plummeted and atmospheric quality suffered. In 1858, the St. Louis-

[54] "Draining of Land—What Hinders more Frequent Trials of it?", *Cultivator* 6 (January 1858): 11.

[55] W. G. Edmundson, "Agricultural Resources of the Great West," *Cultivator* 9 (October 1852): 345.

based *Valley Farmer* acknowledged that although its contributors "frequently alluded to the importance of land draining … its benefits are so little understood in the West."[56]

The increasing stridency of drainage boosterism in the years leading up to the Civil War reflected disappointment regarding the pace of wetlands drainage, which remained uneven, localized, and mostly limited to isolated pockets of land east of the Appalachian Mountains. Nonetheless, the slowness of farmers to convert wetlands into profitable crop fields had much less to do with their failure to conceptualize the risk that stagnant surface waters posed to the health of their families and livestock than the fact that the state and national governments had not yet passed drainage laws unleashing the collective energy of farmers against wet ecosystems. Once state legislatures passed effective drainage legislation around the time of the Civil War, Americans experienced no compunctions about engaging in drainage because Hippocratic environmental values taught them that wetlands were dysfunctional landscapes that served no useful purpose other than poisoning the atmosphere, depressing property values, driving down annual crop yields, undermining the quality of fruits and grasses, and impeding travel.

[56] "Draining, High Manuring, and Thorough Cultivation," *Valley Farmer* 10 (May 1858): 138.

CHAPTER 3: THE AMERICAN STATE AND NINETEENTH-CENTURY NATIONAL WATER POLICY

The preceding chapters demonstrated that wetlands drainage in the early republic resulted as much from medical fears as the need to open up new farmland. The eighteenth-century Hippocratic revival and pneumatic chemistry revolution dictated the elimination of atmosphere contamination as a means to improve public health. Influenced by prevailing medical theories and the Enlightenment's unfettered confidence in man's ability to improve his lot, physicians spearheaded the campaign of atmospheric reform. Yet the enthusiastic support for land drainage masked the ignorance and naïveté of medical professionals regarding the administrative and jurisdictional conflicts involved in land drainage. No matter how much Americans feared and reviled marshes, surface water disposal was a complicated endeavor requiring the cooperation, coordination, and collective investment of multiple landowners and specialized machinery that had not yet been invented. As long as good lands remained abundant and cheap, Americans had little incentive to invest scarce capital in draining marginal lands.

American mythology identifies individualism, industriousness, and self-reliance as the primary sources of the nation's exceptional character and the means by which its people created a thriving and prosperous country out of a desolate wilderness. Rugged individualism was sometimes sufficient to set up a farm. Equipped with the proper tools and plenty of time, a single farmer could chop down enough trees to clear room for cultivation, erect a crude shack, and construct fences. During the eighteenth and nineteenth centuries, the cumulative impact of thousands of such individual actions

dramatically thinned the primeval American forest. Draining wetlands, however, defied individual effort. Swamps, sloughs, bogs, marshes, and wet prairies did not respect artificial property boundaries and demanded collective action. The neglect of one person (such as an absentee owner) to drain his property could render a broader drainage scheme unsuccessful. Landowners without access to a natural outlet on their property—such as a stream, river, or other watercourse— found themselves powerless to drain their fields. To dispose of surface water, for instance, landowners often had to secure permission from a neighbor (or neighbors) to dig a ditch across his property to connect with an outlet.[1]

This chapter focuses on the institutions Americans created to administer land drainage. The renaissance of ancient Greek medical theories heightened public interest in land drainage after the American Revolution, but local communities first confronted the challenge of surface water disposal during the colonial era. In the early eighteenth century, New England colonies adopted Medieval English institutions known as "commissions of sewers" that allowed individuals to regulate the flow of water into meadow fields under the supervision of the colonial governor or legislature. Colonial laws and customs that regulated the control of water were the seeds from which the United States' localized system of land drainage and flood control grew and flourished following independence. By the close of the nineteenth century, drainage districts, which were a more sophisticated version of commissions of sewers, proliferated throughout the

[1] For thoughtful discussions of the conditions that rendered drainage a collective matter, see William B. Meyer, "From Past to Present: A Historical Perspective on Wetlands," in *Wetlands*, eds. Sharon L. Spray and Karent L. McGlothlin (Lanham: Rowman & Littlefield Publishers, Inc., 2004), 91-2; and John T. Cumbler, *Northwest and Midwest United States: An Environmental History* (Santa Barbara: ABC-CLIO, 2005), 134. The best study of the American forest is Michael Williams, *Americans and Their Forests: A Historical Geography* (Cambridge: Cambridge University Press, 1989).

Midwest and South, transforming nature as they transformed the relationship between people, local communities, and the federal government.

In colonial America, commissions of sewers developed due largely to the absence of centralized control over water. Unwilling to direct and finance local drainage projects, colonial governments granted the responsibility for land drainage to local communities. As in Medieval England, landowners directly benefitted by the improvements, and not the state, supervised, financed, and maintained drainage projects. The creation of the United States in the late 1780s did nothing to disrupt colonial drainage customs. The Constitution's silence on natural resource matters, Americans' deep aversion towards concentrated political sovereignty, and the dispersal of formal authority between the national government and thirteen "states" reinforced local control over surface waters. National wetlands policy before 1849 was built from the ground up with the national government deferring in matters of surface water management to local communities scattered across the country.

The local mode of land drainage came under increasing scrutiny in the 1830s and 1840s. During those decades, local communities, farmers, and state policymakers from public land states disputed the effectiveness of the local mode of drainage in their home states. Unlike the original thirteen colonies, states carved out of the public domain west of the Appalachian Mountains entered the Union with large quantities of federally-owned land within their borders. In public land states, farmers and plantation owners complained that a glut of unsold federal land interfered with surface water disposal since federal property could not be taxed, condemned, or included in local drainage enterprises. The outpouring of anger persuaded Congress to implement a special drainage program

for public land states before the Civil War. In 1849, 1850, and 1860, Congress passed three "Swamp Land Acts" that ceded the federal government's "swamp and overflowed" to fifteen public land states on the condition that they sell the lands and invest the revenue in wetlands drainage. The experiment in state administration proved an abysmal and embarrassing failure. Instead of complying with the laws, states used their swampland grants to subsidize railroad corporations, erect public buildings, finance road and bridge construction, and fund education and benevolent institutions. The failure of the Swamp Land Acts compelled state policymakers to devolve drainage responsibilities back to local communities. The rapid proliferation of drainage districts following the brief interlude in state administration symbolized the American state's formal detachment from the process of land drainage, its inability to impose uniform wetlands policies on peripheral communities, and the triumph of the local mode of drainage.

Administrative Problems and Solutions for Drainage: English Commissions of Sewers

In seventeenth-century New England, colonial leaders adopted English institutions empowering landowners to form associations that collectivized the costs and burdens of land drainage. During the Medieval Period, the English Crown issued provisional tribunals called "commissions of sewers" or "courts of sewers" to oversee the improvement, repair, and, after 1550, construction of drainage and flood control works in the English countryside. High turnover in landownership and disagreements between landowners about the apportionment of maintenance costs for existing projects had obliged the Crown to create an administrative body to mediate disputes. In 1259, the first commission instructed Lincolnshire's Henry of Bath and a local sheriff to formalize a

plan to repair sea banks in Lincolnshire. In 1531, Henry VIII empowered the Lord Chancellor, lord treasurer, and chief justices to grant three-year commissions. (The three-year tenure proved inadequate and, in 1550 and 1571, ordinances extended commissions' period of operation to five and ten years). Composed of prominent landowners, the commissions enjoyed wide authority over land drainage and flood control, although promoting river navigation fell outside of their jurisdiction. They could order landowners (or tax them) to repair sea walls or embankments and to keep watercourses and drainage ditches unobstructed, free of debris, and confined within their banks. In carrying out their responsibilities, commissioners sat juries and held hearings to fix tax liabilities and assign work orders. Punishment for noncompliance was harsh, swift, and sometimes capricious. Commissions had the authority to imprison, fine, or distrain the property of delinquent ratepayers or recalcitrant landowners.[2]

Important court rulings eventually pared back commissions' unlimited powers. In the early seventeenth century, a commission of sewers ordered 15 towns on the Isle of Ely to pay for the creation of a new river and make repairs to an e defective drainage system. The controversial decree was referred to the justices of the Common Pleas for review. In the *Case of the Isle of Ely* (1610), justices ruled that the commission

[2] The best overview of the history and development of the commissions of sewers is Sidney Webb and Beatrice Webb, *English Local Government: Statutory Authorities for Special Purposes* (London: Longmans, Green and Co., 1922), 13-106. See also Fred P. Bosselman, "Limitations Inherent in the title to Wetlands at Common Law," *Stanford Environmental Law Journal* 15 (1996): 297-303; H. C. Darby, *The Changing Fenland* (Cambridge: Cambridge University Press, 1983), 36-7; Darby, "The Draining of the Fens, A. D. 1600-1800," in *An Historical Geography of England Before A. D. 1800: Fourteen Studies*, ed. H. C. Darby (Cambridge: Cambridge University Press, 1961), 444; H. E. Hallam, *Settlement and Society: A Study of the Early Agrarian History of South Lincolnshire* (Cambridge: Cambridge University Press, 1965), 135-6; Christopher Hill, *Intellectual Origins of the English Revolution Revisited,* revised ed. (Oxford: Oxford University Press, 1997), 215-6; H. G. Richardson, "The Early History of the Commissions of Sewers," *English Historical Review* 34 (July 1919): 385-93; and Thomas S. Willan, *River Navigation in England, 1600-1750* (London: Routledge, 1964), 16-23. See also William Blackstone, *Commentaries on the Laws of England: Book the Third*, 14th ed. (London: A. Strahan, 1803), 3:72-3.

overstepped its authority by creating a new river nonessential for land drainage and levying taxes on distant towns instead of the landowners directly benefitted by the mandated improvements. Upholding the common law principle that no individual could be compelled to provide for removing public burdens, the ruling instructed future commissioners to levy taxes only on parties directly *benefitted* by the improvements and only *in proportion* to the quantity of land they owned and their anticipated benefit. The *Case of the Isle of Ely* institutionalized the **principle of proportionality** as the yardstick for calculating land drainage assessments in England.[3]

Despite the restraints imposed by the *Case of the Isle of Ely*, commissions continued to exercise broad judicial, executive, and legislative powers. As judicial bodies, they held court, before local juries, to determine assessments, arbitrate disputes, issue new regulations, and impose penalties for noncompliance. The commissions' ability to appoint surveyors, overseers, collectors, and other officers; to distrain property for delinquent taxes; and to impress landlords' tools, oxen, and wagons into service constituted executive authority. Finally, commissions' legislative powers flowed from their ability to create policies regulating the use, maintenance, and renovation of drainage structures under their jurisdiction. Commissions of sewers' multiplicity of tasks, broad autonomy, and oversight responsibilities have led some scholars to argue that they symbolized a harbinger of the modern administrative state.[4]

---

[3] Bernard H. Siegan, *Property Rights: From Magna Carta to the Fourteenth Amendment* (Piscataway, NJ: Transaction Publications, 2001), 26-7, 43.

[4] Darby, *The Changing Fenland*, 41-2; and Bosselman, "Limitations Inherent in the Title to Wetlands at Common Law," 297-303. Louis L. Jaffe and Edith G. Henderson argue that "perhaps more than any other administrative agency of the Stuart period the activities and powers of the Commissioners [of Sewers] had the breadth and variety which we associate with administrative power." See Jaffe and Henderson, "Judicial Review and the Rule of Law: Historical Origins," *The Law Quarterly Review* 72 (July 1956): 345-64, quote at 348.

The decentralized model of wetlands management pioneered in Medieval England appealed to English settlers living in overseas colonies where power was dispersed, capital was often scarce, and colonial authorities left the most basic questions of water management to local communities. In his study of the agricultural development of colonial Concord, Massachusetts, Brian Donahue persuasively argues that the "legal custom" of commissions of sewers was "transferred to New England" as early as 1644.[5] The New England system of mixed husbandry, Donahue explains, depended on the routine harvesting of meadow hay. Controlling the flow of water into and out of meadows was a prerequisite for producing a bountiful hay crop. Elevated water levels at an inopportune moment could jeopardize the harvest if it prevented farmers from getting their livestock into the meadows to mow the hay or obstructed them from picking up harvested hay from the ground before it rotted. Removing natural obstructions from watercourses, which caused untimely overflows into riparian meadows, also became an important community function. In 1644, the Massachusetts General Court ordered four individuals from Concord, Sudbury, and Cambridge to form a commission "to set some order which may conduce to the better surveying, improving, and draining of the meadows, and saving and preserving of the hay there gotten, either by draining of the same, or otherwise, and to proportion the charges layed [sic.] out about it equally and justly."[6] Though the Court's language was vague and nondescript, the principle of proportionality was the primary factor in determining rate assessments. As Donahue puts it, commissions of sewers in New England were "an institutional means to compel all

[5] Brian Donahue, *The Great Meadow: Farmers and the Land in Colonial Concord* (New Haven: Yale University Press, 2004), 63, 94.

[6] Quoted in Ibid., 94.

those meadow owners who might benefit (rather than ratepayers in general) to contribute to improving their soggy property."[7] Landowners were collectively responsible for the destiny of their own rural communities.

In 1702 and 1711, Massachusetts and Connecticut officially formalized a procedure for granting commissions of sewers. The "Act for appointing Commissioners of Sewers" stipulated that when a "major part" of the owners of a plot of land desired to drain it or remove obstructions from watercourses leading to its inundation, they could apply to the governor for permission to form a commission. If approved, the commission was to meet occasionally to "view, consider, consult and contrive, such ways and methods for the clearing and removing the obstructions … and dreyning [sic.] of swamps and other unprofitable grounds."[8] The principle of proportionality mediated rate assessments: landowners' tax rates were based upon the "quantity of land" they owned and the potential "benefits to be received."[9] Commissioners' most coercive power—with the exception of imposing prison sentences, which North American colonies never allowed—was their authority to seize the property of delinquent taxpayers "until the rates and profits to be received of those lands, may reimburst [sic.] them." The decentralized model of land drainage pioneered in Medieval England had made the journey across the Atlantic. By the mid eighteenth-century, local communities were the chief actors in

---

[7] Ibid. Historical surveys of taxation in colonial America completely ignore land drainage assessments. The most recent example is Alvin Rabushka, *Taxation in Colonial America* (Princeton: Princeton University Press, 2008).

[8] Connecticut's law was identical to the 1702 Massachusetts law. *The Acts and Resolves, Public and Private, of the Province of the Massachusetts Bay: To Which are Prefixed the Charters of the Province. With Historical and Explanatory Notes, and an Appendix*, vol. 1 (Boston: Wright & Potter, 1869), 506-7; and Charles J. Hoadly, ed., *The Public Records of the Colony of Connecticut, From October, 1706, to October, 1716, With the Council Journal From October, 1710, to February, 1717* (Hartford: Press of Case, Lockwood and Brainard, 1870), 221.

[9] Hoadly, ed., 221.

managing the continent's surface waters, a responsibility they would not relinquish until well into the twentieth century.[10]

From 1702 until the American Revolution four other colonies joined Massachusetts and Connecticut in enacting drainage statutes: New Jersey, New York, Pennsylvania, and South Carolina.[11] The laws varied in substance and scope, but they shared several key attributes: first, drainage costs should be borne locally, assessed proportionally, and shared by dissenting landowners; second, the initiation of land drainage procedures should occur only after majority consent; third, delinquent and recalcitrant ratepayers should suffer severe penalties, including the confiscation of their property by the state. As the legal scholar John F. Hart argues, English colonial leaders treated personal property as a fluid entity subject to a bevy of rules, regulations, and restrictions, elevating the rights of groups of individuals above those of a single person when competing interests over private land use collided.[12] Since water was a community resource that could not be owned by individuals, colonial leaders viewed water management as so important that they were willing to strip dissenting landowners of their property if they refused to cooperate or pay taxes. Surface water management dictated that the rights of minority landowners be subverted to the rights of the majority or the community at large; private landownership was not an inviolable privilege. By the time of the American Revolution, the basic administrative institution for draining wetlands, which developed independently of centralized control, had been institutionalized and,

---

[10] Ibid.

[11] John F. Hart, "Colonial Land Use Law and Its Significance for Modern Takings Doctrine," *Harvard Law Review* 109 (April 1996): 1268-9.

[12] Ibid.

with uneven and varied results, used in several colonies to control the flow of water into marshes and drain interior and coastal wetlands.

The Early American State and Wetlands Drainage

The conclusion of the American Revolution did nothing to disrupt or displace the custom of local water management which evolved during the eighteenth century. In addition to toppling British imperial rule, the American Revolution rejected European models of concentrated political authority. It also unleashed a social revolution, inspired by the political ideology of republicanism, with a goal of erasing the last vestiges of monarchical social organization in the colonies. In addition, the sheer geographic size of the United States prevented the development of a centralized and formal state structure similar to western European nations. Power in the fledgling nation became vested in the people (i. e. white males), who elected their own representatives, and not in a supreme parliament (as in post-revolution Britain) or in a formal bureaucracy subservient to absolute monarchs (as in continental Europe).[13]

The Constitution mirrored Americans' popular antipathy towards concentrated political authority, which they associated with corruption, tyranny, and avarice. Judging power and liberty as irreconcilable antagonists, the founders wrote a Constitution that dispersed sovereignty, implemented a "compound" structure dividing governing responsibilities between the central government and thirteen separate "states," created a system of checks and balances, and provided for the formal separation of powers in the national government between three distinct branches. In the apt judgment of Stephen

[13] On the first and final points, see Theda Skocpol, *Protecting Soldiers and Mothers: The Political Origins of Social Policy in the United States* (Cambridge, Mass.: Harvard University Press, 1992), 42, 67-8.

Skowronek, the Constitution's silence on almost every substantive public policy issue—including water management—"left the most practical questions of state operations shrouded in ambiguity."[14]

The social structure of the United States did not hinder the Constitution's radical diffusion of power. The United States was bereft of feudal precursors, monarchs, princes, or an aristocracy capable of concentrating power. Lacking a state-financed church, clergy, landed gentry, intelligentsia, or military caste, the country had no ruling class that could impose a unified state development program. The United States' tremendous geographical size, abundance of cheap and easily available land, ethnic and religious pluralism, and early universal manhood suffrage fostered a fondness for localism. The ideology of republicanism, which infused the revolutionaries' battle against Britain with optimism, clarity, and a common purpose, furthered political fragmentation by attacking the practices monarchies traditionally employed to consolidate, wield, and dispense power. As Gordon Wood puts it, republicanism served as a "counterculture to monarchy" because it sought to blur the age-old distinction between gentlemen and the rest of society and substituted the social bonds of love, respect, merit, and consent in place of kinship, patriarchy, patronage, and coercion. In the minds of early Americans, government favoritism of any one class, community, or group emerged as a form of tyranny no less reprehensible than liberty-usurping standing armies and cadres of ministers and bureaucrats. Americans' suspicion that corruption

[14] Stephen Skowronek, *Building a New American State: The Expansion of National Administrative Capacities, 1877-1920* (Cambridge: Cambridge University Press, 1982), 21. For a discussion of the "compound" structure of American federalism, see Harry N. Scheiber, "Federalism and the Constitution: The Original Understanding," in *American Law and the Constitutional Order: Historical Perspectives,* eds. Lawrence M. Friedman and Harry N. Scheiber (Cambridge: Harvard University Press, 1988), 85-98. See also Robert Kelley, *Battling the Inland Sea: Floods, Public Policy, and the Sacramento Valley* (University of California Press, 1989), 30-1.

lurked everywhere men exercised power made them prefer that the seats of power remain close to home where they could be closely supervised.[15]

The absence of serious national security threats also hampered early American state building. Waging protracted wars against other states played a pivotal role in western European state development. Isolated from European conflicts and lacking bellicose neighbors on its borders, the federal government had little incentive to maintain a large standing army, appropriate scarce funds to educate officers, or establish a national defense-related civil service during its formative political period. Comparisons between the United States and Britain are instructive. From 1783 to 1815, the American government waged war against imperial powers for four years. In the same period of time, Britain fought wars for 25 years. The first American census, taken in 1790, counted people to determine congressional representation. Carried out ten years later, Britain's first census tallied the number of men available for military service. So puny, feeble, and stunted was the incipient national state's administrative capacity that congressmen initially outnumbered bureaucrats.[16]

---

[15] Gordon S. Wood, *The Radicalism of the American Revolution* (New York: Vintage Books, 1991), 96, 229. My understanding of republicanism owes much to Bernard Bailyn, *The Ideological Origins of the American Revolution* (Cambridge, Mass.: Harvard University Press, 1967); and Wood, *The Creation of the American Republic, 1776-1787* (Chapel Hill: University of North Carolina Press, 1969). On the formation of the early American state, see Charles C. Bright, "The State in the United States During the Nineteenth Century," in *Statemaking and Social Movements: Essays in History and Theory*, eds. Charles C. Bright and Susan Harding (Ann Arbor: University of Michigan Press, 1984), 123-4; Samuel Huntington, *Political Order in Changing Societies* (New Haven: Yale University Press, 1968), 93-139; Seymour Martin Lipset, "American Exceptionalism Reaffirmed," in *Is American Different? A New Look at American Exceptionalism*, ed. Byron E. Shafer (Oxford: Clarendon Press, 1991), 7-8; and Theda Skocpol, "Bringing the State Back In: Strategies of Analysis in Current Research," in *Bringing the State Back In*, eds. Peter B. Evans, Dietrich Rueschemeyer, and Theda Skocpol (Cambridge: Cambridge University Press, 1985), 12.

[16] Morton Keller, *America's Three Regimes: A New Political History* (New York: Oxford University Press, 2007), 50-1. On war and the process of western European state building, see Charles Tilly, ed., *The Formation of National States in Western Europe* (Princeton: Princeton University Press, 1975).

The dynamics of early American political culture shaped the contours of water resources management in profound and lasting ways. Since the American Revolution, the association of centralized power with tyranny, the public's preference for localism and economic individualism, and the Constitution's complete silence on natural resource development detached the American state from the process of local land drainage. As a result, the institutional framework for land drainage pioneered in Medieval England and transferred to colonial New England underwent a seamless transition between the colonial period and the early republic. Constituting an invisible layer of American government largely unnoticed by national politicians, atmospheric reformers, and later historians, commissions of sewers ensured that American federalism remained robust and dynamic in rural water management. To be sure, Congress never formally delegated authority for wetlands drainage to the states or local communities. It did not have to. From the states' perspective, the national government's tentativeness symbolized a de facto devolution of authority and a tacit endorsement of local control. States were free to set their own procedures and guidelines establishing the criteria for applying for a

---

The early national state was not entirely insulated from military conflict. National leaders periodically called upon troops to subdue Indians, expropriate their land, protect backcountry communities from Indian raids, and eject squatters from the public domain. Compared to the prolonged and costly wars afflicting European monarchs and states since the Medieval period, conflicts with Indians were short, decisive, and relatively inexpensive. They did not require the construction of elaborate and centralized agencies to equip and organize armies, establish supply lines over long distances, or to innovate in public finance. This is not to say that American Indians were passive victims of American aggression. Indians often tenaciously resisted American encroachments into their territory. Their eventual subjugation had much less to do with the U. S. army's superior organization, manpower, or fighting prowess than recurrent "virgin soil epidemics" that decimated and socially disorganized Indian nations for several centuries before the republic's creation. Indians had no immunities to European diseases and often succumbed rapidly after expose. Pre-contact Indian population estimates remain a source of contention and vigorous disagreement. Russell Thornton, for instance, estimates that Indians in what is now the U. S. "decreased from 5 + million in 1492 to about 250,000 in the decade from 1890 to 1900." See *American Indian Holocaust and Survival: A Population History Since 1492* (Norman: University of Oklahoma Press, 1987), 43. For an overview of military conflicts between the U. S. and American Indians following the Revolution see Armstrong Starkey, *European and Native American Warfare, 1675-1815* (Norman: University of Oklahoma Press, 1998).

commission (or later drainage districts), the petition process, penalties for noncompliance, the manner of setting and collecting assessments, the rights of minority landowners, and limitations regarding the disposal of surface water. So radical was the devolution of authority over surface water management that most states allowed local associations/commissions to formulate their own rules, regulations, and traditions governing the day-to-day operation of surface water disposal independent of courts, governors, or legislatures. By keeping power close to home, commissions fragmented political authority over wetlands drainage and effectively shut national and provincial elites out of managing 11% of the surface area of the contiguous 48 states. Interestingly, atmospheric reformers' insistence that intervention by national policymakers in land drainage was unnecessary and superfluous proved prophetic.[17]

Congress did not defer to local communities in all areas of pre-Civil War water resource management. Indeed, national policymakers took a decidedly different approach towards interstate rivers than isolated wetlands. In the landmark 1824 decision of *Gibbons v. Ogden*, the nationalistic Supreme Court, under the direction of John Marshall, recognized Congress's authority to regulate "commerce" to include navigation. Writing for a unanimous Court, Marshall insisted that the Commerce Clause "comprehends, and has been always understood to comprehend, navigation within its meaning." The Constitution, then, "expressly granted" Congress the authority to promote

[17] For an excellent analysis of the structure, nature, and history of American water management, see Robert Kelley, "The Context and the Process: How They Have Changed Over Time," in *Water Resources Administration in the United States: Policy, Practice, and Emerging Issues*, ed. Martin Reuss, (East Lansing: American Water Resources Association and Michigan State University Press, 1993), 10-22.

navigation on the nation's interior waterways.[18] Congress did not delay in asserting its authority over the nation's arteries of interstate commerce. Before the year's end, it allocated $75,000 for the Army Corps of Engineers to promote navigation on the Ohio and Mississippi Rivers by removing river obstructions. In 1826, Congress passed the nation's first omnibus river and harbor act, appropriating $86,000 for improvements at 20 sites. Federal expenditures for the removal of snags, sandbars, uprooted trees, obstructive rocks, ice chunks, and immersed steamboat wreckages from rivers surpassed every other nonmilitary item in the federal budget from the 1820s to 1860 and constituted one of Congress's clearest interventions into antebellum economic and environmental planning.[19] Yet *Gibbons* paradoxically reinforced the colonial custom holding drainage as a local matter. Politicians interpreted *Gibbons* as evidence that the national government possessed clear constitutional authority to engage in water projects facilitating the *distribution* of agricultural and consumer goods but not their *production*. The distribution of goods benefitted society as a whole but their production favored a few at the expense of many. This critical distinction theoretically confined the federal government's role in managing water to those flowing between a navigable river's banks. Diffused surface waters unconnected to watercourses remained outside of Congress's

[18] *Gibbons v. Ogden*, 22 U. S. 1 (1824). For an examination of the historical events and complicated litigation behind *Gibbons*, see Maurice G. Baxter, *The Steamboat Monopoly: Gibbons v. Ogden, 1824* (Alfred A. Knopf, 1972); W. Howard Mann, "The Marshall Court: Nationalization of Private Rights and Personal Liberty from the Authority of the Commerce Clause," *Indiana Law Journal* 38 (Winter 1963): 149-238; and R. Kent Newmyer, *John Marshall and the Heroic Age of the Supreme Court* (Baton Rogue: Louisiana State University Press, 2001), 302-15.

[19] Paul F. Paskoff, *Troubled Waters: Steamboat Disasters, River Improvements, and American Public Policy, 1821-1860* (Baton Rogue: Louisiana State University Press, 2001), 4, 124; Martin Reuss, *Designing the Bayous: The Control of Water in the Atchafalaya Basin, 1800-1995* (College Station: Texas A&M University Press, 2004), 10; and Todd Shallat, *Structures in the Stream: Water, Science, and the Rise of the U. S. Army Corps of Engineers* (Austin: University of Texas Press, 1994), 129.

jurisdiction since their removal usually fostered cultivation and brought an economic benefit.[20]

Surface Water Law and the Application of the Local Model of Drainage West of the Appalachians

Beginning in the 1830s, western states passed laws modeled after colonial commissions to deal with the problem of surface water. Intending to liberate Americans from the thorny financial and legal obstacles associated with drainage, these "ditch laws" unleashed the collective energy of citizens against wetlands and represented a rural precursor of mid nineteenth-century urban sanitary reform. Like urban homes, farms should be provided with outlets for the disposal of their supposedly fetid, miasmatic, and unsanitary waters. Ditch laws enabled a landowner (or a group of landowners) whose property was isolated from natural outlets to build ditches across the land of neighboring proprietors after reimbursing them for damages. In 1832, Indiana became the first public land state to create the institutional means for this process to occur. Indiana's ditch law stipulated that "any person or persons owning or possessing any swamps, bogs, meadow, ponds, or other low lands … who shall be desirous to drain such land, and who shall deem it necessary in order hereto, that a ditch or ditches should be opened through lands belonging to other persons, in case the owners of any such lands shall refuse to permit the opening of such ditch or ditches" could petition the township justice of the peace for

[20] See Sam Mims, "Louisiana's Administration of Swamp Land Funds," *Louisiana Historical Quarterly* 28 (January 1945): 282; and Karen M. O'Neill, *Rivers by Design: State Power and the Origins of U. S. Flood Control* (Durham: Duke University Press, 2006), xiii, 4-5, 26.

relief.[21] Reviewing the petition's merits, the justice of the peace sat a "jury" of twelve disinterested freeholders to visit and examine the site of the proposed ditch, determine the appropriateness of if its location and dimensions, consider objections, and assess damages for the injured neighbor(s).[22] Michigan (1833), Florida (1834), Tennessee (1842), and Illinois (1845) soon followed Indiana's lead and adopted comparable legislation.[23] In 1841, Ohio's legislature passed legislation that empowered local citizens to form "commissions of sewers" when a "major part" of the landowners of any particular meadow, marsh, or lowland desired to remove obstructions from nearby watercourses to prevent overflows or to drain swamps and other "unprofitable lands."[24]

In the American South, policymakers empowered levee boards with authorities similar to northern ditch and sewer commissions. Antebellum Americans generally regarded land drainage and flood control as flip sides of the same coin since both activities promoted public health and facilitated agriculture by keeping water and soil from intermingling. After statehood, Louisiana and Mississippi formally adopted the French and Spanish colonial customs that required riparian landowners to erect and maintain levees along the Mississippi River. Like commissions of sewers, levee boards possessed police, taxing, and confiscatory powers and granted recalcitrant landowners no participatory exemptions. In March 1816, Louisiana passed an "act concerning the levees

---

[21] *Laws of Indiana*, Chapter CXIV, 1831-1832, 106.

[22] Ibid., 107-8.

[23] *Laws of Michigan Territory, 1833,* 86-7; *Laws of Florida Territory*, Chapter 766, 1834, 48-50; *Laws of Tennessee,* Chapter LXXI, 1842, 85; and *Revised Laws of Illinois*, 1845, 277-82. For an insightful and illuminating study of early ditch and commission of sewers legislation in the Old Northwest, see James E. Hergert, "Taming the Environment: The Drainage District in Illinois," *Illinois State Historical Society Journal* 71 (May 1978): 107-18.

[24] *Laws of Ohio, 1841,* 122-5.

and roads on the banks of the Mississippi and for other purposes" that assigned responsibility for levee construction and maintenance to local parishes. The law empowered parish police juries to appoint disinterested inspectors to supervise levee building and upkeep. Riparian landowners had a certain period of time to comply with inspectors' instructions before facing stiff fines ranging from $100 to $1,000. Judging from the number of detailed sections in the enabling legislation devoted to the subject, inspectors' most divisive, controversial, and hated power was their authority to requisition nearby planters' slaves during periods of high water for emergency repairs. The pace of levee building along the Mississippi River quickened after Louisiana entered the Union and, by 1828, levees stretched almost continuously from New Orleans to the Red River landing.[25]

In 1819, Mississippi's General Assembly took what the historian Robert W. Harrison calls the "exceptional" step of authorizing the proportional assessment of riparian proprietors' land to fund the erection of a levee in Warren County.[26] The law represented the first direct application of the principle of proportionality to southern water management. The legislation instructed five specifically-named commissioners to appoint three "discreet, disinterested freeholders" to assess proportional taxes, not

---

[25] Robert W. Harrison, *Alluvial Empire: A Study of State and Local Efforts Toward Land Development in the Alluvial Valley of the Lower Mississippi River, Including Flood Control, Land Drainage, Land Clearing, Land Forming* (Little Rock: Pioneer Press, 1961), 57. The large number of detailed sections in the law devoted to slave requisition revealed that the authors wrestled with the propriety of compelling plantations owners to release their slaves to inspectors during times of high water or collapsing levees. So heavily did Louisiana's localized system of levee maintenance depend on slave labor that the 1816 law recommended prison sentences for plantation owners who met inspectors' requisitions with physical intimidation or violence. Since riparian landowners were culpable when levees on their land failed, the law required them to compensate their neighbors whose slaves were called away at the rate of $1 per slave per day and to feed them for the duration of their work on the levee. Not only did slaves build the South's plantation economy, they were integral in maintaining the first flood control system in U. S. history.

[26] Robert W. Harrison, "Early State Flood Control Legislation in the Mississippi Alluvial Valley," *Journal of Mississippi History* 23 (April 1961): 113.

exceeding $8,000, on the property of riparian proprietors whose "lands, houses or lots so assessed may be benefitted by the erection of the said levee." The law instructed the sheriff to collect the taxes in the same manner as other county levies. Little is known about the 1819 law's effectiveness or implementation. Harrison describes it as the "first state-authorized levee project" in American history that set a precedent for hundreds of later state levee laws by imposing pro rata assessments determined according to the benefits landowners expected to receive from the project.[27]

During the next 30 years, Mississippi and Louisiana strengthened the powers of levee boards and attempted to make them more equitable. In 1833, Mississippi's General Assembly passed the first in a series of acts to facilitate levee construction in Washington, Coahoma, Tunica, Bolivar, Issaquena, and De Soto Counties. Most of the laws empowered county Boards of Police (now known as Boards of Supervisors) with supervisory powers. The 1838 Act relating to Washington and Bolivar Counties, for instance, authorized the Boards of Police to divide the counties into at least five levee districts and appoint five inspectors to oversee each district's operations. Prohibited from supervising levees more than 10 miles from home, the inspectors elected a "president" and additional officials to compose the county's Board of Levee Inspectors. The inspectors made determinations for the location and size of drainage ditches, levees, and other structures and placed advertisements in local newspapers requesting bids for construction. Noncompliant landowners faced stiff fines and court penalties. In periods of imminent danger, such as high water, the inspectors could requisition slaves whose

[27] *Laws of Mississippi 1819*, 78-80, quotes at 78 and 79; Robert W. Harrison, "Levee Building in Mississippi Before the Civil War," *Journal of Mississippi History* 12 (April 1950): 63; and Harrison, "Early State Flood Control Legislation in the Mississippi Alluvial Valley," *Journal of Mississippi History* 23 (April 1961): 113.

owners lived within a three-mile radius of the levee in question. Over time riparian plantations owners implored the Assembly to disperse the burden of levee construction by extending responsibility for assessments to interior landowners who also benefitted from flood control. In 1846, assemblymen acquiesced and extended levee assessments to backcountry residents.[28]

After 1850, organized land drainage grew in importance due to increasing conflicts between landowners throughout the United States over surface water disposal. Indeed, some interpretations of surface water law barred landowners from indiscriminately disposing of water that originated on their land without incurring liability. "Diffused surface waters" were technically defined as "waters from rain, springs or melting snow which lie or flow on the surface of the earth but which do not form part of a watercourse or lake."[29] Surface water law regulated the use, diversion, and disposal of waters unaffiliated with a watercourse until they converged with the waters in a river, stream, creek, lake, or pond. In an 1881 decision, the Kansas Supreme Court aptly described this transition:

> When surface waters reach and become part of a natural water course, they lose their character as surface waters, and come under the rules governing water courses … And such waters, when they have ceased to spread and diffuse over the surface or percolate through the soil, when they have lost their casual and vagrant character and have reached and come to rest in a permanent mass or body, in a natural receptacle or reservoir, not spreading over or soaking into the soil,

---

[28] Section 4 of the 1846 law explicitly stipulated that "back lands (not located on the bank of the river, and that would be benefitted by the erection of a levee) shall be taxed in proportion to the benefit the proprietors of land would receive." See Harrison, *Alluvial Empire*, 61; Harrison, "Early State Flood Control Legislation," 112-3; and Harrison, "Levee Building in Mississippi," 64-5. An interesting overview of flood control legislation in a single county is Wlater Sillers, Jr., "Flood Control in Bolivar County, 1838-1924," *Journal of Mississippi History* 9 (January 1947): 3-20.

[29] Clifford Davis, "The Law of Diffused Surface Water in Eastern Riparian States," *Connecticut Law Review* 6 (Winter 1973-4): 227 n. 1.

> forming mere bog or marsh, cannot be regarded as surface waters any more than they can be after they have reached a stream.[30]

In general, American states adopted one of three surface water rules: civil law, "common enemy," and reasonable use. The civil law followed the natural law maxim of *aqua currit et debet currere ut currere sole bat*, that is, "water runs and ought to run, as it used to run."[31] Originally developed during Roman times and later incorporated into France's Napoleonic Code, the civil law rule imposed liability on landowners when they damaged adjacent proprietor's property during the process of surface water disposal. The idea of servitude was the rule's basis: an upper landowner could not injure a lower landowner while ridding his property of water. Conversely, a lower landowner had no right to block the natural flow of water onto his land to the detriment of an upper landowner. By curtailing the freedom of landowners to dispose of surface water in any manner they desired, the 18 states that adopted the civil law rule before 1940 placed a formidable obstacle before people seeking to drain their lands. Local administrative bodies supervising and regulating the disposal of surface in an orderly manner were at a premium in civil law states. In any case, the civil law rule's preference to avert disputes between property owners by leaving the natural flow of surface water unimpeded ran counter to prevailing nineteenth-century cultural attitudes privileging wetlands' rapid destruction for agricultural and health purposes.[32]

---

[30] *Gibbs v. Williams*, 25 Kan. 149, 153 (1881).

[31] Jennifer S. Graham, "The Reasonable Use Rule in Surface Water Law," *Missouri Law Review* 57 (Winter 1992): 225.

[32] Alabama, California, Colorado, Georgia, Illinois, Iowa, Kansas, Kentucky, Louisiana, Maryland, Michigan, Nevada, North Carolina, Ohio, Pennsylvania, South Dakota, Tennessee, and Texas adopted the civil law rule. Also see Stanley V. Kinyon and Robert C. McClure, "Interferences with Surface Water," *Minnesota Law Review* 24 (June 1940): 891-939; Donald V. Dobbins, "Surface Water Drainage," *Notre Dame Law Review* 36 (August 1961): 518-26; Graham, "The Reasonable Use Rule in Surface Water

Rejecting the civil law's passivity, the common enemy doctrine applied an instrumental approach to wetlands. The legal maxim *cujus est solum, ejus est usque ad coelum et ad inferos*, that is, "whose is the soil, his is even to the skies and to the depths below" constituted the rule's foundation. Sometimes mistakenly called the common law, the common enemy rule, as its name implied, regarded water lying or flowing across the surface of the ground as a common enemy that a property-owner could eliminate as he or she desired, regardless of the consequences to others. In the District of Columbia and 21 states that adopted the rule, landowners incurred no liability if they damaged a neighboring proprietor's land during the process of surface water removal. Though nineteenth-century courts imposed a host of qualifications and limitations to the common enemy rule (as well as the civil law), it corresponded nicely with cultural prejudices towards wetlands. It envisioned a landscape devoid of noncirculating waters that exsisted outside of a watercourse or lake and, as a result, reinforced the myth, dating to ancient Greece, that wetlands were unnatural, undesirable, and anomalous.[33]

The reasonable use principle blended the civil law and common enemy doctrines to make "reasonableness" the primary standard for determining liability in surface water

---

Law"; "Obstruction, Repulsion and Discharge of Surface Water," *Columbia Law Review* 4 (November 1904): 506-7; H. H. M., "Surface Water: The Rights of Abutting Property Owners," *Virginia Law Review* 15 (January 1929): 288-93; and "Waters and Watercourses: Obstruction of Diffused Surface Water by Lower Owner," *Columbia Law Review* (March 1920): 356-57. For an insightful albeit brief evaluation of how the civil law handicapped landowners' drainage efforts, see Mary R. McCorvie and Christopher L. Lant, "Drainage District Formation and the Loss of Midwestern Wetlands, 1850-1930," *Agricultural History* 67 (Fall 1993): 34.

[33] Arizona, Arkansas, Connecticut, Washington DC, Indiana, Maine, Massachusetts, Mississippi, Missouri, Montana, Nebraska, New Jersey, New Mexico, New York, North Dakota, Oklahoma, Rhode Island, South Carolina, Virginia, Washington, West Virginia, and Wisconsin eventually adopted the common enemy doctrine. See the sources at footnote 106.

disputes. Since prior to 1940 only Minnesota and New Hampshire adopted this rule, the reasonable use doctrine had little bearing on nineteenth-century drainage.[34]

Prologue to the Swamp Land Acts: The Creation of the Public Domain

Unanticipated difficulties impeded the progress of drainage and flood control institutions in public land states. The most serious of these problems involved federal land ownership. Unlike the original thirteen colonies, most territories west of the Appalachians entered the Union as public land states. Federal land ownership and the leisurely pace of public lands disposal rendered local water management regimes ineffective since public lands could not be taxed or forcibly included in commissions or levee projects. Furthermore, vacant public wetlands, westerners charged, poisoned the atmosphere with miasmas and often overflowed adjacent private property. By the 1830s, communities west of the Appalachian Mountains clamored that Congress had a responsibility to get out of the way of surface water management by paying to drain the public domain, quickly disposing of unsold public lands, or ceding them to the counties or states so they could sell the lands and invest the revenue in drainage projects.

The creation of the public domain was one of the most contentious chapters in early U. S. political history. The original colonial charters of Connecticut, Massachusetts, New York, Virginia, North Carolina, South Carolina, and Georgia conferred land grants stretching from the Atlantic to the Pacific. Dismissing the rights of American Indians, the "sea to sea" charters envisioned the forging of a transcontinental empire. In the 1763 Treaty of Paris, which ended the French and Indian War, Great

[34] See Graham, "The Reasonable Use Rule in Surface Water Law"; and Kinyon and McClure, "Interferences with Surface Waters."

Britain recognized Spain's claim of sovereignty over the trans-Mississippi West by cutting off the sea-to-sea grants at the Mississippi River. In 1774, Parliament further circumscribed the grants by passing the Quebec Act, which transferred the tract of land north of the Ohio River to Quebec. Jeopardizing the western claims of Massachusetts, Connecticut, New York, and Virginia, the Quebec Act reduced colonial land claims by some 177 million acres, imperiled colonies' ability to reward veterans of the Seven Years' War with land bounties, interfered with the Indian trade, and nullified the claims of prominent land companies and speculators.[35]

When the Continental Congress convened during the American Revolution, controversy erupted over the fate of colonies' remaining western lands. Colonies without western lands—Delaware, New Hampshire, New Jersey, Pennsylvania, Rhode Island, and Maryland—feared domination at the hands of the larger landed colonies after the overthrow of British authority. The landless colonies fretted that western claims gave the landed colonies unfair economic and political advantages, enabling them to pay off war debts, attract new settlers, reduce taxes, and create loyal western territories. In 1776, Maryland asked Virginia and other landed colonies to relinquish their existing charters west of the Appalachians to Congress. The western lands, Marylanders insisted, should be held as "common property" and sold to retire war debts. Far-sighted leaders worried that the smaller colonies might bond together, raise an army, and violently seize the West

[35] Paul Wallace Gates, *History of Public Land Law Development* (Washington: Public Land Law Review Commission, 1968), 49.

if the issue lingered without resolution. Wanting the debate settled quickly and equitably, they asked for the creation of an impartial body to rule on the disputed territory's fate.[36]

In 1780, the independent committee sided with the smaller colonies and implored the landed states to:

> remove the embarrassment respecting the western country, [by making] a liberal surrender of a portion of their territorial claims, since they cannot be preserved entire without endangering the stability of the general confederacy; to remind them how indispensably necessary it is to establish the federal union on a fixed and permanent basis, and on principles acceptable to all respective members.[37]

Dissension subsided once the landed colonies acquiesced. One by one they handed over control of their colonial claims to Congress: New York in 1780, Virginia in 1784, Massachusetts in 1785, Connecticut in 1786, South Carolina in 1787, North Carolina in 1789-90, and finally Georgia in 1802. The combined cessions, which created the young confederacy's public domain, exceeded 237 million acres. On March 1, 1781, Maryland's legislature acknowledged the goodwill of the landed colonies and withdrew its opposition to the ratification of the Articles of Confederation.[38]

Agreeing on how to govern, dispose, and divide the public domain proved no less of a thorny problem. Congress adopted two principles first articulated in Virginia's Act of Cession. First, Congress should manage the public domain to benefit *all* of the colonies by depositing revenue generated from land sales into a "common fund." Second, new states carved out of the public domain should enter the union on an equal basis with the original thirteen colonies. Once the 1783 Treaty of Paris ended the War of

---

[36] Ibid., 49-50; and Peter S. Onuf, *The Origins of the Federal Republic: Jurisdictional Controversies in the United States, 1775-1787* (Philadelphia: University of Pennsylvania Press, 1983), 12-4, 151-2.

[37] Quoted in Peter A. Appel, "The Power of Congress 'Without Limitation': The Property Clause and Federal Regulation of Private Property," *Minnesota Law Review* 86 (November 2001): 22.

[38] Gates, *History of Public Land Law Development*, 50-7.

Independence and established the Mississippi River as the U. S.'s western boundary, Congress passed legislation to achieve these goals. The Land Ordinance of 1785 stipulated how the western lands should be surveyed and divided. The efficient section-township-range system it created remains in effect to this day. The 1787 Northwest Ordinance laid down the terms upon which new states could enter the union "on an equal footing with the original States, in all respects whatever." It required that territories reach a population of 60,000 before applying for admission, prohibited them from interfering with public land disposal, and barred them from taxing public property.[39]

It is unnecessary to review the daunting thicket of rules and regulations Congress implemented to govern the public domain's disposal. Several able scholars have discussed the partisan conflicts surrounding public land prices, squatters, preemption, military bounties for soldiers, the minimum purchase size, and land speculation. Land policies became a partisan political issue no less pivotal than debates over internal improvements, the national bank, slavery, and the tariff. Polarization over such issues pointed to a shift in American political culture as the loosely organized, collegial, and uncompetitive first-party system gave way to a competitive, highly coordinated, and regionally-based system in which universal white manhood suffrage generated high voter turnout and participation by ordinary Americans.[40]

---

[39] Appel, "The Power of Congress," 23-9; and Daniel Feller, *The Public Lands in Jacksonian Politics* (Madison: University of Wisconsin Press, 1984), 5-6.

[40] On public land policy and development, see Everett Dick, *The Lure of the Land: A Social History of the Public Lands from the Articles of Confederation to the New Deal* (Lincoln: University of Nebraska Press, 1970); Feller, *The Public Lands in Jacksonian Politics*; Gates, *History of Public Land Law Development*; Roy M. Robbins, *Our Landed Heritage: The Public Domain, 1776-1936* (Princeton: Princeton University Press, 1942); George M. Stephenson, *The Political History of the Public Lands from 1840 to 1862: From Pre-emption to Homestead* (New York: Russell and Russell, 1917); Payson Jackson Treat, *The National Land System, 1785-1820* (New York: E. B. Treat and Company, 1910); and Raynor G.

National land policy created a multitude of competing interests that often splintered along sectional lines. In the 1820s, western states carved out of the public domain demanded land reforms enabling them to share in a greater portion of the nation's prosperity and population. No one articulated western grievances with more passion and clarity than Sen. Thomas Benton of Missouri. Elected to the Senate following the Missouri Compromise of 1820, the cantankerous and irascible Missourian made liberalizing the terms of public land disposal a personal crusade. Eastern avarice and prejudice, he fulminated, inflated public land prices, priced ordinary settlers out of the market, and biased land distribution in favor of speculators. Statistics on the quantity of unsold public lands lent credibility to Benton's accusations. In addition to the 128 million acres of ceded Indian lands still unavailable to settlers, the 82 million acres of unsold public lands in the three territories and seven public land states dwarfed the 19 million acres (subtracting relinquishments and forfeitures) that had been sold.[41]

Benton proposed two major overhauls. First, he contended that previous reductions in prices and minimum acreage purchase requirements were insufficient. The Land Act of 1796 established a minimum purchasing price of $2 per acre and set 640 acres as the minimum tract size. In 1800, 1804, and 1824, Congress halved the minimum tract size to 320, 160, and finally 80 acres. The 1824 law reduced the minimum price to $1.25 per acre. In 1824, Benton proposed that unsold public lands be offered at a minimum price of 50 cents per acre after five years. Though the proposal elicited little support, the principle that public lands should incur progressive price deductions the

---

Wellington, *The Political and Sectional Influence of the Public Lands from 1828-1842* (Cambridge, Mass.: Riverside Press, 1914).

[41] Feller, The *Public Lands in Jacksonian Politics,* 75-80.

longer they sat on the market unsold—Benton called this idea "graduation"—became the Missourian's most cherished land reform. Second, Benton believed that public land distribution should benefit the settler, not the speculator. Since tariff revenue had produced budget surpluses, public lands were no longer indispensible as a revenue source. Congress, therefore, should give 80 acres to anyone meeting a 3-year residency requirement. An abundance of cheap and easily-available land, he concluded, differentiated corrupt, venal, and tyrannous monarchies from virtuous and egalitarian republics. Benton's greatest political asset was his skill in couching western grievances within a traditional Jeffersonian framework that trumpeted yeomen as the republic's source of virtue and prosperity.[42]

The public land historian Daniel Feller argues that Benton's reform crusade coincided with a "veritable mania" for cheap western lands. Between 1828-33 the legislatures of Alabama, Illinois, Indiana, Louisiana, and Missouri demanded that Congress place them on an "equal footing" with the original thirteen states by ceding the remaining public lands within their borders. Many of those states, as well as the territories of Arkansas and Florida, also supported graduation, free lands for settlers, and preemption rights. Yet their requests fell on deaf ears. As Feller explains: "in the East graduation [and cession] found no friends. Benton spoke of liberating the surplus population of the East, but no one there could see any surplus. Rather, they saw deserted

[42] Ibid., 68-9; and Laura Jensen, *Patriots, Settlers, and the Origins of American Social Policy* (Cambridge: Cambridge University Press, 2003), 140.

farmers, declining property values, glutted crop markets, and stunted manufactures, all attributable to the lure of fertile Western soils."[43]

In 1826, Benton made a last ditch effort to secure additional concessions. He introduced another graduation measure and, in May, took to the Senate floor to lambaste some unidentified eastern conspiracy putting large chunks of the public domain off limits. As soon as Benton recognized that easterners were unlikely to cede the public domain, he floated an apparent compromise. In March 1826, he asked the General Land Office (GLO) to report on the location and quantity of public lands in Missouri and Illinois that "may be unfit for cultivation on account of being wet and marshy, or subject to inundation from the overflowing of the rivers, or covered with standing water in ponds or lakes."[44] The perspective of hindsight, along with the ongoing sectional fracas over public land disposition, yields clues as to Benton's motivations. Recognizing that the prospects for outright cession were doubtful, he hoped to convince Congress to give the states its public swamp and overflow lands "unfit for cultivation." Wetlands cession was thus a bargain for both the federal government and the states. The national government would dispose of wastelands incapable of generating revenue while the states would gain a more equitable share of the public domain.[45]

The GLO dashed Benton's dim hopes for a compromise. In the winter of 1826-7, the GLO's W. McRee responded to Benton's resolution by concluding that it was

---

[43] Gates, *History of Public Land Law Development*, 9; and Feller, *The Public Lands in Jacksonian Politics*, 76-8.

[44] *Senate Journal*, 19th Congress 1st Session, March 31, 1826, p. 217.

[45] In 1850, Benton admitted that the intention of his 1826 resolution was to ensure that public wetlands "pass[ed] out of the hands of the United States" and into the lap of the states. See *Congressional Globe*, 31st Congress, 1st Session, September 17, 1850, 1849. See, for instance, Matthias Nordberg Orfield, "Federal Land Grants to the States with Special Reference to Minnesota," University of Minnesota, Studies in the Social Sciences, *Bulletin* 2 (March 1915): 112.

impossible to evaluate the quantity of public wet or inundated lands "unfit for cultivation" because of ambiguous public land survey laws. Laws required surveyors to note the distance across "swamps, marshes, or inundation tracts" but not to run lines over them unless they intersected with a section or quarter section line. As a result, the only swamps, marshes, small ponds, or inundated lands recorded in surveyor notebooks were those overlapping section or quarter section lines. Moreover, the precise size of those tracts could not be determined unless they intersected a second reference point (such as another section or quarter section line). To conserve time, McRee studied the field notes of the 250 townships bordering the Wabash, Ohio, Mississippi, Illinois, and Missouri Rivers and estimated that they contained 1096 "lakes and ponds, or separate tracts of swamps, marshes, &c." covering an area of 330,414 acres. McRee's report emphasized the manifest difficulty of determining what constituted a wetland "unfit for cultivation" and where they were located without costly new surveys, forcing Benton to abandon his proposal.[46]

Grassroots Dissension and the Passage of the Swamp Land Acts

Scholars have generally cited five general reasons for the passage of the Swamp Land Acts of 1849, 1850, and 1860, which fulfilled Benton's vision of public wetlands cession. First, Margaret Beattie Bogue, Daniel Clynch, and Matthias N. Orfield interpret the laws as the culmination of an attempt by crafty policymakers from public land states

[46] *Senate Document No. 29*, 19th Congress, 2nd Session, 1827, 7-10. Before voting in favor of the Swamp Land Acts of 1849 and 1850, Benton supported an unsuccessful proposal for ceding the Everglades so Florida could sell the lands and invest the revenue in building drainage projects. See William M. Meigs, *The Life of Thomas Hart Benton* (Philadelphia: J. B. Lippincott Company, 1904), 179.

to secure a larger portion of the public domain for their constituents.[47] Second, Ann Vileisis describes the acts as a sincere effort to perpetuate an ideology of agrarianism by converting uncultivable lands into farms.[48] Third, William J. Mitsch and James G. Gosselink argue that the Swamp Land Acts were "designed to decrease federal involvement in flood control and drainage by transferring federally owned wetlands to the states."[49] Fourth, John M. Barry frames the laws from the perspective of the antebellum period's discordant sectionalism. He claims that "eastern politicians acceded to the demands" of Upper Missouri Valley legislators for public wetlands cession to prevent them from "forging a political alliance with the South."[50] Finally, Hugh Prince, Benjmain Horace Hibbard, and Paul Wallace Gates portray the Acts as the product of a combination of historical factors that included Congress's desire to enhance the value of allegedly "worthless" land, improve the atmosphere, and rid itself of lands unlikely to be sold as long as good lands remained abundant and cheap.[51]

---

[47] Bogue qualified her argument by insisting that "it is difficult to determine whether those who urged these measures upon Congress were primarily interested in developing a successful policy for wet-land [sic.] drainage or in securing generous donations of federal land to their States. Possibly they were interested in both." See Bogue, "The Swamp Land Act and Wet Land Utilization in Illinois, 1850-1890," *Agricultural History* 25 (October 1951): 170; Daniel F. Clynch, "An Introduction to Swamp Land Disposal in Iowa: 1850-1880," (M. A. Thesis, State University of Iowa, 1957), 1-2; and Nordberg, "Federal Land Grants to the States with Special Reference to Minnesota," 112.

[48] In her insightful survey of the history of U. S. wetlands, Ann Vileisis mentions several reasons for the passage of the Swamp Land Acts. She nonetheless concludes that supporters of the Acts "drew upon the familiar and common language of agrarianism to understand wetlands. …[Supporters] clarified the reasoning behind the swampland grants: to make swamps suitable for farming." See Vileisis, *Discovering the Unknown Landscape*, 74.

[49] William J. Mitsch and James G. Gosselink, *Wetlands*, 4th ed. (Hoboken, NJ: John Wiley & Sons, 2007), 291.

[50] John M. Barry, *Rising Tide: The Great Mississippi Flood of 1927and How it Changed America* (New York: Simon and Schuster, 1997), 34. O'Neill, *Rivers by Design*, 49, uncritically accepts Barry's argument.

[51] Hugh Prince, *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes* (Chicago: Chicago University Press, 1997), 140-8; and Benjamin Horace Hibbard, *A History of*

Except for the third and fourth explanations, all of these reasons have enriched our understanding of the events surrounding the passage of three of the most important natural resource laws in American history. The contention of Mitsch and Gosselink that the laws symbolized an attempt to "decrease" the federal government's role in drainage and flood control is historically inaccurate since Congress deferred to local communities in these matters prior to mid-century. Barry's suggestion is baseless and uncorroborated by the historical record. An analysis of the roll call votes for the Swamp Land Acts and a close reading of the congressional debates reveal that eastern congressmen were the primary *opponents* of federal wetlands cession. In any case, the historiography of national wetlands policy has largely overlooked the initial impetus for the Swamp Land Acts: grassroots anger over the interference of federal landownership with local water management. From 1827-1849 unaffiliated southern and western communities argued that Congress's dilatoriness in disposing of publicly-owned wetlands imposed undue financial and medical hardships on their communities and put them at a competitive disadvantage in recruiting settlers with eastern states where drainage was not encumbered by federal land ownership. Since farmers and plantation owners sometimes invested their own time and money in building drainage ditches and levees on federal land, they argued that Congress should cede all public wetlands as compensation for their efforts.

Louisiana was the first state to express outrage over the state of affairs. In 1828, angry state legislators demanded that Congress explain why half of the public lands in Louisiana remained unsurveyed and unsold. The "peculiar" situation inhibited

---

the Public Land Policies (New York: The MacMillan Company, 1924), 270. Gates lists several reasons for the passage of the Swamp Land Acts before wryly concluding that "Congress seemed only too glad to dump the swamplands on the states, thereby ridding itself of any further obligation for them." See Gates, *History of Public Land Law Development*, 323.

Louisiana's settlement, impeded the production of agricultural commodities, and burdened landowners with "great losses" and "inconveniences." Forced to build levees on adjacent public lands to protect their own property, riparian plantation owners deserved relief:

> In order to protect their own plantations from inundation, [riparian proprietors] have had to raise and keep in repair, embankments in front of the public lands that lie on the margins of water-courses; to procure the necessary intercourse between the different parts of the State, and to communicate with their home markets, they have been obliged to build bridges and open public roads on those lands, and more than one-half of the whole male population of Louisiana, from sixteen to forty-five years, have, for the last ten years, and at this time do work at least five days in the year to the making and repairing of those roads, bridges, and embankments on the public lands alone.[52]

Within a decade, local communities from other public land states joined the angry chorus of discontent. The small trickle of petitions to Congress that demanded some form of assistance with drainage and flood control quickly turned into a flood. During the late 1830s and 1840s, nearly four dozen petitions and resolutions from state legislatures, counties, local drainage conventions, and private citizens poured in to Congress from Arkansas, Florida, Illinois, Indiana, Iowa, Louisiana, Mississippi, Missouri, and Wisconsin. The petitions most commonly asked for Congress to subsidize drainage in public land states by ceding its "worthless" and "refuse" wetlands so the states or counties could sell them and then invest the revenue in building their own drainage projects. Other petitions favored the creation of a national drainage program, sharp reductions in the price of unsold swamplands, or congressional authorization to build drainage works on federal lands.[53]

---

[52] *Senate Document 10*, 20th Congress, 2nd Session, 1828, 1.

[53] For the motions, resolutions, and memorials sent to Congress regarding drainage, cession, and public wetlands, see *House Journal*, 21st Congress, 2nd Session, December 17, 1830, 77, 23rd Congress, 2nd

Petitioners routinely emphasized how unsold public wetlands represented a menace to everyday life. Wetlands impeded commerce, disrupted travel, complicated road construction, locked otherwise arable land out of agricultural production, saturated the atmosphere with miasmas, and provided sanctuary for vicious predators that preyed on livestock and other domestic animals. In 1841 and again in 1842, for instance, citizens of Scott County, Missouri, asked Congress for an appropriation "for the purpose of draining certain marshes … belonging to the United States, and situated in their

---

Session, December 27, 1834, 133, 25th Congress, 2nd Session, January 2, 1838, 185, 26th Congress, 1st Session, February 5, 1840, 205, February 6, 1840, 334, February 24, 1840, 434, July 21, 1840, 1345, 26th Congress, 2nd Session, December 16, 1840, 49, December 31, 1840, 123, 27th Congress, 2nd Session, December 15, 1841, 67, March 14, 1842, 529-30, 28th Congress, 1st Session, March 25, 1844, 659, 28th Congress, 1st Session, April 30, 1844, 862, 29th Congress, 1st Session, December 11, 1845, 80, December 30, 1845, 76, January 13, 1846, 237, 29th Congress, 2nd Session, January 2, 1847, 124, January 27, 1846, 311, 30th Congress, 1st Session, December 18, 1847, 111, January 17, 1848, 240, February 7, 1848, 370, April 18, 1848, 702, July 11, 1848, 1021, 30th Congress, 2nd Session, December 18, 1848, 111, February 14, 1849, 445, March 3, 1849, 669, 31st Session, 1st Congress, December 31, 1849, 198-9, February 1, 1850, 445, February 25, 1850, 601, July 5, 1850, 1081; and *Senate Journal* 22nd Congress, 1st Session, March 27, 1832, 210, 25th Congress, 2nd Session, March 1, 1838, 257, 26th Congress, 2nd Session, February 5, 1841, 163, 27th Congress, 3rd Session, December 22, 1842, 43, February 15, 1843, 176, 29th Congress, 1st Session, March 9, 1846, 182, March 16, 1846, 192, June 26, 1846, 368, 29th Congress, 2nd Session, January 4, 1847, 77, 79, February 25, 1847, 226, 30th Congress, 1st Session, February 29, 1848, 194, 30th Congress, 2nd Session, December 19, 1848, 68, 31st Congress, 1st Session, January 3, 1850, 47. The congressional serial set also recorded several of the memorials and petitions. See *Public Land Document No. 1345*, 24th Congress, 1st Session, December 16, 1835, 245-6, *Public Land Document No. 1454*, 24th Congress, 1st Session, 511, *Public Land Document No. 1535*, 24th Congress, 1st Session, June 1, 1836, 709-11, *Public Land Document No. 1572*, 24th Congress, 2nd Session, January 23, 1837, 929, *House Document No. 168*, 25th Congress, 2nd Session, January 16, 1838, *House Report No. 351*, 25th Congress, 3rd Session, January 2, 1839, *Senate Document No. 163*, 26th Congress, 2nd Session, December 12, 1840, *House Report No. 586*, 27th Congress, 2nd Session, April 12, 1842, *Senate Document No. 174*, 27th Congress, 3rd Session, February 15, 1843, *House Document No. 27*, 29th Congress, 1st Session, December 11, 1845, *Senate Document No. 79*, 29th Congress, 1st Session, January 20, 1846, *Senate Document No. 213*, 29th Congress, 1st Session, February 18, 1846, *Senate Document No. 225*, 29th Congress, 1st Session, March 16, 1846, *House Document No. 180*, 29th Congress, 1st Session, April 6, 1846, *House Document No. 27*, 29th Congress, 2nd Session, January 2, 1847, *Senate Document No. 30*, 29th Congress, 2nd Session, January 4, 1847, *Senate Document No. 31*, 29th Congress, 2nd Session, January 4, 1847, *Senate Document No. 200*, 29th Congress, 2nd Session, February 25, 1847, *House Miscellaneous Document No. 39*, 30th Congress, 1st Session, March 8, 1848, *House Miscellaneous Document No. 108*, 30th Congress, 1st Session, March 31, 1848, *House Miscellaneous Document No. 79*, 30th Congress, 1st Session, May 3, 1848, *Senate Miscellaneous Document No. 69*, 30th Congress, 1st Session, February 29, 1848, *Senate Miscellaneous Document No. 108*, 30th Congress, 1st Session, March 31, 1848, *House Miscellaneous Document No. 16*, 30th Congress, 2nd Session, January 25, 1849, *Senate Miscellaneous Document No. 55*, 30th Congress, 2nd Session, February 16, 1849.

immediate vicinity."[54] Two 1844 petitions from Indiana citizens implored Congress to pass "some regulation for the drainage of the wet lands" in Fort Wayne and Winnamac land districts.[55] In 1848, St. John's County, Florida, settlers asked Congress to give them a land grant to defray the cost of draining the "Twelve-mile Swamp."[56] The following year Winnebago County, Wisconsin, residents implored the national government to subsidize the drainage of a shallow lake with a land grant.[57]

Missouri's General Assembly spearheaded the push for cession. Assemblymen deplored the extensive overflow lands in the Southeast Missouri Lowland counties of Cape Girardeau, New Madrid, Scott, Stoddard, and Wayne. Periodic overflows from the St. Francis River and smaller streams flanking the eastern side of the Ozark Mountains inundated the lower-elevated counties, creating a patchwork of scattered swamps, lakes, and marshes. The Assembly complained that the submerged lands retarded settlement, rendered potentially fertile tracts uncultivable, depreciated the value of adjacent property, hindered travel, and injured public health. Local newspapers supported the Assembly's grievances. In 1845, the *St. Louis New Era* editorialized that the federal government, by leaving large blocks of public wetlands undeveloped or unsold, was indirectly culpable for killing "hundreds" of Missourians:

> The Great Swamps that extend over many counties in south east Missouri … are well worthy of the serious consideration of members of Congress. It is very clear that those extensive swamps have an evil influence on the health of several States, and prevent much rich land from being cultivated and improved. The lives of

---

[54] The petitions quoted in this section represent but a small sampling of the larger body of grassroots appeals and memorials to Congress. *House Journal*, 27th Congress, 2nd Session, December 15, 1841, 67, and March 14, 1842, 529.

[55] *House Journal*, 28th Congress, 2nd Session, April 30, 1844, 862.

[56] Ibid., 30th Congress, 1st Session, July 11, 1848, 1021.

[57] Ibid., 30th Congress, 2nd Session, March 3, 1849, 669.

> hundreds of excellent citizens are annually lost, by reasons of the exhalations from these morasses.[58]

In 1840 and again in 1843, the Assembly memorialized Congress to donate all "marshy lands" to the five counties on the condition that they immediately sell the lands and invest the revenue in drainage. By 1847, the Assembly applauded its own efforts and anticipated that federal wetlands cession was inevitable. In preparation for receiving federal land subsidies, assemblymen created county boards of internal improvements with the eventual responsibility of draining swamps, marshes, and other lowlands using revenue obtained from selling or leasing donated public lands.[59]

Preoccupied with debates over the expansion of slavery into western territories, preemption, internal improvements, and the fate of Texas, Congress waited a full year to respond to the Assembly's initial memorials. After evaluating GLO records, the House Committee on Public Lands issued a seminal report, written by Missouri Democrat John Jameson, estimating that 3/5 of the 90 townships in Cape Girardeau, New Madrid, Scott, Stoddard, and Wayne counties were too swampy and unhealthy for settlement—a wasteland incapable of providing anything but a "precarious subsistence" for hunters and trappers pursuing bison, elk, and deer herds. The Jameson report doubted that public land sales could offset the costs of necessary new surveys. The issue was one of supply and demand. As long as productive lands remained elsewhere, settlers had little incentive to settle on marginal lands and Congress had little reason to subsidize drainage.[60]

---

[58] Quoted in *Jeffersonian Republican* (New Orleans, Louisiana), November 25, 1845.

[59] For the full text of the Assembly's memorials, see *Senate Document No. 163*, 26th Congress, 2nd Session; and *Senate Document No. 174*, 27th Congress, 3rd Session. See also Leon Parker Ogilvie, "Governmental Efforts at Reclamation in the Southeast Missouri Lowlands," *Missouri Historical Review* 64 (January 1970): 159.

[60] *House Report No. 310*, 28th Congress, 1st Session, March 15, 1844, 1-2.

Constitutional questions weighed just as heavily on Jameson as fiscal politics. Jameson never called federal drainage "unconstitutional," but his conclusion that it was "not good policy for the General Government to enter upon this improvement" indicated his preference to avoid a contentious, bitter, and lengthy constitutional debate on the propriety of nationalizing drainage. At the same time, Jameson rejected the idea that Congress could continue to depend solely on local communities to remove surface water. National policymakers had the authority to subsidize wetlands drainage with land grants just as it did canals, roads, and other internal improvements. Since wetlands interfered with travel and the efficient movement of goods, drainage projects were no less deserving of liberal subsidies. Like the vast majority of antebellum Americans, Jameson viewed wetlands drainage as an indispensible component of wise environmental stewardship. It was thus necessary, appropriate, and just for Congress to ensure that its land policies did not hamper wetlands conversion in any American community. The Jameson report's final recommendation that Congress transfer alternative sections of public land in the five counties to Arkansas and Missouri (but not the counties, as the Assembly requested) "for the purpose of draining the swamp" was predictable given cultural prejudices towards wetlands and constituted Congress's first definitive statement on national wetlands policy.[61]

Congress Yields to Grassroots Pressure

In the 1840s, mounting grassroots enthusiasm for national wetlands cession coincided with a campaign orchestrated by Mississippi Valley communities clamoring for federal aid for river improvements. Organized by civic commercial associations and

[61] Ibid.

local governments, river aid advocates insisted that federal river and harbor appropriations disproportionately favored the northeast, that Congress had a responsibility to promote commerce through the improvement of interstate rivers, and that flood control deserved federal funding to keep rivers from shifting courses and disrupting travel, agriculture, and public lands disposition. Politicians, civic leaders, landowners, levee district managers, steamboat corporations, and local businessmen organized and attended river improvement conventions in Cincinnati (1842), Memphis (1844, 1845, and 1846), Chicago (1847, 1850), Evansville, Indiana, (1850), and Burlington, Iowa, (1851) prior to the Civil War. Along with a series of devastating Mississippi River floods during the 1840s, southern and Midwestern river aid advocates attracted the attention of many prominent and local congressmen. Senator John C. Calhoun of South Carolina and Congressman Abraham Lincoln attended conventions while former President Martin Van Buren, Henry Clay, and Daniel Webster sent letters endorsing more assertive federal action.[62]

Following the conclusion of the Mexican War (1846-48), Congress bowed to public pressure and revisited the issue of public wetlands cession. In the summer of 1848, the Senate considered the proposal of Sen. Solon Borland, an Arkansas Democrat and physician, to "grant to the State of Arkansas certain unsold lands subject to overflow, for the purposes of internal improvement, education, and for other purposes."[63] Demands from other Senators persuaded Borland to expand the bill's scope to "useless lands in the

[62] O'Neill, *Rivers by Design*, 44-8, 187-9; Cynthia R. Poe, "Reconstructing the Levees: The Politics of Flooding in Nineteenth-Century Louisiana," (PhD diss., University of Wisconsin, 2006), 85-8; and George S. Pabis, "Delaying the Deluge: The Engineering Debate over Flood Control on the Lower Mississippi River, 1848-1861," *The Journal of Southern History* 64 (August 1998): 429.

[63] *Congressional Globe* [hereafter cited as *CG*], 30th Congress, 1st Session, August 5, 1848, 1043.

adjoining States."[64] Democratic southerners commended the measure for promising to transform miasmatic wastelands into productive farms at no cost to the federal treasury. Florida's James Diament Westcott, Jr., endorsed cession as the best strategy for eliminating wetlands since a federal program would "require ten regiments of topographical engineers, and a hundred millions of money."[65] Two of Westcott's fellow Democrats, Jefferson Davis of Mississippi and William Rufus de Vane King of Alabama, agreed that drainage was beyond the means of Congress or private enterprise. Only the states had the constitutional authority, resources, and financial incentive to carry out the plan. "If the States would do this," King concluded, "it was the only way in which the lands could be made valuable."[66] Henry Johnson, a Louisiana Whig, insisted that drainage was vital to his constituents' welfare since miasmas generated by periodic floods and swamps compromised Louisiana's atmospheric quality.

The initial bipartisan efforts attracted little support and Borland's bill languished without an up or down vote. Reevaluating their strategy, proponents of cession rallied behind a bill *only* applicable to Louisiana. Louisiana offered a unique test case since its residents, having invested large sums of money in building levees on federal land, could claim a legitimate grievance. In early 1849, Louisiana Rep. John Henry Harmanson requested a vote on a proposal to donate all public wetlands in Louisiana to the state so it could sell them to raise revenue for "the necessary levees and drains."[67] Praising the Herculean flood control efforts of plantation owners, he argued that Congress owed them

---

[64] *CG*, 30th Congress, 1st Session, August 7, 1848, 1047.

[65] Ibid., 1048.

[66] Ibid.

[67] H. R. 635 (Harmanson), 30th Congress, 1st Session, August 8, 1848, 1.

the remaining public swamplands as "compensation for the cost of reclaiming them."[68] According to Harmanson, other states benefitted from Congress's liberal policy of granting public lands to construct internal improvements. Ohio (1.26 million acres), Indiana (1.47 million acres), Wisconsin (858,000 acres), and Iowa (825,000 acres) had up to that time received lavish grants for canal, road, and turnpike construction. Since wetlands obstructed travel and commerce, drainage represented an internal improvement no less deserving of federal land subsidies. In Harmanson's opinion, there was no reason for representatives from states benefitting from congressional largesse to block Louisiana's request, especially since "the grants made to the above named States were choice lands, while those now asked for by Louisiana are utterly worthless."[69]

The House Committee on Public Lands endorsed Harmanson's arguments. The committee's chairman, Rep. Richard Brodhead of Pennsylvania, marveled at the debt incurred by Louisianans in building levees. By the beginning of 1848, they had erected 1400 miles of levees along the Mississippi River's west bank and tributaries at a princely sum of $2,464,000. The average levee measured 10 feet wide at its top, 30 feet wide at its base, and 4 ½ feet in height, totaling an aggregate of 24,640,000 cubic yards of soil. Brodhead wildly speculated that Louisianans' had reclaimed 2.7 million of the state's 5.4 million acres of wetlands. Since the public domain comprised most of the improved land, the levees enhanced the marketability of federal lands at no cost to Congress. Brodhead concluded that Louisiana was "equitably entitled" to a grant of all the public swamplands

[68] *CG*, 30th Congress, 2nd Session, February 24, 1849, 592.

[69] J. H. Harmanson to Richard Brodhead, July 1848, in Ibid., 6.

within its boundaries as reimbursement. The chairman also suggested that, in time, Congress should expand the program to other public land states.[70]

Opponents of public wetlands cession lambasted the plan's ambiguity and unprecedented magnitude. Whig Rep. Samuel F. Vinton of Ohio objected because Congress had not precisely defined what constituted a "swamp land unfit for cultivation." The most prescient and informed skeptic of public wetlands cession, Vinton understood that "swamplands," "inundated lands," and "overflow lands" were imprecise and vague terms subject to multiple interpretations. Could Louisiana claim a valuable piece of land as a "swampland unfit for cultivation" if it was subject to an hour-long inundation while a river was in spate? No one knew and the bill's ambiguous terminology made Congress vulnerable to the machinations of rapacious speculators and dishonest state officials. Vinton prophetically predicted that cession threatened to "arrest all the sales of the public lands" in Louisiana if disputes between it and Congress over whether a tract qualified for cession lingered.[71] At the very least, the program would require Congress to underwrite expensive new surveys to determine, with precision and clarity, which lands met Congress's criteria or the system of public land disposal might be thrown into chaos and shut down.

Vinton's second objection focused on the propriety of transferring so much land to the states. Donating public wetlands to Louisiana would establish a "principle" that other public land states (and newly-admitted states) would invoke to pry as much land as possible from Congress. Certain that Congress would expand cession to other public land states—as Borland's bill actually envisioned—Vinton emphasized that "three-fourths of

[70] *House Report No. 816*, 30th Congress, 1st Session, August 8, 1848, esp. 4.

[71] Ibid., 591.

all the public lands in Florida, Alabama, Arkansas, and perhaps other states were unfit for cultivation." It was foolish, shortsighted, and wrongheaded for Congress to divest itself of public wetlands "without knowing anything about the[ir] extent." The law threatened to turn the nation's centripetal land policy centrifugal and empower the states at the federal government's expense.[72]

Vinton's warnings fell on deaf ears. On February 24, 1849, the House passed Harmanson's bill by a largely sectional vote of 100 to 61.[73] Democrats (65 affirmative votes) and Whigs from states with significant quantities of public wetlands (12 affirmative votes) provided the bulk of the bill's support. Opposition clustered around Whigs (49 negative votes) and Democrats from nonpublic land states (12 negative votes). Approved by the Senate and signed into law by President James K. Polk on March 2, the "Act to aid the State of Louisiana in draining the Swamp Lands therein" dedicated all of the "swamp and overflow lands" that "may be or are found unfit for cultivation" to Louisiana so it could sell the lands and invest the revenue "exclusively" in building ditches and levees.[74] As Vinton had warned, congressmen from Mississippi, Arkansas, Missouri, and Indiana immediately maneuvered to capitalize on the positive sentiment.[75] Faced with such pressure, the Senate agreed to take up Borland's new proposal to transfer

---

[72] Ibid., 591-2. Vinton elaborated on how granting public swamplands to Louisiana would create a domino effect with new states demanding similar concessions: "If the principle [of wetlands cession] were once established, of ceding the public lands to the States because they are unfit for cultivation, large portions of the public lands would be claimed … and members from the new States would be instructed to procure such grants. The precedent would be perfectly irresistible, and Congress could not refuse to vote these grants to all the States."

[73] The results of the House vote are recorded in *CG*, 30th Congress, 2nd Session, February 24, 1849, 592.

[74] *U. S. Statutes at Large* 9 (Act of 2 March 1849) 352.

[75] See, for instance, *CG,* 31st Congress, 1st Session, December 31, 1849, 90, January 22, 1850, 198, January 28, 1850, 232, February 6, 1850, 294, and February 27, 1850, 430.

public wetlands to Arkansas so it could use the revenue from those lands to "execute a system of embankments … for the protection of said lands from overflow and reclamation from their present valueless condition."[76] Before favorably reporting the bill, the Senate Committee on Public Lands extended its provisions to "other States of the Union in which such 'swamp lands' … may be situated."[77]

As a leading proponent of expanding the program, Borland mocked the idea that Congress's power over the nation's waters began and ended with those deemed "navigable." As he explained to incredulous easterners, who increasingly viewed cession as a gigantic land grab, the Commerce Clause justified federal intervention in the West:

> Our western rivers have soft, alluvial, sandy bottoms, easily and frequently changing, alternately, into channels and bars, under the action of the current, especially during floods and overflows. They have also soft, alluvial banks, which, when overflowed for any length of time … become saturated with the water, and, yielding to the combined force of the weight and rapidity of the current, are broken down and swept off. How often are these occurrences witnessed! How disastrous have they not proven, alike to the planters on the bank of the river and to the vessels which navigate it! Not a flood has ever come and gone without changing … the channels of the rivers—often in a manner to defy the skill of the most experienced pilots.[78]

Unpredictable and capricious, western rivers disrupted commerce on water and land by overflowing their banks, changing courses, and inundating adjacent floodplains. Western steamboat operators suffered significant financial hardships since their insurance rates were double those of eastern competitors. Furthermore, once waters escaped the banks of rivers, they diffused over the surface of the land, ruining crops, impeding the movement

---

[76] S. 3 (Borland), 31st Congress, 1st Session, December 27, 1849, 1.

[77] *Senate Report No. 19*, 31st Congress, 1st Session, January 28, 1850; and S. 3 (Borland), 31st Congress, 1st Session, December 27, 1849, 3. Among making other changes, the committee inserted a section into the original bill stating that "the provisions of this act be extended to, and the benefits be conferred upon, *each of the other States of the Union* in which such 'swamp lands,' known and designated as aforesaid, may be situated." Emphasis added.

[78] *Senate Report No. 19*, 31st Congress, 1st Session, January 28, 1850, 1-2.

of goods and products, and releasing "miasmatic exhalations" into the atmosphere that "spread over all the adjacent country, for many miles around."[79]

According to Borland, the Property Clause offered another potential avenue for federal intervention. In his thoughtful study of the Property Clause, the legal scholar Peter A. Appel argues that courts and legislators have traditionally applied the clause broadly: "The federal government possesses both proprietary and sovereign powers over its property, can regulate activities on privately owned lands that affect its lands, and exercises the equivalent of the police power in this area."[80] Borland insisted that the Property Clause conferred sweeping authority on Congress to improve the public domain: the "authority of the government to execute the proposed work of reclaiming these lands…will hardly be questioned. That such authority, as a general power, attaches to the government, as a land proprietor, will, it is believed be admitted by all."[81] As a landowner, the national government enjoyed the same rights and privileges to improve its property as individual landowners.

Public health improvement also justified federal involvement. By eliminating the source of unwholesome miasmas, drainage benefitted the health of rural and nearby urban communities and, in Borland's words, "promote[d] the general welfare." The physician and Senator did not elaborate on this statement, but it suggests that in his reading of the Constitution the General Welfare Clause justified a national drainage program. Atmospheric reform had finally been taken up in the halls of Congress.[82]

---

[79] Ibid., 2.

[80] Appel, "The Power of Congress 'Without Limitation,'" 4. See also pp. 8-9.

[81] *Senate Report No. 19*, 31st Congress, 1st Session, January 28, 1850, 3.

[82] Ibid., 3.

Prevailing nineteenth-century explanations for disease armed proponents with a powerful weapon. It was bad enough, westerners and southerners emphasized, that the glut of federal land slowed population growth in their sections. But the threat posed to public health by vacant and undeveloped wetlands was even more terrifying. Miasmas and malaria discharged by swamps and overflow lands sickened nearby communities, depressed the values of neighboring plantations and farms, and, in the opinion of Mississippi Sen. Jefferson Davis, rendered adjacent lands "so unhealthy that lands susceptible of cultivation cannot be occupied."[83] During the Senate debate on Borland's bill, proponents invoked prevailing medical ideas to frame the discussion from the perspective of public health. Champions of cession demonized swamps and riparian lands subject to flooding as "a fertile cause of disease"; "generative of noxious influences which were injurious to human health"; "prolific source[s] of disease"; "fruitful promoters of disease and death"; and "pestilential to the people of the country."[84] Since the destruction of wetlands was a matter of life or death, congressmen had an ethical obligation to act. On June 13, 1850, the Senate agreed and passed Borland's measure.[85]

No Congressman or Senator seriously challenged the premise that all of the nation's wetlands should be drained. The only unanswered questions were whether wetlands drainage outside of Louisiana warranted federal land subsidies like canals, roads, and railroads and whether it was appropriate to donate such a large and indefinite

---

[83] *CG*, 31st Congress, 1st Session, June 13, 1850, 1192.

[84] The quotes are respectively from Sen. Borland (Arkansas), Sen. Henry S. Foote (Mississippi), Sen. Borland, Rep. James B. Bowlin (Missouri), and Sen. Benton (Missouri). For a sampling of the references in the Senate and House of Representatives to the association between wetlands and disease, see *CG*, 30th Congress, 1st Session, August 8, 1848, 30th Congress, 2nd Session, February 24, 1849, 592, February 26, 1849, 594, 31st Congress, 1st Session, June 13, 1850, 1191-2, September 16, 1850, 1826, and September 17, 1850, 1848-9.

[85] Ibid., 31st Congress, 1st Session, June 13, 1850, 1192.

quantity of land to the states. Before considering the Senate version of the bill, the House of Representatives asked its Committee on Public Lands to study the question. In explaining his committee's favorable report, James B. Bowlin, a Missouri Democrat who a few years earlier participated in local drainage conventions in his home state, described why drainage was meritorious of federal subsidization.[86] Bowlin recognized that the primary question involved was one of power and taxation. Draining swamps and marshes in the original thirteen states, he explained, encountered few jurisdictional difficulties as long as legislatures passed appropriate laws that collectivized the costs and responsibilities of drainage. In public land states, the patchwork of federal, state, and private land ownership undermined surface water removal since states could not forcibly include federal property within levy districts, ditch enterprises, or commissions of sewers. "The people of the [public land] sections affected by" wetlands, Bowlin explained, "cannot reclaim them, alike from the wants of means and that legitimate organization so essential to the prosecution of a great work."[87] Even if citizens in public land states mobilized the capital and "legitimate organization" necessary to build drainage and flood control projects, the fruits of their labor would unfairly benefit an absentee landowner—the federal government—and settlers who later purchased those lands from Congress. Bowlin found this arrangement intolerable because it violated the unstated principle of proportionality holding that land conservation costs should be shared proportionally by *all* benefitting landowners. In Bowlin's opinion, forcing citizens to improve public land

[86] Bowlin echoed many of the committee's findings during his speech on the floor of the House of Representatives. For the committee's report, see *House Report No. 108*, 31st Congress, 1st Session, February 20, 1850.

[87] *CG*, 31st Congress, 1st Session, September 16, 1850, 1826.

without direct compensation or some form of subsidization was inequitable, unjust, and discriminatory.

> The case [of drainage] is wholly different in the new States, where the land is owned, and its primary disposal regulated by a Government separate, in some respects, to that which enjoys the possession of the soil. There, if [farmers] reclaim [wetlands], the profits of their own labor do not inure to their own benefit, but to the benefit of others *who contribute nothing to produce it*… It is true, that if this Government will cling to [public wetlands] with a miser's grasp, that in the course of time necessity will compel the States, in preserving the health of their citizens, to reclaim them, and this Government will be able to make a profitable speculation upon their labor; but such a course is too obviously unjust to merit a consideration for a moment … [A]nd yet, by inactivity upon this subject, and slumbering quietly over the frequent applications of the States interested to do something in this matter, we are daily, by non-action, carrying out the obnoxious doctrine.[88]

Sympathy for rural Americans in public land states inspired Bowlin's favorable report. The chairman singled out the industry of Ohio farmers and Louisiana plantation owners. Ohioans had drained a tremendous quantity of public lands without receiving any compensation while the costly erection of levees by Louisianans had "necessarily reclaimed millions of acres, which were subsequently surveyed and sold by this Government."[89] Bowlin insisted Congress had two options: create a national program to drain the public domain or cede them to the states. Although Bowlin and a handful of other congressman favored nationalization, the objections of skeptical colleagues persuaded him to support cession since a constitutional debate on the issue "would keep [federal drainage] forever an open question, whilst the people would be left to suffer all the inconveniences."[90] Little wonder Bowlin recommended the speedy passage of the Senate bill. "All [the states] ask," the Missourian explained, "is [for] the assurance that if

---

[88] Emphasis added. Ibid.

[89] Ibid.

[90] Ibid.

they spend their means in reclaiming lands utterly worthless in their present condition … that they shall have, as a source of reimbursement in part, all the lands they redeem from the water and render fit for habitation and cultivation."[91]

On September 17, 1850, the House of Representatives passed the second Swamp Land Act by a wide margin of 120-53. Opposition was bipartisan (19 Democrats, 32 Whigs, and 2 Free Soilers) and confined almost exclusively to congressmen representing eastern states. Indeed, only three representatives from public land states that eventually received federal swampland grants dissented (Vinton, Ohio; Nathan Evans, Ohio; and Jacob Thompson, Mississippi). The law ceded "the whole of those swamp and overflowed lands, made unfit thereby for cultivation" to Arkansas, Alabama, California, Florida, Illinois, Indiana, Iowa, Michigan, Mississippi, Missouri, Ohio, and Wisconsin on the condition they "exclusively" dedicate the revenue raised from the sale of those lands to building drainage projects.[92] In 1860, Congress passed the third and final Swamp Land Act, extending the program to Minnesota and Oregon.[93] Envisioning a partnership between the federal and state governments, the Swamp Land Acts intended to ensure that Americans in public land states would never again bear responsibility for draining wetlands or building levees. The federal government contributed the funding, in the form of public land subsidies, and the fifteen states would create the administrative machinery necessary to carry out Congress's drainage mandate. The GLO, the agency supervising the states' selection of public "swamp and overflowed lands," instructed states to choose one of two methods to make their selections. First, they could use the original field notes

---

[91] Ibid.

[92] *Stats at Large of USA* 9 (Act of 28 September 1850) 519.

[93] *Stats at Large of USA* 12 (Act of 12 March 1860) 3.

of government surveyors. Any lands designated as swamps on the notes could be claimed. Second, the states had the option of employing their own agents to determine the precise location of "swamp and overflowed" lands within their boundaries. Not surprisingly, most states hired their own agents and, as will be discussed, used dubious strategies to acquire millions of acres that were productive, valuable, and in no way "swamp and overflowed."

Historians and the Swamp Land Acts

Studies of national wetlands policy focus narrowly on the pervasive fraud and graft that accompanied the Swamp Land Acts' administration. It is indisputable that the laws enabled cattle barons, speculators, state and national officials, timber companies, and lawyers hired by states to select swamplands to perpetuate one of the most egregious and criminal land thefts in American history. Loopholes in the Swamp Land Acts permitted swindlers to secure title to extensive stretches of the public domain that were perfectly dry, arable, and productive. In one of the most notorious examples, western cattle baron Henry Miller, the co-proprietor of the Miller and Lux Corporation, attached a boat to the top of an overland wagon pulled by mules and rode over choice sections of the Oregon countryside. Since he had "sailed" over the lands in question, Miller claimed that they were "swamp and overflowed" and thus available for public auction. Some of the most poorly-written laws in American history, the Swamp Land Acts symbolized congressional incompetence and ineptitude. By failing to define what constituted "swamp and overflow" lands or making states demonstrate a record of compliance before applying for additional grants, Congress enabled land grabbers and hucksters like Miller

to defraud the federal government of millions of acres. In 1868, a congressional investigation revealed that at least half of the lands ceded under the Swamp Land Acts were in the hands of speculators. In 1871, Indiana Rep. George Washington Julian, the chairman of the House Committee on Public Lands, summarized the program's sordid track record:

> I was in Congress when the [Swamp Land] act of 1850 was passed ... It was said that these swamp lands, which were then supposed to be located mainly in the South, would be used in repairing the levees of the Mississippi, and in rendering that section of our country healthy and salubrious by draining off the water; but while the levees have not been built, nor the country rendered healthy by drainage, millions of acres of dry and excellent land have been bought from the States as swamp, at prices next to nothing, through the machinery of the swamp-land laws, and are held as great monopolies to-day by men who will neither sell the land to those who want homes nor till it themselves. It was said that no difficulty could arise in distinguishing swamp and overflowed from dry lands … but this assertion was based upon the extremely violent presumption that Government surveyors would prove to be honest and incorruptible men, who would not take bribes from thieves.[94]

Julian's bill to streamline the process of swampland selection by defining what constituted a "swamp and overflowed" parcel failed, and Congress did not seriously consider reform again until 1906.

As appalling, scandalous, and reprehensible as the conduct of speculators and corrupt state government officials was, the troubled disposition of the nation's wetlands was symptomatic of larger structural flaws in the administration of nineteenth-century public lands. Indeed, the most surprising thing about scholars' indignation is that they have been surprised at all. As Paul Wallace Gates, the eminent public lands historian, puts it: "The early experience of the states in land administration reflect[ed] little vision

---

[94] *Appendix to the CG*, 41st Congress, 3rd Session, March 3, 1871, 285. On the 1868 congressional investigation, see Hibbard, *A History of the Public Land Policies*, 281 n. 21. On Miller's fraudulent selections, see Nancy Langston, *Where Land and Water Meet: A Western Landscape Transformed* (Seattle: University of Washington Press, 37; and David Igler, *Industrial Cowboys: Miller & Lux and the Transformation of the Far West, 1850-1920* (Berkeley: University of California Press, 2001), 60.

or long range planning, a tendency to rush into leasing or selling without proper consideration of the effects of policies being adopted, and careless management of the funds received from sales and leases. Too frequently, legislatures and public officers appeared to shape policies that would enable them to profit personally."[95] In short, there is no denying the tremendous fraud and criminal conspiracies committed by state, federal, and local officials and speculators. The real victims in this shameful chapter of American history were the future generations of homesteaders pushed onto marginal lands and robbed of the opportunity to take up a fertile piece of land.

Nevertheless, the narrow focus on the fraudulent disposition of the nation's swamplands has blinded many historians to the laws' broader impact on water resource administration, state building, and American federalism. One of the notable exceptions is Ann Vileisis's historical survey of American wetlands. Vileisis argues that the Swamp Land Acts were "revolutionary" because they compelled Americans to "accept a whole new vision of the proper role of state government."[96] While it is true that the Acts envisioned a new form of water resources management in public land states, most states, with the exception of Louisiana and Arkansas, never created the administrative machinery necessary to comply with Congress's drainage mandate. Instead, most states used their swamp land grants for every purpose but draining swamps. The wetlands paid for public schools, seminaries, benevolent institutions, harbor improvements, and railroad, bridge, road, and public building construction. The misappropriation of funds reveals that in clamoring for cession, state policymakers, unlike the local communities they represented, sought to extract their pound of flesh from a central government whose

[95] Gates, *History of Public Land Law Development*, 336-39, quote at 337.

[96] Vileisis, *Discovering the Unknown Landscape*, 79.

land policies they perceived as venal, inequitable, and inimical to their interests. They judged the building up of local public infrastructure as a higher priority than draining miasmatic wetlands. In any case, the failure of most states to live up to their responsibilities eventually reverted authority for land drainage back to local communities. The Swamp Land Acts were "revolutionary" more in theory than in effect.[97]

The failure of individual states to comply with Congress's mandate is just as much a part of the Swamp Land Acts' troubling legacy as the actions of speculators and venal public officials. The next section provides a brief overview of how program states, excepting Louisiana and Arkansas, evaded their responsibilities and used their grants for every purpose but drainage.

Indiana

Under the 1850 Swamp Land Act, Indiana secured title to 1,254,271 acres of "swamp and overflowed" lands.[98] The bulk of the grant was located in the state's flat northwestern corner, where the Kankakee River, following an aimless course, overflowed sections of Fulton, Jasper, Newton, Porter, Pulaski, and St. Joseph counties. Corruption, graft, and fraud plagued Indiana's grant disposal and administration.

[97] Paul Wallace Gates, "The Homestead Law in an Incongruous Land System," *American Historical Review* 41 (July 1936): 659, notes that "with the exception of the swamp land grants, the purpose of [public land] donations was to provide the states with a valuable commodity, the sale of which would produce revenue or endowment for educational and other state institutions." Apparently, nineteenth-century state policymakers did not recognize or simply ignored this distinction since they used swampland donations in the same manner as other grants.

[98] The statistics for the amount of "swamp and overflowed" lands Indiana and other program states received is taken from Prince, *Wetlands of the American Midwest*, 145. Roughly 64 million acres of supposedly "swamp and overflowed" lands passed from the federal government under the acts of 1849, 1850, and 1860. An act of 1855 allowed states to select indemnity lands as compensation when citizens had already settled on wet tracts. The indemnity lands totaled only a meager 744,386 acres.

Legislators' initially interpreted the grant as a source to pay down the debt Indiana accumulated while publicly financing canal construction during the 1840s. In 1851, the state's new constitution terminated the practice and made compliance with Congress's mandate a priority. Section 2 of Article VIII dedicated revenue generated from swampland sales to building reclamation projects. (The constitution decreed that surplus money was to be funneled into the Common School Fund). To commence the process, the legislature empowered the governor to appoint a swamp land commissioner for every county to oversee project construction. Giving responsibility to the counties proved disastrous. Commissioners routinely accepted the bids of friends or higher government officials—including, in one instance, a governor's son—who had no intention of carrying out the proposed work. The handful of honest commissioners discovered that the original cost estimates were too low and that most contractors were incompetent. The state legislature complicated the matter by passing legislation, without the knowledge of county officials, transferring money from swampland sales to state benevolent institutions, abruptly suspending work on unfinished projects. To revive the program, Governor Joseph A. Wright endorsed a plan allowing citizens to trade labor on drainage projects for land scrip. Corruption plagued the labor-for-land program. Speculators with no intention of fulfilling labor obligations gained title to extensive tracts. In 1861, a committee investigating swampland frauds concluded that only 10% of contracted projects were ever completed, that finished projects were poorly constructed, and that many commissioners colluded with speculators and embezzled $100,000 from swampland sales. Not until the legislature passed local drainage district laws would drainage occur on a scale originally envisioned by Congress. In the apt judgment of

Charles Kettleborough, collusion between contractors and county officials, speculation by politicians, and state employees' "scandalous" embezzlement of swampland funds rendered Indiana's swampland administration "one of the most sordid and uninspiring chapters in [Indiana's] history."[99]

Michigan

Michigan was the recipient of 5.66 million acres, the fourth largest swampland cession. To drain the state's wetlands, which covered one-sixth of the upper and lower peninsulas, policymakers devised a strategy based on road construction. Building roads would hasten drainage since it required filling, bridging, clearing, draining, and ditching lowlands and swamps. Convinced of the plan's imminent success, politicians subsidized road construction with lavish grants: companies received 640 acres of swampland for every mile of road they laid in the Lower Peninsula and up to 1,280 acres per mile in the Upper Peninsula. Enacted with lofty expectations, the plan failed as contractors bypassed densely timbered swamps, built around lowland marshes, and followed existing settlement areas rather than blazing new trails as policymakers had envisaged.

Michigan also promised 80 acres of swamplands to any settler who improved a plot of land and fulfilled a five-year residency requirement. The legislature also adopted a "time-payment plan" that required settlers to put 25% down before taking possession of a tract. Unscrupulous capitalists exploited the program to secure choice timberlands.

[99] Charles Kettleborough, "Drainage and Reclamation of Swamp and Overflowed Lands," Indiana Bureau of Legislative Information, *Bulletin* 2 (April 1914): 37; and Stephen F. Strausberg, "Indiana and the Swamp Lands Act: A Study in State Administration," *Indiana Magazine of History* (September 1977): 191-203.

They put up their 25%, clear cut the timber, abandoned their plot, and moved on to another well-wooded parcel.[100]

In 1869, the legislature decided to subsidize private railroads with swampland grants. Apparently, the legislature assumed that railroads would have an incentive to drain the land. By 1874, Michigan policymakers had approved the transfer of nearly 1.7 million acres of ceded swamplands to four railroad companies in return for pledges to construct 500 miles of track. Swampland cessions were also used to pay for improvements to 24 rivers, 6 bridges, and one harbor. Eager to subsidize public works with swampland grants, Michigan policymakers elevated infrastructure development and local economic growth above land drainage.[101]

In Michigan, the state took large tracts of former "swamp and overflowed lands" off the market in the 1890s to establish conservation areas. In 1891, the State Land Department persuaded the legislature to bar additional entries, grants, or sales of wetlands in Huron County's Wild Fowl Bay. The legislation's enabling act described the area as a "public shooting or hunting ground for the benefit and enjoyment of the people." Eight years later the legislature set aside an additional 200,000 acres of state-owned wetlands as forests reserves and established a supervisory Forestry Commission. The draining and filling of ecologically rich wetlands was one of the darkest chapters in nineteenth- and twentieth-century American environmental history. Farsighted Michigan legislators,

[100] LeRoy Barnett, "Roads, Railroads, and Recreation: Swamplands and the Building of Michigan," *Michigan History*72 (July/August 1988): 32.

[101] The four railway corporations receiving swampland grants from the state included the Chicago and Northwestern; Detroit, Mackinac and Marquette; Marquette, Houghton and Ontonagon; and Menominee River Railroad. See Ibid., 33-34.

pressured by sportsmen, provided one of the few bright spots in this legacy of destruction.[102]

Iowa

Speculators, swindlers, county governments, and railroad corporations profited handsomely from the disposal of Iowa's swampland grant. Iowa was one of three states to cede control over its donated swamplands to the counties, which used them for every purpose but building drainage projects. In a sampling of 32 Iowa counties, one scholar found that only 2 of them used their federal grants for drainage purposes. The other 30 counties funneled revenue from grant sales into bridge, school, courthouse, road, and railway construction. After 1865, two counties provided land bonuses to Civil War veterans with swamplands.[103]

In 1855, Iowa's legislature criminalized trespassing or cutting timber on unsold swamplands. Squatters living on land claimed under the 1850 Act had the right to preemption for $1.25 per acre. Unfortunately, the law allowed the claimant *or an agent* to enter for up to 160 acres. Notorious speculators manipulated this provision by hiring dummy entrymen to file on claims scattered throughout the state. Robert P. Swierenga's case study reveals the extent to which speculators monopolized Iowa wetlands: in Boone County, 8 purchasers (out of 147 total buyers) gained title to 6,266 acres (one-third of the county's swampland grant); in Mahaska County, John A. L. Crookham, an infamous

[102] Ibid., 34; and Wade De Vries, "How Michigan Handles Its State Owned Lands," *Journal of Land and Public Utility Economics* 6 (May 1930): 119, 123.

[103] Congress's grant to Iowa was the fourth smallest amongst Swamp Land states. However, Iowa received nearly 322,000 additional acres of indemnity lands under the 1855 law. Clynch, "An Introduction to Swamp Land Disposal in Iowa," 23-4, 32-56.

speculator, seized control of 2,784 acres (one-half of the county's grant); and in Johnson County, five land grabbers obtained 1,731 acres (49% of the county's grant). The largest swindler was the Hartford, Connecticut-based American Emigrant Company. Conspiring with dishonest local officials, the company eventually attained 300,000 acres, or about 1/3 of Iowa's total grant.[104]

Illinois

In 1852, Illinois followed Iowa's lead and transferred its 1.5 million-acre grant to the counties. County officials looked upon wetlands as an asset to build internal improvements and something to be disposed of as urgently as possible. As Margaret Beattie Bogue has demonstrated, counties had little incentive to hold the grants since they did not collect property taxes if the lands remained unpatented. Bogue's study of swampland disposition in eight Illinois counties reveals that "an insignificant portion of proceeds from swamp land sales were used for drainage."[105] County administrators saw public education and bridge, courthouse, and road construction as higher priorities than drainage.

Speculators and absentee owners gobbled up Illinois's grant. From 1857-63, the period when counties disposed of the bulk of their donations, a series of poor harvests and depressed grain prices discouraged prospective buyers. Only speculators and livestock raisers possessed the necessary capital to buy swamplands during the troubled

[104] Robert P. Swierenga, *Pioneers and Profits: Land Speculation on the Iowa Frontier* (Ames: Iowa State University Press, 1968), 72-9; and Clynch, "An Introduction to Swamp Land Disposal in Iowa," 57-69.

[105] Bogue, "The Swamp Land Act and Wet Land Utilization in Illinois," 169-80, quote at 174. Paul Wallace Gates concurred with Bogue's appraisal: "Practically no effective work was done in drainage [Illinois's] wet lands." See Gates, "The Disposal of the Public Domain In Illinois, 1848-1856," *Journal of Economic and Business History* 3 (February 1931): 219.

economic period. Eager to dispose of their grants, the counties had no qualms about selling to such individuals. At least half of the original swampland grant in Champaign, Ford, Iroquois, Kankakee, Livingston, McLean, Piatt, and Vermillion counties ended up in the hands of large landowners. Backroom deals greased the wheels of disposition. In Iroquois County alone, George C. Tallman from Utica, New York, purchased 45,500 of the county's 61,000-acre grant at the average price of $0.90 per acre. Enraged local residents accused Tallman, a close friend of the county judge who arranged the sale, of receiving preferential treatment since he rewarded the judge with a 4,250-acre kickback. During the next 15 years, Tallman sold his unimproved grant for $2 to $4 per acre.[106]

Florida

The federal swampland donation to Florida, which surpassed 20 million acres and constituted about 1/3 of the federal "swamp and overflow" grant following the 1903 cession of the Everglades, was the largest grant of public land to any state in American history. In 1855, Florida policymakers created an Internal Improvement Fund (IIF), composed of the governor and his cabinet, to oversee the subsidization of railroads, canals, and drainage projects using land grants. As one scholar explains, Florida's swampland grant enriched corporations and speculators but drained few swamps: "If the state had to give away swampland to attract railroads … it seemed a small price to pay for growth and development."[107] Up to 1881, when William D. Bloxham became

[106] Ibid., 172-5; and Bogue, *Patterns from the Sod: Land Use and Tenure in the Grand Prairie, 1850-1900* (New York: Arno Press, 1979), 33. Only one of the eight Illinois counties studied by Bogue (Livingston County) developed the policy of disposing of its land grant to small settlers and not large speculators or absentee owners.

[107] Michael Grunwald, *The Swamp: The Everglades, Florida, and the Politics of Paradise* (New York: Simon & Schuster, 2006), 67.

governor, the IFF had disposed of a trifling 1.7 million acres of "swamp and overflowed lands." Lingering economic problems triggered by the Civil War and Reconstruction forced several railroads into receivership. Since the IIF had backed insolvent railroads' bonds in addition to giving them lavish grants, it, too, faced grim financial prospects.

Bloxham recommended saving the IFF by rapidly selling off the state's wetlands. Before the end of 1882, the IIF had given away or sold 4.5 million acres. The largest purchaser was Hamilton Disston, the son of a wealthy Pennsylvania saw-maker, who paid 25 cents for each of the 4 million acres he purchased. Disston's purchase allowed the agency to escape bankruptcy and restart operations. By 1904, the IIF had transferred (or sold) 8.3 million acres to railroads, 2.3 million acres to canal companies, 4 million acres to Disston, and 2.6 million acres to other individuals, totaling 17.1 million acres of the 20.2 million acres eventually attained under the 1850 law. Too ambitious in fulfilling its duties, the IFF had promised an additional 5.4 million acres to railroad companies, leaving Florida more than 2 million acres in debt. Not even the reforms of Progressive governor William Jennings (1900-05), including pledges of full compliance with the Swamp Land Acts, saved the state from a painful, embarrassing, and bitter struggle with the railroads over the balance of the promised lands. In 1903, the deficit forced Bryan to ask Congress for an appropriation of $1,000,000 to drain the Everglades. The request was a direct admission that Florida had failed to live up to its responsibilities under the 1850 Swamp Land Act.[108]

[108] J. E. Dovell, "The Railroads and the Public Lands of Florida, 1879-1905," *Florida Historical Quarterly* 34 (January 1956): 236-58; and David McCally, *The Everglades: An Environmental History* (Gainesville: University Press of Florida, 1999), 88-91.

California

California was one of two states west of the Missouri River that participated in the swampland program. Subterfuge committed by federal and state officials plagued California's administration of its grant. In one instance, J. F. Hough, the Surveyor General of California, colluded with the son of the U. S. surveyor general of the state to sell a fertile 16,000-acre tract of dry land as "swamp and overflowed."[109]

In 1851, California's legislature took the first step toward disposing of its 2.12 million-acre grant by selling 640 acres on an island in the Sacramento-San Joaquin Delta to John F. Booth and David Calloway. The terms of the sale required Booth and Calloway to drain and cultivate the parcel. Another act in 1855 stipulated that individuals could purchase up to 320 acres of swampland for $1 per acre if they paid off their balance within five years and reclaimed at least half the land. In 1858, a new law eliminated credit sales, did away with the drainage obligation, and required that an upfront purchase price of $1 per acre be deposited in a General Swamp Land Fund, which the legislature intended to use to comply with the terms of the grant. In 1859, another act increased the maximum purchase size and extended more liberal payment terms. Conflict between California and the federal government about the location and extent of California's "swamp and overflow land," however, discouraged potential buyers.[110]

Dissatisfied with lagging sales and the leisurely pace of drainage, California's legislature voted in 1861 to create a new commission. The Board of Swamp Land Commissioners, consisting of five people elected by the legislature, could use the General

[109] Gerald D. Nash, "The California State Land Office, 1858-1898," *Huntington Library Quarterly* 27 (August 1964): 350.

[110] Richard H. Peterson, "The Failure to Reclaim: California State Swamp Land Policy and the Sacramento Valley, 1850-1866," *Southern California Quarterly* 56 (Winter 1974): 45-9.

Swamp Land Fund (the law pumped $200,000 into the fund) to carry out drainage projects. When one-third of the owners of any tract of land susceptible of drainage petitioned the Board for assistance, the commissioners dispatched engineers to conduct surveys, develop construction plans, and ensure that the project's costs remained below $1 per acre. In 1862, policymakers authorized county boards of supervisors to levy reclamation taxes on districts and created a special fund from swampland sales in each of the 28 districts. Chronic problems plagued the program. First, the districts never produced enough revenue to cover drainage costs. Second, settlers with semidry tracts or narrow riparian frontages opposed inclusion in the districts. Finally, ranchers and farmers in the Sacramento Valley, where much of the state's wetlands existed, saw drainage as inimical to their interests since they depended on the river's periodic overflows to produce the hay and tules their cattle, hogs, horses, and sheep foraged upon. Discouraged and frustrated, the legislature in 1866 abolished the commission and transferred drainage responsibilities to individual counties.[111]

Oregon

Encompassing fewer than 265,000 acres, Oregon's swamp land grant was the program's second smallest (Ohio's 26,000-acre donation was the smallest). The administration of Oregon's grant was unexceptional since the state did little to comply with the law. What made the grant's disposition noteworthy was how cattle barons in

[111] Richard H. Peterson argues that the 1861 law represented California's "first systematic attempt to perfect the state title to the swamp and overflow lands granted by the [1850] Act." Peterson criticizes the law since it failed to promote the kind of drainage envisioned by Congress. Notwithstanding California's shortcomings, the state committed more resources and made more attempts to follow Congress's intent than most other participating states. See Peterson, "The Failure to Reclaim," 50-7, quote at 50. See also Robert Kelley, *Battling the Inland Sea: Floods, Public Policy, and the Sacramento Valley* (Berkeley: University of California Press, 1989), 35-6, 42-53, 55-6.

southeastern Oregon manipulated the terms of the Swamp Land Act to secure title to valuable water rights. As the historian Nancy Langston sardonically puts it, the Swamp Land Act might have been "designed to fulfill a national vision of transforming wasteful wetlands into prosperous farms, [but in Oregon] this act instead fostered an empire not of turnips but of cows."[112]

Under Oregon's doctrine of riparian rights, an individual could not divert water from a river or stream unless he or she owned land abutting the watercourse. The right to divert water for agricultural or livestock purposes, then, attached to riparian landownership. Oregon cattle magnates such as Peter French viewed the acquisition of riparian meadowlands as a prerequisite for financial success since they supplied an invaluable source of forage and, even more significantly, access to scarce fresh water. By 1877 French had secured title to at least 48,570 acres previously acquired under the Swamp Land Acts that were rich in hay and conferred water rights. Between 1882 and 1889 French consolidated his ownership of riparian southeastern Oregon lands by instructing employees to file homestead claims alongside rivers and streams and then selling them back to French. W. B. Todhunter, a Harney County cattle baron, used the Swamp Land Acts to secure title to 40,332 acres of such lands on the shores of Marlheur and Harney Lakes. In 1849, 1850, and 1860, Congress ceded the nation's "swamp and overflow" lands in part because they were deemed "worthless" and "useless" without drainage. As a vehicle for cattle magnates to monopolize southeastern Oregon's scarce waters, riparian wetlands emerged as a lucrative commodity.[113]

---

[112] Langston, *Where Land and Water Meet*, 36.

[113] Ibid., 35-7, 177 n. 86, quote at 37. On the legal doctrine of riparian rights, see Donald J. Pisani, *To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902* (Albuquerque: University of New

Arkansas

Arkansas was one of two states that attempted, albeit temporarily and unsuccessfully, to comply with Congress's drainage mandate. Under the 1850 grant, Arkansas received 7.7 million acres, the program's third largest donation. In 1851, legislators heeded Governor John S. Roane's suggestions to centralize the selection, disposition, and management of ceded wetlands by creating a three-member Board of Swamp Land Commissioners. The law empowered commissioners to set the price of swamplands, select the best locations to build levees and drainage ditches, solicit construction bids, and reimburse contractors with swampland scrip. After dividing the state into three districts, commissioners oversaw the erection of 109 miles of levees during the Board's first two years. Troubled by commissioners' shoddy accounting and recordkeeping practices, new Governor Elias N. Conway proposed to involve the State Land Agent, Auditor, and Treasurer. In 1853, the legislature heeded the governor's recommendations, authorizing the State Land Agent to supervise swampland sales and directing the State Treasurer to issue scrip but only upon the auditor's approval. The inefficient system threw the program into disarray; created friction between the Board of Swamp Land Commissioners and the Land Agent, Auditor, and Treasurer; and fragmented authority so badly that drainage work slowed to a crawl. In 1856 and 1857, new legislation abolished the Commission, transferred its responsibilities to the governor, permitted him to establish a new position—the Swamp Land Secretary—to supervise swampland disposition and drainage work, and replaced scrip with specie as the means of satisfying outstanding debts. Despite chronic administrative problems and extensive

---

Mexico Press, 1992), 11-12; and Pisani, *Water, Land, and Law in the West: The Limits of Public Policy, 1850-1920* (Lawrence: University Press of Kansas, 1996), 1-23, 200 n.4.

frauds perpetuated by state officials to secure title to swampland tracts, the state erected 13,165,466 cubic yards of levees at a cost of $2.5 million before the Civil War. Poor oversight resulted in shoddy workmanship as contractors were more interested in turning a quick profit than building durable levees.[114]

Arkansas's compliance efforts proved ephemeral. During the Civil War, advancing Union troops sabotaged the levees, recurrent floods obliterated what was left standing, and land sales stagnated. In 1869, the legislature replaced the Board of Swamp Land Commissioners with the Commissioner of Public Works and Internal Improvements. The new agency undertook few new drainage and flood control projects and only halfheartedly attempted to repair damaged levees. When railroad mania swept Arkansas during the early 1870s, the legislature transferred most of the remaining grant to four railroad corporations.[115]

Louisiana

The ink was barely dry on the first Swamp Land Act before Louisiana's congressional delegation demanded additional public land cessions. Sen. Solomon Weathersbee Down insisted that Louisiana's swampland donation, which eventually surpassed 9.3 million acres, was inadequate. In 1851, Downs introduced legislation providing for the complete cession of public lands in Louisiana "to aid … in preventing

[114] Robert W. Harrison and Walter M. Kollmorgen, "Land Reclamation in Arkansas Under the Swamp Land Grant of 1850," *Arkansas Historical Quarterly* 6 (Winter 1947): 369-405, 416-17.

[115] The four railroads were the Washington and Hope Railroad; the Iron Mountain and Helena Railroad; the Searcy, Pine Bluff and Monroe Railroad; and the Little Rock, Mississippi and Texas Railroad. After the creation of the Mississippi River Commission in 1879, Arkansas halfheartedly began to comply with the provisions of the Swamp Land Act. It gave levee districts, which became the primary governmental units implementing flood control, ceded swamplands to help defray their operating costs. I will briefly discuss the creation of levee districts in the next section. See Ibid., 406-14.

the overflow of the Mississippi river, and in reclaiming the overflowed lands therein."[116] Levees built by plantation owners reclaimed a tremendous quantity of federal lands and supposedly brought the federal treasury a $3 million windfall. Down's pleas fell on deaf ears as Congress insisted that the Swamp Land Acts, which constituted Congress's most liberal public land donation to the states, was sufficient.

Louisiana did more than any other state to comply with the law. As Martin Reuss argues, the Swamp Land Acts provided a unique opportunity for state governments to expand in matters related to water resource management.[117] In 1852, Louisiana took its first steps towards implementation when it instructed the State Treasurer and Registrar of the State Land Office to offer land warrants for 1 million acres of ceded swamplands for sale. Regulations prohibited the warrants from exceeding 640 acres or comprising less than 40 acres and fixed the price at $1.25 per acre. Revenue generated by warrant sales, which surpassed $110,000 by 1853, was funneled into a levee construction fund.[118]

The next year state policymakers created a Board of Swamp Land Commissioners. The enabling legislation divided the state into three levee districts that ignored natural hydrographic boundaries. One commissioner supervised each district, served on the 3-person Board of Swamp Land Commissioners, and submitted annual

---

[116] *CG*, 31st Congress, 2nd Session, February 27, 1851, 738-42, quote at 738.

[117] Reuss discusses how the Swamp Land Act altered the state government's relationship to its rivers, streams, and swamps: "Before 1850, the state devoted its efforts to clearing streams and improving navigation. However, the Swampland Acts forced the state to address reclamation problems … and state government assumed the leading role in planning and developing an integrated levee system. Although this burden involved the Louisiana legislature in the usual political disputes over the distribution of funds, the politicians did provide for ongoing inspections and funding for the system." See Reuss, *Designing the Bayous*, 46. Scholars interested in a thorough and exhaustive treatment of Louisiana's compliance efforts should consult Robert W. Harrison, *Swamp Land Reclamation in Louisiana, 1849-1879: A Study of Flood Control and Land Drainage in Louisiana Under the Swamp land Grant of 1849* (Baton Rogue, 1951).

[118] Harrison, *Alluvial Empire*, 1:72; Mims, "Louisiana's Administration of Swamp Land Funds," 285; and Reuss, *Designing the Bayous*, 44.

recommendations to the legislature regarding the location, extent, and costs of future works. The creation of the Board of Swamp Land Commissioners symbolized a sincere effort to shift responsibility for flood control from plantation owners to state administrators although the Board retained the power to call out the slaves of riparian land owners during emergencies (a levee breach, high water, and so forth). Plantation owners were to be compensated $1.50 per slave for each day they worked on the levees. Owners refusing slave requisitions incurred a $5 per day fine. The Board of Swamp Land Commissioners administered Louisiana's flood control and drainage activities until 1859 when the legislature shifted its responsibilities to a Board of Public Works, whose operations were suspended following Louisiana's secession from the Union.

During the Civil War, union soldiers dismantled miles of levees on the Mississippi, Red, and Atchafalaya Rivers and along the Bayous Teche and Lafourche. Faced with the daunting task of repairing levees with scarce funds, Louisiana's post-war levee management broke down. In 1867, the cash-strapped state authorized a new Board of Levee Commissioners to sell $4 million in bonds. Louisiana's credit was so poor that the commissioners seldom received more than $0.50 or $0.60 on the dollar. The next year the legislature revitalized the Board of Public Works, charging it with building levees, draining swampland, and constructing internal improvements in five separate districts. In 1871, the Board of State Engineers, comprised of a head engineer and two engineers appointed by the governor, replaced the Board of Public Works. Its tasks included drainage, flood control, and navigation improvement. In the same year, the legislature gave the Louisiana Levee Company (LLC), an inefficient and corrupt company owned by carpetbaggers, a 21-year monopoly on Louisiana levee construction,

undercutting the Board of State Engineer's autonomy. It then created a "Commission of Persons on the Levees of Louisiana" to supervise the LLC. Two people selected by the LCC and the state sat on a Commission of Engineers, which evaluated and chose levee locations and designs. In the late 1870s, additional legislation further fragmented drainage and flood control efforts before the legislature turned over responsibilities in 1879 to a Board of State Engineers. "The overlapping functions, the lack of clear centralized authority, and widespread corruption," concludes Reuss, "nearly overwhelmed the task of levee construction."[119] Towards the close of the 1870s, Louisiana's obsessive compliance efforts with the Swamp Land Acts ironically proved just as paralyzing as other states' blatant disregard of the law.

The fragmentation of state administration led Louisiana's policymakers to continue to plea for federal assistance. Throughout the period of Reconstruction, Congress demurred since levee construction would benefit private landowners and specific communities. Nonetheless, opponents of increased federal involvement could not deny that the practices of flood control and navigation were closely related. The popular belief that levee construction intensified the velocity of water within a watercours, causing the current to "scour" a river's bottom and normalize stream flow, linked levee projects directly to Congress's undisputed authority over interstate navigation. In any case, the 1879 creation of the Mississippi River Commission symbolized that the future of flood control lay with federal institutions. Composed of members of the Army Corps of Engineers, the Coast and Geodetic Survey, and three civilians, the Mississippi River Commission oversaw the creation of plans to improve navigation, flood control, and the promotion of commerce on the Mississippi River. In

[119] Reuss, *Designing the Bayous*, 58.

the coming decades, the Mississippi River Commission worked closely with levee districts in Louisiana, Mississippi, and Arkansas to coordinate the repair of faulty levees and administer other river-related improvements. The establishment of the Commission acknowledged that the Swamp Land Acts proved insufficient to solve the thorny financial, administrative, and jurisdictional problems associated with drainage and flood control.

The Abortive Experiment in State Administration:

The brief interlude in states administration was a colossal failure. The decision of most states to use revenue generated from ceded wetlands for every purpose but drainage led them to devolve authority for surface water management back to local communities in the form of drainage district legislation. According to Vileisis, drainage districts, "with their taxing and land condemnation powers, were a radical concept. There was little precedent for creating such layers of local government, except for boards some states had started to implement the Swamp Land Acts."[120] As the descendents of colonial commissions of sewers, which exercised land distrainment and taxing powers, drainage districts were not, as Vileisis maintains, a "radical" and unprecedented institutional innovation. Drainage districts were autonomous and quasi-corporate entities authorized by state legislatures to enable groups of farmers to drain their lands. By collectivizing costs and creating an administrative structure to supervise construction and maintenance of drainage works, drainage districts allowed farmers to overcome the prohibitive price of drainage, the difficulties involved in securing right-a-ways across other proprietors' property, and the strict rules for surface water disposal implemented by civil law states.

[120] Vileisis, *Discovering the Unknown Landscape*, 125.

Legislation authorizing the formation of districts permitted them to incur bonded indebtedness to finance construction, to coerce the participation of minority landowners, and to determine proportional assessments based on the potential benefits inhering to landowners. The ability to incur bonded indebtedness constituted one of districts most important powers. Furthermore, drainage districts possessed eminent domain powers, allowing them to seize and condemn lands to fulfill their stated mission.[121]

The complicated labyrinth of laws regarding drainage district formation and operation defies any simple overview. Laws authorizing drainage districts varied greatly between states and were regularly amended, revised, and superseded by new statues or modified, pared back, and sometimes struck down by state courts. Nevertheless, two general principles seem to have been adopted across state lines. As a prerequisite of district formation, most states required petitioners to demonstrate that the estimated financial benefits generated by the proposed improvement would exceeded anticipated costs and provide a public benefit (such as public health, utility, and welfare). Initiating the process of district formation straightforward. In general, laws mandated that a specific proportion of landowners in the area proposed to be improved submit a signed petition to a specific governing entity (usually courts or state legislatures). In most cases, the signatures of one-third of the landowners owning more than 50% of the land or the approval of a majority of landowners owning at least one-third of land to be improved were required. In a few Mississippi Valley states, districts could be organized if one-fourth of the landowners consented—regardless of the size of their holdings. In even

[121] For a good introduction to post Civil War drainage districts' functions and powers, see John C. Bollens, *Special District Governments in the United States* (Berkeley: University of California Press, 1957); Hergert, "Taming the Environment"; McCorvie and Lant, "Drainage District Formation and the Loss of Midwestern Wetlands,"; Prince, *Wetlands of the American Midwest*, 206-9; and Vileisis, *Discovering the Unknown Landscape*, 126-7.

rarer cases, states required only the consent of landowners whose property comprised a simple majority of a plot to be drained.

Once the petitioners met the minimum requirements, the supervising entity (the courts or legislatures) received the petition, posted public notices about the time and location of hearings to determine its merits, and appointed a disinterested "board of reviewers." Reviewers' responsibilities included surveying the land, levying proportional assessments based on anticipated benefits, designing construction plans and maps, estimating future maintenance costs, and, if necessary, hiring an engineer to help overcome difficult topographical problems. If the superintending entity approved the petition and established a drainage district, the special assessments were collected in the customary manner as other taxes. Many state drainage laws provided for elections of leaders so they could make determinations about the issuance of bonds, evaluate complaints regarding assessments, supervise project maintenance, and decide about the inclusion of outlying properties.[122]

Although the heyday of drainage district formation occurred between 1905-1919 (see chapter 5), anecdotal evidence suggests that the intervening period between the conclusion of the Civil War and 1900 witnessed an uptick in drainage district formation and county drainage projects west of the Appalachians with the largest overall amount of wetlands losses concentrated in the states of Ohio, Indiana, and Illinois. During the last quarter of the nineteenth century, technological innovations quickened the pace of

[122] John Thompson's discussion of the procedures involved with drainage district formation in Illinois is the best available source on the topic. See Thompson, *Wetlands Drainage, River Modification, and Sectoral Conflict in the Lower Illinois Valley, 1890-1930* (Carbondale: Southern Illinois University Press, 2002), 13-4. For a more general discussion, see Harrison, *Alluvial Empire*, 1:178-80; and McCorvie and Lant, "Drainage District Formation and the Loss of Midwestern Wetlands," 31-2. For a sampling of some of the legal challenges to drainage district legislation, see William B. Meyer, "When Dismal Swamps Became Priceless Wetlands," *American Heritage* 45 (May/June 1994): 111; and esp. Hergert, "Taming the Environment."

wetlands conversion and drainage district formation. Giant horse-and oxen-drawn excavators and steam-powered trenchers facilitated rapid and efficient drainage ditch construction. The growth of the clay tile industry promoted better subsurface drainage. Buried below the surface of fields, horseshoe-shaped clay tiles channeled subsurface water into larger drainage ditches, rivers, and creeks. Seeking to keep down distribution and delivery costs, tile manufacturers usually built new factories near areas undergoing rapid agricultural development. The number of factories that manufactured tiles steadily climbed in the decades following the Swamp Land Acts: in 1859, 66; in the 1860s, 234; in 1879, 840; and in 1882, 1,140. Of the 1,140 factories operating in 1882, 90% were located in Ohio, Indiana, and Illinois, the epicenter of pre-twentieth century wetlands drainage.[123]

Farmers participating in drainage enterprises usually received a good return on their investment in the forms of better crop yields and enhanced property values. Up to 1900, drainage enterprises invested a mean sum of $4.22 for every acre under their jurisdiction. In the last two decades of the nineteenth century, the 500% increase in the value of drained lands dwarfed the 40% rise in the value of other lands and farm improvements. In some rural Illinois communities, artificial drainage increased the price of land between 25-50% in the seven-year interval between 1880 to 1887. In 1885, the tax valuation of an 80-acre farm in Harrison Township in Henry County, Ohio, was $14 per acre. Valuations jumped as farmers drained the land surrounding the Maumee River and its tributaries. In 1910 and 1920, the valuation of Harrison Township lands respectively soared to $25 and then to $50. Henry County's Bartlow and Richfield

[123] Prince, *Wetlands of the American Midwest*, 213, 216; and Thomas R. Biebighauser, *Wetland Drainage, Restoration, and Repair* (Lexington: University Press of Kentucky, 2007), 8.

Townships experienced an even higher drainage-related increase in valuations. As a dense and sometimes impenetrable swamp, portions of Bartlow and Richfield Townships were some of the last places in Henry County—as well as Ohio—to be settled. In 1885, 80-acre farms in both townships were assessed at $5 per acre. By 1920, after drainage had boosted agricultural production and slow settlement, Bartlow Township farms were assessed at $66 per acre while Richfield farms reached a $75 per acre taxable value.[124]

The historian William B. Meyers argues that drainage districts served as the "indispensible engine" of American wetlands drainage.[125] By the close of the nineteenth century, land conservation by drainage was firmly under the control of local districts and county governments. Communities set their own policies, determined rate assessments, supervised the maintenance and repair of drainage works, and often held meetings to resolve disputes and craft new regulations. It makes more sense to see American land conservation on the verge of the twentieth century as a series of discrete grassroots movements—which were initiated, organized, and carried out by ordinary citizens—rather than as a *single movement* controlled and directed by national elites. Rural surface water management was built from the ground up and favored the growth of local bureaucracies at the expense of the national state. Until 1906, the federal government deferred to local communities in matters of wetlands management and was content to remain detached from the process of wetlands drainage. Anonymous and faceless

[124] McCorvie and Lant, "Drainage District Formation and the Loss of Midwestern Wetlands," 33; Prince, *Wetlands of the American Midwest,* 228-9; Chester McArthur Destler, "Agricultural Readjustment and Agrarian Unrest in Illinois, 1880-1896," *Agricultural History* 21 (April 1947): 109; and Peter W. Wilhem, "Draining the Black Swamp: Henry and Wood Counties, Ohio, 1870-1920," *Northwest Ohio Quarterly* 56 (Summer 1984): 90-1.

[125] William B. Meyer, *Human Impact on the Earth* (Cambridge: Cambridge University Press, 1996), 73.

farmers—and not national elites—were chief actors in the story of American land conservation before and after 1900.

Compared to other forms of land conservation such as flood control and arid land irrigation, drainage was less capital intensive, encountered fewer interstate problems, did not involve the lengthy adjudication of water rights, and rarely required the erection of large storage reservoirs or costly diversion canals. Unlike levee districts, which were southern institutions devoted to building and maintaining levees alongside major rivers, the fate of individual drainage districts was not tied to the success or failure of nearby enterprises. Requiring coordination, cooperation, and centralized planning on a more limited scale, drainage seldom demanded the intervention of provincial or national elites and could be handled by local institutions. The next chapter is a case study of what happened when local institutions were incapable of handling drainage responsibilities on their own.

CHAPTER 4: "I AM NO SOCIALIST": FARMERS, LAND DRAINAGE, AND RAILROADS IN THE VALLEY OF THE RED RIVER OF THE NORTH, 1879-1901

The 1881 spring planting season passed without incident for Andrew Lommeland, a farmer in Minnesota's far western Clay County. The widowed father of two young daughters, he planted 37 acres of wheat and 3 acres of oats. In May 1877, Lommeland had moved to Clay County, filed for a homestead, plowed under the native prairie grasses, and put in his first small crop the next year. Flat, low, and marshy, Lommeland's quarter section of land would have tested the skill and patience of even the most resolute yeoman. Nonetheless, in 1883, Lommeland succeeded in "proving up" his homestead and received title to 160 acres from the federal government.[1]

Life on the prairie was cruel, arduous, and frustrating for many settlers like Lommeland in the Valley of the Red River of the North, which forms the present-day boundary between Minnesota and North Dakota. Born in Norway in 1823, Lommeland immigrated to the United States seeking a better life and an opportunity to secure cheap land. Lommeland was not prosperous. According to the 1880 agricultural census, he only owned three mules, a cow, a calf, and, for a brief time, three lambs. He had little luck with the lambs. Late in 1879, Lommeland slaughtered a lamb for food and then

[1] Information about Andrew Lommeland is taken from the 1880 United States Census and testimony records during subsequent court cases between Clay County farmers and the St. Paul, Minneapolis and Manitoba Railroad (SPM&M). The predecessor to the Great Northern, the SPM&M's legal records are kept in the legal files of the Great Northern Railroad Corporate Records. See *State of Minnesota. Supreme Court, April Term, 1886. Andrew A. Lommeland vs. St. Paul, Minneaposli and Manitoba Railway Company* (St. Paul, H. M. Smyth Printing Company, [n. d.]), 47-9, Great Northern Railroad Corporate Records (hereafter cited as GN Records), Law Department Records, Minnesota Historical Society, St. Paul, Minnesota. Hereafter references will cite this document as "Lommeland Paper Book."

watched in dismay as the other two died of a baffling disease, after producing only 12 lbs. of fleece. Tragedy followed Lommeland everywhere. Becoming widowed, selecting an inferior parcel of land, and watching the lambs succumb to a mysterious ailment were enough to shake the confidence of even the hardiest pioneer. Yet Lommeland persevered. Providing for his daughters, Sarra and Amalia, aged 12 and 8, was enough motivation for him to plow up more of the prairie each year and gradually expand production. After planting 40 acres in 1881, Lommeland eagerly anticipated the fall harvest and expected his best crop to date.[2]

Misfortune struck again shortly after Lommeland's crops sprouted. Sometime during the early spring of 1881, he awoke one morning to a distressing, unfortunate, and puzzling situation. Looking out over his patchwork of cultivated fields and unimproved lowlands, Lommeland stared in disbelief as an enormous shallow lake of water covered the prairie as far as the eye could see. Gently flowing over the land from the southeast, the 12-inch deep sea of water was a mysterious, uninvited intruder. Lommeland and his neighbors in Moland Township struggled mightily to explain where the water came from. The nearby Buffalo River was not cresting. There were no large dams near Moland that might have breached. There had been no torrential thunderstorms. Yet the unwelcome waters ruined Lommeland's crops and dashed his chances of getting ahead.[3]

It did not take long for the Moland farmers to unravel the mystery. In October 1880, the St. Paul, Minneapolis and Manitoba (SPM&M) railroad, the predecessor of the Great Northern (GN), the last transcontinental to reach the Pacific coast during the late

---

[2] U. S. Census Office, *Nonpopulation Census Schedule, Minnesota, 1860-1880*, microfilm reel 4, "Agriculture Schedules, 1880, Aitkin—Crow Wing Counties," (St. Paul: Minnesota Historical Society, 1977), frames 677. Hereafter cited as "*Nonpopulation Census Schedule*."

[3] Lommeland Paper Book, 47-9.

nineteenth century, built a series of drainage ditches from Clay County all the way north to Crookston, Minnesota. The drainage system was the brainchild of James J. Hill, a brilliant, headstrong, and occasionally ruthless railroad manager who, within a decade, was recognized as one of the Gilded Age's most successful and prosperous entrepreneurs. Hill and a group of associates took over the bankrupt St. Paul and Pacific railway and transformed it into the lucrative and efficient SPM&M by capturing the growing wheat market of the valley of the Red River of the North and rapidly disposing of the company's 3.8 million-acre land grant. In the early 1880s, the combination of poor land drainage and the Valley's meandering rivers, which often overflowed their shallow banks and created large, sprawling marshes, constituted one of the principal obstacles to the company's financial revival. Water on the prairie's surface washed out railroad tracks, kept large tracts of land out of cultivation, prevented the SPM&M from disposing of its land grant, complicated travel, and shortened the already brief northern growing season by delaying when a farmer could put in his crop. Furthermore, the absence of government involvement in land drainage by Minnesota and Dakota Territory delivered a fatal blow to local communities. As early as 1879, Valley farmers and newspapers implored the SPM&M to serve as a surrogate for the state and territorial governments by building main drainage outlets into which farmers could empty ditches from their own waterlogged fields. Fascinated by the control of water, Hill agreed to help, launching the SPM&M's ill-fated drainage program that disastrously flooded the land of more than four dozen farmers like Andrew Lommeland. After the SPM&M's abandoned its drainage program, Valley farmers and business leaders led a grassroots uprising clamoring for the

state of Minnesota finally live up to its responsibilities under the 1860 Swamp Land Act by appropriating funds for drainage.

The story of land drainage in the Valley of the Red River of the North provides a case study of the limitations of local power in the matter of wetlands drainage. As Chapter 3 discusses, the breakdown of federal wetlands policy compelled states to devolve responsibilities for surface water removal to drainage districts and county and township governments. Intended to release the collective energy of Americans against nature, local institutions such as those in the Red River Valley proved incapable of solving complicated surface water disposal problems. The Valley's paucity of natural outlets, flat topography, and meandering, ill-defined rivers defied local control. Indeed, counties, townships, and farmers discovered that without the construction of very long artificial outlets and the improvement and channelization of existing watercourses, they would have nowhere to dispose of the surface water that originated on their lands. This chapter takes a brief look at how individual farmers, communities, and corporations in one part of the country responded to the failure of the Swamp Land Acts. It argues that Minnesotans and Dakotans clamored for the expansion of government into wetlands management after the SPM&M retreated from its experiment of direct environmental planning. In the late nineteenth and early twentieth centuries, American farmers welcomed and applauded the intervention of local and state governments into their lives, farms, and communities if it produced a desirable environmental outcome such as a drained landscape. The rapid growth of local and state governments dedicated to drainage is the great untold story of American environmental history and U. S. state

building. Indeed, the expansion of local governments rivaled, if not surpassed, the growth of federal administrative and regulatory capacities.

The Agricultural Transformation of the Red River Valley

Andrew Lommeland arrived in Clay County during the preliminary phase of what one scholar calls the "Red River Boom." In 1880, the Valley of the Red River of the North eclipsed Kansas and Nebraska as the epicenter of western settlement as American, Norwegian, Swedish, Finnish, and German land seekers poured into the area. The so-called Boom, which reached its apogee in 1882, transformed the Valley into one of the world's principal wheat producing regions. During the 1880s, the Valley's population tripled from 56,000 to 166,000, the quantity of its land integrated into farms jumped from 1.6 million acres to 5.4 million acres, and the ratio of farmland in crop soared from 22% to 65%. Poor European wheat harvests coincided with the Boom and pushed prices above their 1870s median level although they leveled off after 1882.[4]

The complex chain of events that triggered the Red River Boom included the obsession of Minnesota's territorial leaders with railroads, the emergence of Minneapolis as a major milling hub, innovations in milling technology, and the financial collapse of the Northern Pacific Railroad (NP) during the Panic of 1873. Beginning in the 1840s, the United States entered a cultural stage described by some scholars as "railroad mania." By 1837, about 1,500 miles of railroad had been laid east of the Mississippi River by private companies. The total jumped to 9,000 miles by the close of the 1840s and more than tripled to 31,000 miles by 1860, dwarfing the 5,000 miles of canals and slack-water

[4] Stanley Norman Murray, *The Valley Comes of Age: A History of Agriculture in the Valley of the Red River of the North, 1812-1920* (Fargo: North Dakota Institute of Regional Studies, 1967), 120, 127-9, 141.

navigation. The power, size, alacrity, and ability of the iron horse to operate year-round, unlike seasonally frozen rivers and canals, captivated Americans. The railroad's elimination of time and space captured the imagination of nationalists and social critics. In 1844, Ralph Waldo Emerson rhapsodized that "railroad iron is a magician's rod, in its power to evoke the sleeping energies of land and water."[5] Not to be outdone, the poet Walt Whitman celebrated the sheer power, novelty, and technological prowess of the iron horse:

> Thy great protruding head-light fix'd in front,
> Thy long, pale, floating vapor-pennants, tinged with delicate purple,
> Thy dense and murky clouds out-belching from they smoke-stack,
> Thy knitted frame, thy springs and valves, the tremulous twinkle of they wheels,
> Thy train of cars behind, obedient, merrily following,
> Though gale of calm, now swift, now slack, yet steadily careering;
> Type of the modern—emblem of motion and power—pulse of the continent[6]

The tremendous growth of railroad mileage between 1850 and 1871 would not have been possible without federal land grants. Federal subsidization of railroads with public land grants was one of Congress's most critical interventions into nineteenth-century economic planning. Up to 1871, when Congress suspended the practice of giving lavish grants to railroads due to popular indignation over the Crédit Mobilier scandal, the

---

[5] Quoted in Carlos A. Schwantes and James P. Ronda, *The West the Railroads Made* (Seattle: University of Washington Press and Washington State Historical Society, 2008), 5. On the antebellum "railroad mania," see Frank Heywood Hodder, "The Railroad Background of the Nebraska-Kansas Act," *Mississippi Valley Historical Review* 12 (June 1925): 4; and James A. Ward, *Railroads and the Character of America, 1820-1887* (Knoxville: The University of Tennessee Press, 1986), 13-4. On railroad track mileage, see Robert G. Angevine, *The Railroad and the State: War, Politics, and Technology in Nineteenth-Century America* (Sanford: Stanford University Press, 2004), 110.

[6] Walt Whitman, "To a Locomotive in Winter," in *Walt Whitman: Complete Poetry and Collected Prose*, ed. Justin Kaplan (New York: Library of America, 1982), 583.

national legislature gave 155,000,000 acres to over eighty railroad companies. In 1850, the Illinois Central and Mobile and Ohio Railways became the first companies to benefit from congressional largesse. Congress gave each railroad the odd-numbered sections of public land within a 6-mile strip of the right-of-way. As the pet project of Sen. Stephen Douglass, the Illinois Central grant was particularly generous and comprised 2.6 million of the 11 million acres of public land in Illinois.[7]

Railroad mania influenced the leaders of Minnesota Territory. On March 3, 1857, Congress acceded to the request of the territorial legislature for public land subsidies for railroads, giving the odd-numbered sections in six-mile wide corridors to railroads building according to a predetermined network. For the sake of this study the two most important corridors extended from St. Paul in a westerly route and also followed a northwest line from the territorial capitol to the place where the Red River of the North intersected the international boundary. The very same year Minnesota's legislature incorporated the Minnesota and Pacific railroad to construct a line from Stillwater to St. Paul all the way west to Breckenridge with a branch line connecting to Pembina on the 49th parallel. The Minnesota and Pacific's chief engineer gloated about the company's potential and wildly forecasted that the 2,460,000-acre land grant, if disposed of at $8 per acre, would raise $20 million. The Panic of 1857 intervened and dried up existing capital, sapped investors' enthusiasm for speculative ventures, and left prominent businessmen hesitant to invest capital in a vast territory with a sparse population of 150,000 people. In April 1858, the legislature authorized the state to issue bonds, not

[7] Angevine, *The Railroad and the State*, 122-3; Lloyd J. Mercer, *Railroads and Land Grant Policy: A Study in Government Intervention* (New York: Academic Press, 1982), 1-3, 6. For an overview of railroad land grant case law, see James W. Ely, Jr., *Railroads and American Law* (Lawrence: University Press of Kansas, 2001), 51-66.

exceeding $5 million, to fund construction. Recognizing that the new state could not redeem the bonds, the 1859 legislature terminated their issuance at $2.3 million and the railroad failed to lay a single track.[8]

The Minnesota and Pacific's inauspicious beginnings paralleled the fate of many railroads that were conceived according to boosters' fantasies rather than business logic. In 1862, Minnesota languished without a single mile of operational railroad and the legislature incorporated a new line—the St. Paul and Pacific—to take over the franchises, possessions, and land grant of the Minnesota and Pacific. Unlike the previous company, the St. Paul and Pacific made torturously slow progress and, by summer's end, completed a 10-mile line to St. Anthony. Within a decade, the fledgling line had completed 283 miles and, in October 1871, reached Breckenridge, located on the Boise de Sioux River, which forms the present-day boundary between central Minnesota and North Dakota. The St. Paul and Pacific's success in rapidly pushing west concealed its shaky financial status and incompetent leadership. Despite receiving much of the initial 2,460,000 million-acre land grant, the company was unable to manage its high debt load.[9]

The Saint Paul and Pacific was not the only Minnesota railway to benefit from congressional generosity. In 1864, Congress chartered the NP to construct a transcontinental line from Lake Superior to Puget Sound. Though Congress decided against subsidizing the NP with generous loans—as it had the first transcontinental railroad in 1862—it approved a liberal land grant encompassing 20 sections per mile in

---

[8] Mercer, *Railroads and Land Grant Policy*, 56; Ralph W. Hidy, Muriel E. Hidy, Roy V. Scott, and Don L. Hofsommer, *The Great Northern Railway: A History* (Cambridge, Mass.: Harvard Business School Press, 1988), 2-4; and Augustus J. Veenendaal, Jr., *The Saint Paul and Pacific Railroad: An Empire in the Making, 1862-1879* (DeKalb: Northern Illinois University Press, 1999), 24, 26-7.

[9] Veenendaal, *The Saint Paul and Pacific*, 35-41.

states that it crossed and 40 sections per mile through territories. In the summer of 1870, workers began laying the first tracks near Duluth, Minnesota. Capital always proved more elusive for NP leaders than enthusiasm and extravagant predictions of quick wealth. Only 2,500 European-Americans called the region between Duluth and Bozeman, Montana, home when construction commenced. Building in violation of Cornelius Vanderbilt's famous dictum—"you can't build a railroad from nowhere to nowhere"—the NP relied on financier extraordinaire Jay Cooke to provide the funding for the immense undertaking. A brilliant banker who helped raise over one-quarter of the Union's Civil War finances, Cooke's support of the NP overextended his financial firm—Jay Cooke & Associates—and threw the nation into the Panic of 1873, the most severe economic depression Americans had experienced to date. In a few years, the Panic forced the NP into receivership and ultimately set in motion the chain of events that culminated in the Red River Boom.[10]

The Panic of 1873 did not derail Minneapolis's ascendancy as the United States' flour milling capital. Minneapolis's nineteenth-century rise stemmed from its strategic location near the falls of St. Anthony, the discovery that hard spring wheat was well adapted to the short growing season of Minnesota and eastern Dakota Territory, and the Twin Cities' location as a major railroad hub. Despite hard spring wheat's adaptability to northern climates, it posed problems for millers. The wheat's bran—the hard, brittle outer layer of the grain—disintegrated during the milling process and obstructed the millstones. Seeking a solution, Minneapolis millers appropriated an eastern European

[10] Malone, *James J. Hill*, 35; and Mercer, *Railroads and Land Grant Policy*, 52-3. The best account of the failure of Jay Cooke & Associates and the ensuing economic panic is M. John Lubetkin, *Jay Cooke's Gamble: The Northern Pacific Railroad, the Sioux, and the Panic of 1873* (Norman: University of Oklahoma Press, 2006). I have gleaned many of my statistics and Cooke's Civil War career from Lubetkin's fine narrative.

process that employed a series of rollers, separated by diminishing gaps, which detached the germ and bran from the wheat's kernel. After this initial step, a middlings purifier used a burst of air to separate the bran and germ. The innovation enabled Minneapolis millers, including William Washburn and C. A. Pillsbury, to refine the type of grain best adapted to the city's agricultural hinterland.[11]

The voracious appetite of Minneapolis mills for hard spring wheat provided the NP with an opportunity to escape insolvency. James B. Power, the NP's brilliant land commissioner, devised a program that gave NP bondholders the opportunity to exchange their notes for choice tracts of the company's giant land grant, which potentially included 47 million acres, 10.7 million of which were in North Dakota. The exchange program was an immediate success. From September 1875 to August 1878, bondholders' exchanges for land accounted for over 70% of NP land sales. Over half of the 1.2 million acres disposed of went to 40 people. NP President George W. Cass and director Benjamin P. Cheney swapped their bonds for 13,400 acres of land north of present-day Casselton. They received the land at a bargain price of 46 to 60 cents per acre. John L. Grandin and his brother established a second large farm. When Jay Cooke & Associates closed their doors, the Grandin's, who were involved in the banking, lumber, and oil industries, were left holding an $88,000 note. During an 1875 trip to Fargo to investigate the Valley's agricultural potential, Grandin and his guide stumbled upon a farmer residing in a dugout cave near the Elm and Goose rivers. The settler's small patch of wheat was of such an impressive size, color, and quality that Grandin immediately

[11] William Cronon, *Nature's Metropolis: Chicago and the Great West* (New York: W. W. Norton & Company, 1991), 376-7; Elwyn B. Robinson, *History of North Dakota* (Lincoln: University of Nebraska Press, 1966), 135-6; and Lucile M. Kane, *The Waterfall that Built a City: The Falls of St. Anthony in Minneapolis* (St. Paul: Minnesota Historical Society, 1966).

exchanged his note for a 75,000-acre farm. As a series of poor European harvests in the late 1870s elevated American commodity prices, additional bondholders exchanged their notes for large tracts of land that eventually became known as bonanza farms.[12]

Bonanza farms combined professional management, intense capitalization, advanced machinery, and seasonal labor forces to turn the tall grass prairie into uniform factory farms. Reporters from across the county flocked to the bonanzas and wrote stirring stories about the wealth and success awaiting emigrants to the Red River Valley. In the late 1870s, Power sensationalized the bonanzas and extolled the Valley's agricultural productiveness in letters to the *Country Gentleman*, the *New York Tribune*, the *Farmer's Union* (St. Paul, Minn.), and *Pioneer Press* (St. Paul). The public exposure paid dividends. Reporters from several national periodicals visited the bonanzas and publicized the cornucopia of wheat and grain. Fascinated by the press's accounts, President Rutherford B. Hayes visited the Cass-Cheney bonanza farm in 1878. Hayes marveled at the bonanzas' magnitude, efficiency, and productivity. Hayes expressed "admiration and astonishment" regarding the 36 train cars of wheat shipped daily from the farm to Duluth and Minneapolis and the 40 steam threshers which extracted nature's bounty with factory-like precision. By 1882, the Valley was home to 82 farms exceeding 1,000 acres and a decade later 323 farms of that size. During the 1870s, the NP and St. Paul and Pacific dispatched representatives to England, Germany, Holland, Iceland, and

[12] Hiram M. Drache, *The Day of the Bonanza: A History of Bonanza Farming in the Red River Valley of the North* (Fargo: North Dakota Institute of Regional Studies, 1964), 34-5, 38, 42-45, 51-2, 71-82, 207. On the emergence of the bonanzas, see also Harold E. Briggs, "Early Bonanza Farming in the Red River Valley of the North," *Agricultural History* 6 (January 1932): 26-37; Murray, *The Valley Comes of Age*, 105-9, 131-3; and Robinson, *History of North Dakota*, 137-40.

Switzerland to recruit settlers. Seeking to turn a quick and easy profit, waves of home seekers flocked to the Valley.[13]

James J. Hill, the takeover of the SPM&M, and the Growth of the Red River Valley

Few historical figures towered over the agricultural, environmental, and economic development of a particular section of the country as James J. Hill did the Red River Valley. Born on September 16, 1838, in Wellington, Ontario, a small town northwest of Guelph, Hill was the third child and first surviving son of James Hill, a Scots-Irishman who in 1829 relocated his family to Ontario, and Ann (Dunbar) Hill, a Scots-Irish Presbyterian whose family fled religious persecution in their homeland, arriving in Ontario in 1832. After marriage and the birth of their children, the Hill's lived a typical hardscrabble frontier life. Young James recalled gazing at the moon and stars through his parent's porous and dilapidated roof while lying in bed at night. James and his younger brother, Alec, found solace retreating into the woods as they grew fond of hunting, fishing, and other outdoor activities.[14]

In 1856, Hill left his native Canada and immigrated to St. Paul, the bustling capitol of Minnesota Territory. Hill's rise to prominence and prosperity within a few decades was meteoric, strikingly reminiscent of a Horatio Alger rags-to-riches character.

---

[13] Drache, *The Day of the Bonanza*, 68, 71-2; Carroll Engelhardt, *Gateway to the Northern Plains: Railroads and the Birth of Fargo and Moorhead* (Minneapolis: University of Minnesota Press, 2007), 25; Murray, *The Valley Comes of Age*, 67, 117 n. 32, 121; and Stanley N. Murray, "Railroads and the Agricultural Development of the Red River Valley of the North, 1870-1890," *Agricultural History* 31 (October 1957): 63. Hayes's visit to Dakota Territory is described in "President Hayes," *Cincinnati Daily Gazette*, September 7, 1878.

[14] Michael P. Malone, *James J. Hill: Empire Builder of the Northwest* (Norman: University of Oklahoma Press, 1996), 4-5; and Albro Martin, *James J. Hill and the Opening of the Northwest* (New York: Oxford University Press1976), 15-6. Malone and Martin provide the best studies of James Hill's character, life, and business activities and supersede Joseph Gilpin Pyle's hagiographical *The Life of James J. Hill*, 2 vols. (New York: Doubleday, Page & Company, 1917).

By the time Hill arrived in St. Paul, he had developed some of the personality traits that served him well in the rough and tumble frontier economy and later made him both a successful and loathed capitalist. He was ambitious, hardworking, and indefatigable but also imperious, competitive, combative, and unreceptive of criticism. Finding work on the Mississippi River's levees, the industrious Canadian learned the ins and outs of the fur trade, which dominated the city's economy. In 1857, a year after Hill arrived in Minnesota, Canadian Metís traders hauled furs, skins, pemmican, dried buffalo meat, moccasins, and other Indian-crafted items to St. Paul from the region adjacent to the Valley of the Red River of the North amounting to the tune of $183,000. After unloading their red river carts—famous for their five-foot high wooden wheels that could be heard screeching from several miles away as the ungreased axels and wheels grinded against one another—the Metís reloaded their carts with ammunition, clothing, dry goods, farm implements, glass, guns, hardware, liquor, pianos, staple groceries, and tools for the return trip north to Fort Garry (present-day Winnipeg). Many of the furs and manufactured goods demanded by St. Paul's growing population passed through the levees and came into contact with the young Hill, who gained an intimate understanding of the efficient distribution and forwarding of goods.[15]

Hill was no idle spectator of the Red River Valley's transformation into Minneapolis's agricultural hinterland. By the time new milling techniques increased demand for hard spring wheat and the bonanza farms attracted international fame, he was a respected and successful entrepreneur. On the heels of the Civil War, Hill established the James J. Hill Company in St. Paul and maneuvered to become the St. Paul and

[15] Malone, *James J. Hill,* 10-4; Martin, *James J. Hill*, 36; and Rhoda R. Gilman, Carolyn Gilman, and Deborah M. Stultz, *The Red River Trails: Oxcart Routes between St. Paul and the Selkirk Settlement, 1820-1870* (St. Paul: Minnesota Historical Society, 1979), 14.

Pacific's primary forwarding agent. Hill regarded the St. Paul and Pacific as a diamond in the rough that one day could become a lucrative enterprise if it captured the agricultural trade of the Red River Valley. The railroad's financial shortcomings, he privately mused, had much more to do with its incompetent, inept, and listless management than anything else. Hill also became involved in the steam boating business on the Red River. He established the Hill, Griggs and Co. and later merged with his fiercest competitor, Norman Kittson, to form the Red River Transportation Company. Though Hill recognized that railroads provided a much more efficient mode of transportation than steamboats since the Red River lay frozen for half the year and followed a winding northerly route, his firm reaped enormous profits when railroad construction temporarily stalled after 1873.

In the late 1870s, Hill and a group of business "associates" set their sights on seizing control of the St. Paul and Pacific from its Dutch bondholders. Hill, John S. Kennedy, Kittson, Donald Smith, and George Stephen gained control of the line in 1878 and, the next year, rechristened it the SPM&M to reflect the north-south emphasis they intended to pursue. From the moment the associates gained control they pushed vigorously to meet construction deadlines imposed by the legislature to secure additional land grants in Red River Valley. The most important of these deadlines centered on the so-called St. Vincent extension, a north-south line running on the Minnesota side of the Valley to St. Vincent, located where the Red River crossed the international boundary. On November 12, 1878, the SPM&M met the deadline by reaching the 49th parallel and secured an enormously valuable land grant. When it was all said and done, the SPM&M's land grant encompassed the odd-numbered sections for ten miles on both

sides of the track from Breckenridge to St. Vincent, making it the owner of 25% of the upper valley. The acquisition of the grant belies the long-standing myth that the GN, which was the SPM&M's successor, built to the Pacific without the aid of a land grant unlike other transcontinental railroads.[16]

The Remnant of a Glacial Lake

Hill recognized that one of the principal obstacles to the SPM&M's financial turnaround, which depended on the disposition of its 3.8 million-acre grant, was the Valley's poor drainage. Surface water made much of the SPM&M's land grant unattractive to potential buyers, washed out railroad tracks, and impeded the agricultural efforts of the thousands of newly-arrived settlers. The Valley's drainage problems developed during the last ice age, known as the Wisconsin glaciations (see Map1). About 20,000 years ago, glaciers reached their greatest southern penetration in North America, blanketing almost all of present-day Canada and the northern United States. Covering an area the size of Antarctica, the North American glaciers were at least 50% larger than their European and Asian counterparts.[17]

Glaciers develop when winter snow and ice does not melt during the summer. Some scientists believe that complex 100,000-year astronomical cycles influencing the earth's climate promote intervals of glaciation. Very warm summers and cold winters represent one of this cycle's extreme. The other extreme is characterized by mild

[16] Though the St. Paul and Pacific's original land grant—which totaled approximately 3 million acres—appears diminutive when compared to the NP's 40,000,000-acre grant, it was the seventh largest of the 75 federal land grants authorized by Congress for railway corporations. See John B. Rae, "The Great Northern's Land Grant," *The Journal of Economic History* 12 (Spring 1952): 140-45; Murray, *The Valley Comes of Age*, 65; and Veenendaal, *The Saint Paul and Pacific Railroad*, 135.

[17] E. C. Pielou, *After the Ice Age: The Return of Life to Glaciated North America* (Chicago: University of Chicago Press, 1991), 1-2.

summers and winters. This unusual stage probably leads to glacier formation because the mean summer temperature was insufficient to melt winter snow and ice accumulations. During this phase, huge ice sheets slowly build up and expanded over earth's surface until the cycle reversed itself to the point when the mean seasonal temperatures vary considerably and, as a result, summer temperatures melt the ice accumulations.[18]

As the Wisconsin Glaciation drew to a close 12,000 years ago, retreating glaciers in Canada blocked the northerly-flowing Red River of the North from draining into Hudson's Bay. The blockage created an enormous glacial lake spanning 123,500 square miles with a depth of 400 feet. Lake Agassiz, the largest of North America's glacial lakes, persisted in various forms for 4,500 years (see Map 2). Covering much of present-day Manitoba, Ontario, west-central Saskatchewan, and the entire Valley of the Red River of the North, Lake Agassiz's size exceeded contemporary Lake Superior, the world's biggest freshwater lake, by at least four times. Before draining 9,000 years ago,

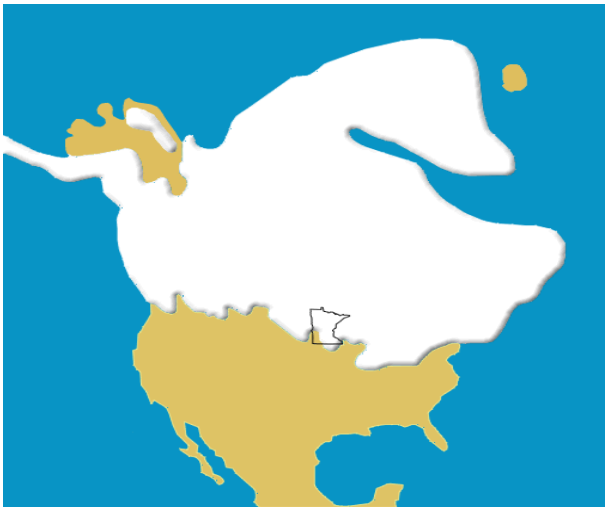

Figure 1: Wisconsin Glaciation
The above map shows the furthest extent of the Wisconsin Glaciation from 100,000 – 10,000 years ago. Retrieved from the website of the Minnesota River Basin Data Center on October 1, 2009.

[18] Ibid., 8-9.

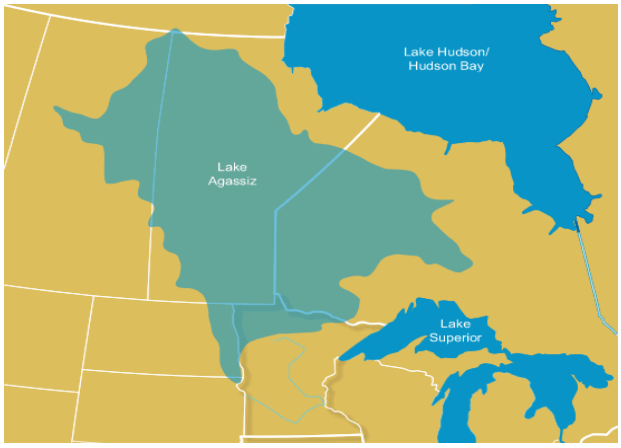

Figure 2: Glacial Lake Agassiz
This map depicts the total surface area covered by Glacial Lake Agassiz. Retrieved from the website of the Minnesota River Basin Data Center on October 1, 2009.

Lake Agassiz had a tremendous influence on the Red River Valley's present-day ecology. Whipped up by winds, waves smoothed the floor of the lake, leaving a uniform and featureless surface. Rivulets flowing into Agassiz transferred mineral matter from the glacial till into the lake, causing heavier clays to settle in the center of the lake, silts in shallower water, and sand in the shallowest portion near the lake's shores and beaches. As the lake drained, tall grass prairie colonized the former lakebed and an exceptionally rich soil accumulated at the rate of an inch per year until reaching a depth of five feet.[19]

Immature drainage systems are a primary characteristic of former glacial lake beds. The recession of Lake Agassiz left in its wake a paucity of natural outlets such as

[19] Ibid., 193, 294; Kim Alan Chapman, Adelheid Fischer, and Mary Kinsella Ziegenhagen, *Valley of Grass: Tallgrass Prairie and Parkland of the Red River Region* (St. Cloud, Minn.: North Star Press of St. Cloud, 1998), 3; Kieth E. Severson and Carolyn Hull Sieg, *The Nature of Eastern North Dakota: Pre-1880 Historical Ecology* (Fargo: North Dakota Institute for Regional Studies, 2006), 8-9; Alton Wilhelm Almquist, "Farm Drainage in the Red River Valley of Minnesota," M. S. thesis (June 1995), 15; John R. Tester, *Minnesota's Natural Heritage: An Ecological Perspective* (Minneapolis: University of Minnesota Press, 1995), 10-14; and H. E. Wright, Jr., "Introduction," in *The Patterned Peatlands of Minnesota*, eds. H. E. Wright, Jr., Barbara A. Coffin, and Norman E. Aaseng (Minneapolis: University of Minnesota Press, 1992), xvii-xviii.

watercourses, creeks, or brooks. On the Minnesota side of the Valley, the few rivers flowing from west to east followed meandering courses, had shallow and undefined banks, and often overflowed their banks while traversing the flattest portions of the former glacial lake's bottom, filling up shallow depressions with water and creating sprawling prairie marshes. During the Red River Boom, Valley settlers in the United States and Canada described the process as the rivers having "lost themselves on the prairie."[20] In addition to the marshes fed by the Red River's tributaries, the Valley contained wide areas of wet prairie. In the early 1950s, the historical geographer Leslie Hewes applied the term "wet prairie" to an arcing strip of territory extending from the Red River of the North's Valley through southwestern Minnesota, most of Iowa, northern and central Illinois, and pockets of southern Wisconsin and eastern Indiana. Wet prairies were seasonal wetlands created when spring snowmelt and late summer thunderstorms engulfed the prairie with more surface water than could soak into the stiff soils or find an outlet owing the scarcity of natural outlets and flat topography. According to one estimate, wet prairies and marshes originally covered about 20% of the surface area of the Red River Valley.[21]

---

[20] Settlers on the Canadian side of the international boundary used similar language to describe rivers crossing the Canadian portion of former Glacial Lake Agassiz. See Shannon Stunden Bower, "Watersheds: Conceptualizing Manitoba's Drained Landscape, 1895-1950," *Environmental History* 12 (October 2007): 799-800.

[21] Leslie Hewes, "The Northern Wet Prairie of the United States: Nature, Sources of Information, and Extent," *Annals of the Association of American Geographers* 41 (December 1951): 307-23; Hewes, "Some Features of Early Woodland and Prairie Settlement in a Central Iowa County," *Annals of the Association of American Geographers* 40 (March 1950): 40-57; Hewes and Phillip E. Frandson, "Occupying the Wet Prairie: The Role of Artificial Drainage in Story County, Iowa," *Annals of the American Association of Geographers* 42 (March 1952): 24-50; Richard H. Pemble, *The Natural History of the Red River Valley Region Before European Settlement* (Moorhead: Minnesota State University-Moorhead, 2005), 13; Hugh Prince, *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes* (Chicago: Chicago University Press, 1997), 41, 53, 57.

The Failure of National Wetlands Policy in Minnesota

Had Minnesota complied with the terms of the Swamp Land Acts, settlers arriving in the Valley during the Red River Boom would have encountered a drained landscape fit for immediate cultivation. Few states showed such a reckless disregard of the conditions and terms of the Acts as Minnesota. Under its 1860 donation, Minnesota received 4.7 million acres of "swamp and overflowed lands," the program's fifth largest individual grant. In 1861, Governor Alexander Ramsey implored the legislature to use the state's grant to build insane asylums, institutes for the "blind, deaf and dumb," state prisons, normal schools, and roads. Legislators endorsed Ramsey's plan with the caveat that "swamp and overflowed lands" also subsidize railroad construction. Soon thereafter the legislature promised the Lake Superior and Mississippi Railroad Company 694,000 aces of ceded swampland to build a railroad between St. Paul and Duluth. It pledged seven sections to the Taylors Falls and Lake Superior Railroad for every mile of railroad it laid between Wyoming, Minnesota, and Taylors Falls. The St. Paul and Chicago Railroad (succeeded by the Chicago, Milwaukee and St. Paul), Minneapolis and St. Cloud Railroad (succeeded by the Great Northern), Southern Minnesota, Minnesota Central, Duluth and Iron Range, and Sioux Falls and Dakota (succeeded by the Northern Pacific) also received lavish grants. Policymakers ceded all of the wetlands in McLeod County (4,683 acres) to enable it to subsidize the construction of an agricultural college and later a seminary. They initially donated 10,000 acres for the construction of a state road to Sioux Falls, South Dakota, 100,000 acres for an insane asylum, 100,000 acres for a "deaf and dumb" institute, up to 225,000 acres for three normal schools, and 100,000 acres for a state prison. In 1881, public outrage over the giveaways prompted the

legislature to pass a constitutional amendment prohibiting additional grants to railroads and dedicating the balance of the state's 1860 grant to education and charitable institutions. By this time, however, railroads held title to most of the 2.9 million acres given to private corporations (62% of the total grant). In Benjamin Palmer's apt judgment, "from the time of the acceptance by the legislature of the lands granted by Congress in 1860 no attention seems to have been given to the clause in the act by which the grant was made."[22]

Minnesota's noncompliance created a power vacuum in the Red River Valley. Like other states, Minnesota devolved authority for draining wetlands to local communities. Between 1858-87 the legislature passed seven different laws authorizing the formation of local ditch associations, county and township drainage projects, and finally drainage districts. In the Red River Valley, however, local institutions were incapable of draining the wet prairie independent of outside assistance for two reasons. First, the Valley's lack of viable outlets required the construction of very long and expensive ditches into which farmers and communities could convey surface water from their fields. Second, in Minnesota, the Valley's meandering, ill-defined rivers, which often overflowed the surrounding prairie during their gradual descent into the Red River, sometimes made land drainage counterproductive. It made little sense for one group of farmers to divert surface water into these rivers if such an action increased the volume and velocity of those watercourses to the detriment of downstream riparian proprietors or farmers living near the marshes. Successful land drainage hence depended on the improvement of the Red River's tributaries so they could receive an influx of surface

[22] Benjamin Palmer, "Swamp Land Drainage with Special Reference to Minnesota," University of Minnesota, Studies in the Social Sciences, *Bulletin* 5 (Marcy 1915): 88-94, quote on 94.

water without enlarging marshes on the flattest portion of the Valley where the watercourses lost themselves on the prairie. Apportioning costs for such modifications would be a difficult, protracted, and contentious process pitting communities and townships against one another. Furthermore, improvements made drainage costs prohibitive for even cost-sharing entities, a fact that farmers, local newspapers, and community leaders recognized and deplored.[23]

The inability of local institutions to handle land drainage, the absence of action by Minnesota or Dakota Territory, and the short northern growing season put Boom farmers at nature's mercy. First, the harsh northern climate left a small window for farmers to plant their wheat so they could harvest it before the first fall frost. If heavy winter snowfall inundated the prairie and delayed when a farmer could plant in the spring, the crop was at increased risk of being damaged by fall frosts before it fully matured. Second, when late summer downpours caused water to accumulate on the prairie, a newly-arrived farmer might be unable to "backset" his land. Backsetting was an initial step farmers took to prepare their land for cultivation. After farmers tore up the prairie in June and July, the land was backset—tilled in the opposite direction as the first breaking—in September or October to breakup large clumps and clods to streamline the spring seeding. When water languished on the prairie in the late summer, farmers could not backset before the ground froze. Third, surface water jeopardized the timely harvesting of wheat. Unlike corn, wheat and other small grains are unprotected by a husk and, when mature, remain vulnerable to natural elements. If surface water delayed

[23] Ibid., 59-63, 70-1. No study of federal and state wetlands policy during the nineteenth and early twentieth centuries evaluates the consequences of failed national wetlands policy for ordinary people. When policy decisions go awry, it is ordinary citizens, and not uninterested and uninvolved elites, that pay the price.

when a farmer could harvest his crop, the matured wheat, if subject to rain, wind, or hail, might tumble to the ground and spoil, diminishing annual yields.[24]

Arrivals to the Valley during the Red River Boom bemoaned how the short growing season conspired with surface water to hamper wheat production. In September 1879, George C. Reis, a newly-settled farmer in northwestern Minnesota's Polk County, stared across the prairie in disbelief. It had been four weeks since the last rainstorm yet water still covered Reis's land. The intolerable situation became bleaker with each passing day. As long as water covered the prairie, Reis was "not … able to put my Plows to backsetting."[25] A strong-willed and resourceful man, Reis refused to let nature get the best of him; he briefly considered draining the prairie on his own. But like many Valley farmers, he discovered that drainage was difficult on the level bottom of former Lake Agassiz. The flat topography required farmers to determine correct levels so they could harness the power of gravity to convey water away from their fields. Artificial ditches needed to maintain a uniform depth or even the smallest depression would cause the water to back up. Unless a farmer's property abutted a creek, river, stream, or pond, drainage ditches were useless and could not be emptied. Reis's brief experiences convinced him that is was impossible for any settler to "do his own Draining especially if he can't tell which direction to go, or where the lowest place is."[26]

Discouraged but undeterred, Reis requested assistance from Hill, the reorganized SPM&M's general manager. The railroad was one of the few institutions in northwestern Minnesota with the manpower, engineers, capital, and financial motivation to drain the

[24] Drache, *The Day of the Bonanza*, 95-6; and Cronon, *Nature's Metropolis*, 100.

[25] George C. Reis to Hill, September 13, 1879, President's Office, GN Records.

[26] Ibid.

wet prairie. According to Reis, it behooved the SPM&M to help build a series of drainage ditches since much of the company's land grant in Polk County languished in a similar condition as his own. "It will pay your Co. to look after this a little," Reis explained to Hill, "as your lands can't be Sold if left in present shape."[27] In late 1879, Hill dispatched engineers to Polk County to build drainage ditches for Reis and other farmers, but their efforts proved unsatisfactory. By the following May, Reis's desperation had turned to anger. He had 500 acres of land broken and ready for seeding, but Reis feared that he did not have a single acre of land dry enough to seed.[28]

And then it rained. "Mud is king," declared the *Red River Valley News*, the newspaper of the village of Glyndon, Minnesota, in early April 1880. Every spring area newspapers deplored the detrimental impact of poor drainage on the Valley's reputation, crop production, and roads, but the years 1878 to 1885 witnessed unprecedented precipitation levels. In 1880, the *News* reported that the abundance of surface water rendered county roads "impassible," meadows "too wet" for cutting hay, and wheat crops "stunted" and "yellow."[29] Unless something was done, editors worried, emigrants and home seekers would find northwestern Minnesota to be a miasmatic wasteland instead of the country's breadbasket. Back in Polk County, Reis's correspondence with Hill also took on an increasingly acrimonious tone. Unless the SPM&M built ditches adjacent to

---

[27] Ibid.

[28] Reis to Hill, September 13, 1879, May 25, 1880, and May 26, 1880, and Moses Manston to Hill, January 5, 1880, President's Office, GN Records; and Hill to Reis, September 15, 1879, Saint Paul, Minneapolis and Manitoba Railway Letterbook No. 1 (hereafter cited as SPM&M Letterbook), "June 25—October 15, 1879," and Hill to Reis, May 27, 1880, SPM&M Letterbook No. 3, "March 5—October 7," 1880," James J. Hill Papers (hereafter cited as Hill Papers), James J. Hill Reference Library, St. Paul, Minnesota.

[29] *Red River Valley News* (Glyndon, Minnesota), April 1, 1880, May 27, 1880, and July 22, 1880; and Murray, *The Valley Comes of Age*, 120.

its roadbed for farmers to convey their surface water, Reis predicted his crops "will all be drowned out … and it will be a very serious loss to me and a great draw back to this whole country—we need a good sized Canal cut towards Red River, can your Co. help us some how[?]" After visiting Polk County, Hill agreed to open some large ditches to relieve Reis's land and protect the SPM&M's roadbed from surface water. Due largely to corporate self-interest, Hill had entered the drainage business.[30]

Drainage as a Strategy of Enlightened Environmental Stewardship

Since the time of the early republic, Americans identified wetlands drainage as an important strategy of enlightened environmental stewardship. Popularized by the Hippocratic revival, hostile attitudes towards wetlands changed little during the nineteenth century. In the Red River Valley, newspapers served as clearinghouses which allowed editors and farmers to discuss the issues of drainage and frontier life. In late 1881, the editors of the *Grand Forks Herald* ran a series of articles explaining the historical background, benefits, and methods of land drainage. Drainage, the editors explained, was one of the oldest forms of land conservation in human history, dating back to the times of the Roman Empire. Since then, England and Holland had created innumerable new farms by draining bogs, fens, and coastal marshes by constructing ditches, levees, and pumping projects. Unlike in Europe, however, the United States' abundance of cheap and easily available land slowed the progress of land drainage since it was easier for Americans who lived on farmers beset by drainage problems to relocate rather than drain. As the nation's population soared due to natural increase and

[30] Reis to Hill, May 25, 1880 and May 26, 1880, President's Office, GN Records; Hill to Reis, May 27, 1880, SPM&M Letterbook No. 3, "March 5—October 7, 1880," Hill Papers.

immigration, the supply of arable lands would dwindle and conserving land from surface water would become indispensible.[31]

Valley newspapers argued that ordinary farmers and local communities were incapable of draining the wet prairie and watercourse-fed marshes without assistance from the territorial, state, or federal governments. "Ordinary" and "unfortunate" farmers did not have the capital, manpower, and expertise to dispose of surface water. Cursed by an absence of viable outlets, the Valley afforded only a few fortunate farmers the luxury of having access to a watercourse on their property. Land drainage would proceed in an uneven and sluggish fashion until the territorial and state legislatures intervened. The editors of the *Grand Forks Herald* implored Dakota Territory to open up a series of "main" ditches through low, marshy places into which adjacent farmers could empty lateral ditches from their fields. If the territory dug the main outlets or empowered county officials to dig them, farmers and local communities would incur little expense in draining their fields. Unfortunately, the editors never answered who would pay for the mains or assume responsibility for their maintenance and upkeep.[32]

Editors emphasized that enlightened environmental stewardship included land drainage. Saturated soils were notoriously cool, putrid, and difficult to cultivate. Drainage promised to warm the waterlogged soils—which the editors called "sticky, heavy, sour and cold"—by 10 degree Fahrenheit and boost their ability to withstand summer droughts. By "pulverize[ing]" topsoil and making it "loose and porous,"

---

[31] "Land Drainage. I," *Grand Forks Herald*, November 29, 1881. In 1879, editors from the *Minnesota Farmer (St. Paul)* attributed Minnesota's slow progress in land drainage to farmers' lack of knowledge regarding the benefits and methods of drainage. Nonetheless, they confidently predicted that "as the country becomes older more will engage in [drainage.]" See "On Draining," *Minnesota Farmer* 2 (February 1879): 145.

[32] "Land Drainage. II," *Grand Forks Herald*, December 4, 1881; and "Crop Prospects," *Red River Valley News*, June 17, 1880.

drainage drew moisture from the "deep sub-soil" to the surface. Pulverization also enhanced air circulation, which benefitted plant life. Sodden soils undermined plant growth because they fostered the generation of fungi and parasites that sapped the strength and vitality of immature plants. Editors concluded that drainage negated the harmfulness of these microorganisms by eliminating their breeding habitats.[33]

The final positive result of drainage had nothing to do with crop yields. Building stable rural communities required healthy people in addition to healthy crops. Dead farmers were inefficient farmers. Since the American Revolution, Americans, both urban and rural, associated fetid stagnant waters with fevers known as the ague, autumnal fever, bilbous fever, black swamp fever, the chills, intermittent fever, malaria, typhoid, and typhus. The supposed trigger for the outbreak of these ailments was "miasmas," mysterious vapors released into the atmosphere when the sun's rays came into contact with stagnant pools of water or decomposing animal and vegetable matter. Most settlers and farmers who complained of fevers and the ague probably suffered from malaria. Just before the turn of the century, scientists linked the spread of malaria to the bite of female anopheles mosquitoes, which prefer breeding in stagnant wetlands shielded from disruptive currents by vegetable growth. Despite their confusion of cause and effect, farmers correctly understood that draining wetlands had a favorable impact on human

[33] "Land Drainage. IV," *Grand Forks Herald*, December 22, 1881. Drainage's positive impact on soil composition and the early life cycle of plants were noted throughout Minnesota. Notice the similarities between the discussion of the *Grand Forks Herald* and the newspaper of Albert Lee, a town in south-central Minnesota near the Iowa boundary: "The advantages of drainage are that it enables to farmer to work his ground earlier in the spring; it prevents the soil from packing after heavy, protracted rains; it makes the soil loose and friable; it corrects the 'sourness' of moist lands and makes them warm and kind; and last, though not least, it increases the yield of nearly all kinds of crops, and particularly improves the feeding quality of grasses and hay." See *Freeborn County Standard* (Albert Lee, Minn.), August 30, 1883.

health. As the *Grand Forks Herald* put it, draining the wet prairie would eliminate the "noxious and malarial vapors that arise from wet land."[34]

The first serious legislative attempt to create a drainage program for the Valley occurred in Minnesota. In 1881, Bernard Sampson, a member of the Minnesota House of Representatives from Crookston, introduced legislation appropriating money for drainage surveys in the Valley. The bill dedicated $1,000 for the governor to hire an engineer to survey the region and to submit a report outlining the best system for draining it. Sampson's proposal followed the scheme recommended in the *Grand Forks Herald*: the state would dig main outlets into which farmers could convey surface water from their fields. The *Fisher (Minn.) Bulletin* celebrated the plan, describing it as "dig[ging] a huge ditch—almost a canal in fact—from the swamps on State land to the Red River, and then let the owners of adjoining property run laterals, at their own expense, into the main conduit."[35] Nothing came about because of Sampson's proposition. Nevertheless, the bill acknowledged that Minnesota would, in time, have to revisit its failure to comply with the Swamp Land Acts. Local newspapers and a growing number of farmers believed that state government should take an instrumental role in promoting, directing, and funding land conservation. They had few reservations about inviting the state (or territorial) governments to assert themselves in environmental management if it produced a result beneficial to their families and communities.

---

[34] "Land Drainage. IV," *Grand Forks Herald*, December 22, 1881. On early Americans' association of miasmas/malaria and wetlands, see chapters 1 and 2.

[35] "The Lands of the Red River Valley—The Best System for Draining Them," *Fisher (Minn.) Bulletin*, November 19, 1881.

James J. Hill's Empire of Ditches

While policymakers in Minnesota and Dakota Territory wavered, Hill and the SPM&M organized and implemented a drainage program. Since becoming the SPM&M's general manager, Hill believed his company would transform the valley from a barren, unproductive, and miasmatic wasteland into a verdant, productive, and salubrious garden—the breadbasket of the world. In the early 1880s, Hill's motives for sponsoring drainage combined pragmatism and idealism. First, he viewed increasing the SPM&M's carrying trade, defending its roadbed from washouts, and disposing of its land grant as fundamental to putting the company on a firm financial footing. Second, Hill believed that it was humanity's duty to improve nature's shortcomings, which contained dualistic and contradictory qualities. "Nature," he wrote later in life, "holds out in one hand her horn of plenty and in the other her scourge."[36] The fact that the environment "follows laws of its own" was most apparent in the allotment of water over earth's surface. "Man must adapt the distribution of water, by which the earth's productiveness is regulated, to suit his needs."[37] Hill likened proper environmental management to bringing nature into a proper state of balance by moderating the excesses and surpluses of water. Balance was achieved when water did not interfere with agricultural production. In places dominated by wetlands, it was the responsibility of people to remove surface water; in desert regions, it was the responsibility of people to transport water to the surface of the soil. Utility served as Hill's yardstick for evaluating nature, which had no intrinsic value beyond satisfying humanity's basic needs. At the end of the 1890s, Hill began to see the improvement of marginal lands as fundamental to preserving the

[36] James J. Hill, *Highways of Progress* (New York: Doubleday, Page & Company, 1910), 44.

[37] Ibid., 185.

nation's agrarian heritage and preventing the massing of people in cities. But in the 1880s, reversing the SPM&M's poor financial outlook took precedence over promoting an antediluvian Jeffersonian social vision.[38]

In the summer and fall of 1880, Hill ordered the construction of a broad system of land drainage in Minnesota's Clay, Polk, and Kittson counties. The system's primary purpose was to protect the SPM&M's roadbed from washouts during heavy rainstorms. The plan called for building ditches adjacent to both sides of the railroad bed to intercept water flowing across the prairie's surface from foothills situated on the eastern banks of the former glacial lakebed. Railroad engineers later dug at least 15 additional ditches, totaling some 45 miles, extending perpendicularly and westerly from the roadbed along section lines towards the Red River of the North and its tributaries in Clay, Polk, and Kittson counties. Company engineers intended the perpendicular ditches to divert water away from the parallel roadbed ditches so they did not overflow the tracks. Although the historical record is sketchy, it suggests that SPM&M representatives received permission from farmers to cut the perpendicular ditches across their property on the condition that they could connect their own drainage ditches with the larger railroad outlets. Farmers adjacent to the ditches praised them for draining their farms.[39] Perceiving drainage as an

[38] During the 1880s, Hill's personal correspondence and public speeches do not reference a single Jeffersonian fear. Until the late 1890s, drainage was strictly a financial matter of boosting the SPM&M's carrying trade, selling off its land grant, and reducing maintenance costs associated with track washouts. Like many later Progressive Era conservationists, Hill's later support of federal irrigation was based upon Jeffersonian fears regarding the impact of industrialization on people's character and personal habits. On Hill's promotion of the 1902 Reclamation Act and Jeffersonian, see Donald J. Pisani, "George Maxwell, the Railroads, and American Land Policy, 1899-1904," *Pacific Historical Review* 63 (May 1994): 177-202; and, more broadly, Claire Strom *Profiting from the Plains: The Great Northern Railway and Corporate Development of the American West* (Seattle: University of Washington Press, 2003).

[39] In 1888, attorneys for Ole O. Brevik, a Clay County farmer, told the Clay County District Court that their client, during October 1880, gave railroad employees permission to excavate a ditch across a 16-foot strip of his land near the section line. SPM&M representatives informed Brevik that "the ditch would be a valuable improvement to [his] lands … and that said lands would be effectually drained by said ditch."

uncomplicated initiative, Hill boasted that the plan promised to "drain that whole country away from the track" with a "comparatively small outlay." The *Red River Valley News* commended the SPM&M's investment and anticipated immediate results for railroad and farmer alike: "This enterprise, while serving well the company's interest, will also be a boon to settlers along the line, the lot of whom has this wet season been of special hardship."[40]

One of the SPM&M's most important perpendicular ditches extended for three miles across Moland Township in Clay County. Hastily constructed and poorly designed, the Moland ditch drained an enormous quantity of water from the company's parallel ditches and adjacent farmers' fields. Completed during the 1880-1 winter, the Moland Ditch's most glaring structural flaw was that it emptied into a small "swail" or "depression" on the prairie's surface instead of a watercourse. The swail was 20 yards wide, 12 to 18 inches deep, and ran for two miles from the ditch's mouth before gaining elevation and becoming indistinguishable with the prairie. Company engineers apparently anticipated that surface water discharged onto the prairie by the Moland ditch would disperse and evaporate without harming anyone's property. In an astonishing

---

Brevik's attorneys admitted that Brevik was pleased with his decision because the ditch drained significant parts of his farm. See "Ole O. Brevik v. SPM&M," Clay County District Court Records (hereafter cited as CCDCR), case 1822, MHS.

[40] Hill to R. B. Angus, July 9, 1880, SPM&M Letterbook No. 3, "March 5—October 7, 1880," Hill Papers; and "Railway News" and "Glyndon's Fame Abroad," *Red River Valley News*, June 24, 1880. The best available discussion of the SPM&M's initial drainage efforts on the Minnesota side of the Valley is found in "State Drains: Which Have Been Constructed in the Minnesota Half of the Red River Valley," *Grand Forks Herald*, April 16, 1899.

error of judgment and act of negligence, SPM&M workers did not consider extending the ditch another 1.5 miles so it could empty into the nearby Buffalo River.[41]

The foolish decision to empty the Moland ditch onto the prairie proved disastrous. In April 1881, melting snow and precipitation filled the SPM&M's parallel ditches to capacity. Capturing water from the parallel ditches, the Moland ditch also ran full and discharged large volumes of water into the swale. Rather than dispersing across the prairie and evaporating, the water accumulated to a depth of 12-18 inches and covered an area three miles wide (east to west) and at least nine miles in length (north to south). The shallow flood occurred just weeks after Clay County farmers saw their wheat and oat crops sprout. Andrew Lommeland was but one of dozens of farmers whose farms, homes, and fields lay in the path of the shallow, yet destructive, torrent. Lommeland recalled the water's swift and unexpected arrival. One day in late April his crops had reached a height of about four inches when the water "was coming just a rolling on the prairie." The water stubbornly lingered for more than a month, nullifying the dim prospect that farmers could plow up their ruined fields and replant.[42]

Hogen M. Hogenson lived two miles from Lommeland and six miles from the Moland ditch's mouth. Born in 1857 in Rock County, Wisconsin, Hogenson and his Norwegian parents, Peter and Sonva Hogenson, moved to Olmstead County in southeastern Minnesota when he was six years old. After growing up and helping his parents establish a profitable homestead, Hogenson longed to settle a farm of his own.

---

[41] Detailed descriptions of the ditch appear in "Municipal Court Decision," *Moorhead Weekly News*, August 23, 1883; and "Gabriel Wilson v. SPM&M," CCDCR, case 1489.

[42] "Lommeland paper book," 46, 48. Lommeland later testified in court that the flood had occurred in June 1881. His recollection of the timing of the flood was apparently flawed since all of his neighbors stated that the ditch discharged water over the prairie beginning in April. The April onset makes more sense since it corresponds to the season when the wet prairies were inundated. Subsequent events also reveal that Lommeland misremembered the precise beginning of the flood.

The opportunity arrived in 1880. Allured by stories of the Red River Valley's unrivaled fertility, Hogenson left home and filed for a homestead in Moland Township. Arriving in summer, Hogenson worked hard to plow up the native tall grasses and backset his land before winter. The 23-year-old American citizen was somewhat of an outsider in the multicultural and ethnically diverse township: he was one of a handful of native-born Americans amongst the many Norwegian and Danish immigrants.[43]

The 1881 shallow torrent caught Hogenson off guard and destroyed his first crop. Unlike his skeptical neighbors, Hogenson never doubted the flood's source. Probably during a trip to the nearby village of Glyndon, Hogenson witnessed SPM&M workers digging the Moland ditch. Though he had never seen the ditch running full of water, he concluded it was the only possible source of the water. Outfitting his draw animals one afternoon, Hogenson drove towards the ditch's outlet to test his theory. His animals toiled mightily against the swift and steady current. According to Hogenson, the animals "got tired of driving in the water," and he was forced to turn back before reaching the ditch.[44] Exhausted and angry, Hogenson circulated a petition among his neighbors addressed to Hill. Though the petition is lost to history, it undoubtedly asked the railroad tycoon to dam the ditch or connect it to the Buffalo River. The petition reached Hill's desk at a time when the SPM&M was busily engaged in extending its lines and dealing with similar surface water problems north of Fargo in Dakota Territory. In a perfunctory and unsympathetic response, Hill promised that the matter would "receive attention at the earliest possible moment." After that curt reply, Hogenson, Lommeland, and their

[43] R. I. Holcombe and William R. Bingham, *Compendium of History and Biography of Polk County, Minnesota* (Minneapolis: W. H. Bingham & Co., 1916), 262.

[44] "Lommeland paper book," 15-6, 19-20.

neighbors seem to have been lost in the shuffle as SPM&M officials scurried to address similar flooding problems north of Fargo. Several Dakota farmers had complained to Hill and other railroad executives that the railroad's embankment dammed the natural flow of prairie surface water after rainstorms and flooded their farms. Preoccupied with a host of problems, Hill placed the Moland ditch low on the company's lists of priorities.[45] As 1881 drew to a close, the stage was set for a dramatic showdown between the SPM&M and Moland Township farmers.

The Expansion of Railroad Drainage

Undeterred by the problems in Moland Township, Hill pressed forward with additional drainage plans. In the summer of 1882, he instructed James B. Power, the SPM&M's land commissioner, to study drainage, interview Valley landowners, and prepare a plan. Power was born on August 20, 1833, in Stockport, New York, to William and Catharine Power. At the young age of sixteen, he took a job as a freight and ticket agent for the New York and Erie Railroad. Power spent most of his life working as a

[45] Hill to H. M. Hogenson and others, May 5, 1881, SPM&M Letterbook No. 5, "April 12, 1881—March 23, 1882," Hill Papers. Hill delegated responsibility for dealing with the Moland flooding to Allen Manvel, the SPM&M's new assistant general manager. Manvel asked the railroad's chief engineer, C. C. Smith, to evaluate the situation, but it is unclear if Smith ever visited Moland or evaluated the ditches. See Manvel to Smith, May 5, 1881, SPM&M Letterbook for the Assistant General Manager's Office, "May3—July 24, 1881," Hill Papers. It is curious that Hill believed that surface water problems in Dakota Territory demanded immediate intervention, but that the situation in Clay County was less urgent. In April 1881, several farmers residing north of Fargo wrote Hill that the SPM&M's embankment dammed the natural flow of the prairie's surface water, flooding their farms. Apparently, the location of the farmers to the alleged source of the overflow prompted Hill to judge the Dakota farmers' complaints as justifiable but those of the Clay County farmers as specious. The Dakota farmers claimed that embankments abutting their property blocked the usual flow of prairie surface water, overflowing their farms. In Moland Township, most of the damaged farmers lived 4-6 miles from the Moland ditch. In later court cases, SPM&M attorneys argued that their client was not obligated to pay for damages occurring to farmers that were not "neighbors" of the railroad. In other words, surface water law, as will be discussed, only applied to neighbors and not to distant parties. This conclusion is borne out by bitter letters Hill wrote in ensuing decades about how farmers located six miles from the railroad's ditches (i. e. Hogenson) had sued for damages. See Hill to H. W. Donaldson, June 19, 1893, Special File, "Assistant to President—T. J. Hyman and Others" (hereafter cited as Hyman file), Hill Papers.

civil engineer and surveyor for railroads in New York, Missouri, and finally Minnesota and Dakota Territory when, in 1871, he became the NP's first land commissioner. As the architect of the NP's bonanza farm scheme, Power played an integral role in the disposal of the company's land grant. In the early 1880s, Power fell out of favor with NP management after they accused him of malfeasance in his acquisition of depreciated NP stock and his dilatory response in firing an employee accused of incompetence.[46] Upon his ignominious dismissal, Power accepted an offer from Hill to head the SPM&M's land department. Grateful for a second chance, Power developed a mutual affinity for Hill and shared his belief in nature's infinite malleability. Both men agreed that two factors inhibited the maximization of profits for railroad and farmer alike. One factor was farmers' stubborn refusal to diversify. The other was the large amount of undeveloped wetlands in Minnesota. The lack of drainage depressed land values, delayed the disposal of the SPM&M's land grant, and diminished the railroad's carrying trade.[47]

In an 1882 letter to Hill, Power laid out his vision for the SPM&M's role in promoting drainage. After conferring with prominent landowners, he identified two basic problems. First, the Valley's lack of natural outlets prevented farmers from getting surface water off of their fields and into natural watercourses. Second, rivers on the Minnesota side of the Valley that flowed across the former glacial lake's bottom followed torturous and winding courses, had few tributaries, were choked with natural debris, and

[46] On Power's break with NP leadership, see Robin W. Winks, *Frederick Billings: A Life* (New York: Oxford University Press, 1991), 227.

[47] Poor drainage affected the operations of bonanza farms as much as small landowners and homesteaders, a fact that many studies of the bonanzas overlook. Despite their problems, bonanza owners, unlike small farmers, had sufficient capital and labor force to complete ditching. Except in few instances, Hiram Drache's seminal study of the bonanzas all but ignores drainage. See Drache, *The Day of the Bonanza: A History of Bonanza Farming in the Red River Valley of the North* (Fargo: North Dakota Institute for Regional Studies, 1964), 99.

regularly lost themselves on the flattest portion of their long descent into the Red River, creating sprawling marshes. Water conveyed into these rivers from drainage ditches would raise their volume and velocity to such an extent that they might enlarge the marshes and endanger riparian proprietors' property. According to Power, a couple of bonanza farmers had improved a significant quantity of their land by putting in "small and inefficient drains" at the expense of nearby settlers "that are so unfortunate as to be in the line of the extra overflow from these reclaimed lands. This I fear will be the result in every instance when individual owners attempt to reclaim their own lands and the drainage of these few large farms will in the end damage an area much larger than will be benefitted." [48]

In the absence of state or federal assistance, the SPM&M was the only entity that possessed the manpower, resources, and expertise to provide landowners with drainage. Power recommended "opening a series of main drains" into which farmers could empty their field ditches.[49] Once constructed, the main drains would connect with watercourses prepared by company engineers to handle the increased stream flow. "Effectual reclamation of the valley land," Power emphasized, "can only be accomplished by cleaning out the natural streams … of the obstructions now preventing free flowage and adding to the natural drains a number of artificial water ways."[50] The land commissioner predicted a financial windfall if the company agreed to his plan. Most of the SPM&M's unsold lands were "practically useless" because of poor drainage. In one section of Polk County, for instance, there were 312,000 acres—62,700 of which were owned by the

[48] James B. Power to Hill, June 14, 1882, President's Office, GN Records.

[49] Ibid.

[50] Ibid.

SPM&M—of uncultivable wetland. Power predicted that the drainage of the lands would bring the railroad an "additional carrying business of not less than $250,000 a year" and enhance the value of its unsold grant by at least $100,000.[51]

The Keystone Farm provided an ideal opportunity for Power to test his drainage strategy. Cooperatively owned by Springer Harbaugh of St. Paul, Minnesota, and Charles Lockhart of Pittsburgh, the Keystone Farm was a mammoth Polk County bonanza farm encompassing 9,200 acres. The first bonanza operation established along the SPM&M's St. Vincent Extension, the Keystone Farm, as one visitor observed, resembled a small village. By May of 1885, the farm encompassed 36 different buildings, ten granaries exceeding 80,000 bushels in capacity, nine barns, and a dairy equipped with cold running water to refrigerate bottled milk. The Keystone's proprietors owned 140 horses and mules, 85 cattle, and cultivated 5,550 acres with wheat, oats, rye, barley, and timothy.[52]

The Keystone's agricultural success had been uncertain a few years earlier. In the unprecedented wet seasons of 1880-1, water covered extensive stretches of the farm. The situation grew especially dire in the summer of 1881. Hundreds of seasonal laborers stood idle as surface waters prevented them from putting their plows and reapers into the fields. Displeased with the land's quality, which they purchased from the SPM&M, Harbaugh and Lockhart agreed to allow Power to arrange a system of land drainage after his visit in September 1881. Obsessed with the maximum exploitation of nature, Power ordered railroad engineers to construct a 14-mile long main ditch across the Keystone

---

[51] Ibid.

[52] St. Paul, Minneapolis, and Manitoba Railroad Company, *Letters from Golden Latitudes* (St. Paul: n. p., 1885), 15-6; and Murray, *The Valley Comes of Age*, 135-6.

farm connected to dozens of smaller feeder ditches. Power enthusiastically predicted that the ditch would drain thousands of acres of land on the Keystone farm and large blocks of adjacent railroad property. The editor of the *Fisher Bulletin* anticipated that the project, if successful, would convince farmers throughout the Valley to cooperate in land drainage.[53]

In the spring of 1882, the Keystone Farm's new drainage ditches failed abysmally, flooding the fields of neighboring farmers, the railroad's unsold lands, and some federal lands. Undeterred and undiscouraged, Power directed SPM&M engineers to provide relief for the damaged farmers. By the end of the summer, railroad engineers went to work on a mammoth, 22-mile "canal" intended to drain 30 square miles of railroad, Keystone, and overflowed land into a tributary of the Snake River. Filled with brush, decaying logs, and thick weeds, the Snake's tributary proved unable to carry away the surface water diverted into it. Clearing watercourses of debris had been the second phase of Power's drainage plan, but it was apparently ignored on the Snake River. In any case, the Snake River, swelled by the influx of water, overflowed its narrow banks and inundated thousands of additional acres.[54]

Unwavering confidence in man's ability to dominate nature influenced Hill and Power's approach to drainage. The events in Moland Township and in the vicinity of the Snake River should have served noticed that nature sometimes pushes back against outside intervention. Human mastery of the environment has been more elusive and

---

[53] "Drainage," *Fisher Bulletin*, September 24, 1881, and March 4, 1882; and Power to Joseph Dilworth, February 21, 1882, Letterpress book, "December 1880 - April 1882," Box 2, James B. Power Papers (hereafter cited as Power Papers), North Dakota Institute for Regional Studies, Fargo, North Dakota.

[54] Power to Hill, June 14, 1882, President's Office, GN Records; Power to A. J. Norrish, July 29, 1882, Letterpress book, "April 1882 - March 1885," Box 3, Power Papers; and *Fisher Bulletin*, July 21, 1883, July 28, 1883, and August 11, 1883.

ephemeral than absolute and ongoing. Hill and Power's conceited belief that the Valley's wet prairies would yield to humanity's will, despite overwhelming evidence to the contrary, testified to their arrogance and contributed to corporate hubris as they expanded the company's drainage program in 1883, 1884, and 1885.

Legal Showdown

Farmers from Moland Township and in the Snake River's vicinity learned a valuable lesson in the early 1880s: the power to control water is the power to dominate people. In many human societies, entities controlling the distribution and disposal of water for reasons related to agriculture, industry, and human consumption wield tremendous, if sometimes overlooked, social and political power. Struggles over water are fundamental to environmental history because the power to allocate, withhold, impound, or set the price of water confers privilege and prestige. As the historian Douglas R. Weiner reminds us, "every 'environmental' struggle is, at its foundations, a struggle among interests about power. In fact, I would go further. Every environmental story is a story about power."[55]

The dispute between the Moland farmers and the mighty SPM&M was fundamentally a conflict about the power and limitations involved in disposing of surface water. Were there responsibilities and obligations involved in the disposal of surface water and, if so, to what extent did they influence where and how an individual or corporation could divert it? In the spring of 1882, water from melting snowfall collected in the railroads' parallel ditches and again discharged onto the prairie after travelling

[55] Douglas R. Weiner, "A Death-Defying Attempt to Articulate a Coherent Definition of Environmental History," *Environmental History* 10 (July 2005): 409.

through the Moland Ditch. The destructiveness and length of the 1882 flood dwarfed that of the previous year. Pouring out of the ditch, the surface water diffused across the prairie at a brisk pace, covering an area of 18 square miles. Peter Boen, who lived a mile northeast of Lommeland, claimed that the water lingered on his fields for a couple of months. Though some local skeptics alleged that hard spring rains—and not the SPM&M ditch—were the source of the shallow flood, Boen drove his team of animals against the current until he reached the ditch's mouth. He discovered water pouring out of it in the general direction of Lommeland, Hogenson, and his own farm.[56]

The SPM&M's diversion of surface water onto their farms dominated conversations in the close-knit rural community of Moland Township, where neighbors of different ethnic backgrounds shared seasonal work burdens. When new settlers arrived, established farmers routinely assisted them in breaking and backsetting the tough, tall grass prairie. Cooperation continued throughout the growing season and peaked in autumn as neighbors helped each other harvest, thrash, and load their wheat onto wagons for transport to local towns. Minnesota's far northern climate rendered this communal work arrangement imperative if farmers were to get their crops harvested before the first frost.[57]

Despite the willingness of many neighbors to cooperate, conflict was not absent from everyday life. Roaming livestock were a recurrent source of contention. Before the late nineteenth century, the scarcity of trees in the Red River Valley made fence construction a laborious, expensive, and time-consuming process. Rather than committing scarce resources to hauling wood from the banks of rivers and streams,

[56] "Lommeland Paper Book," 29.

[57] Ibid., 31, 45-6.

residents concentrated on converting more and more of their land into crops, allowing cattle to wander freely in search of forage. Fed up with livestock trampling their crops, a group of Moland farmers petitioned the state legislature in 1881 to "make a special Herd Law for Restraining Cattle." Conflicts involving roaming cattle belied the claims of contemporary elites, including Power and Hill, that Valley farmers needed to achieve diversification in part by raising cattle.[58]

As the harvest of 1882 passed with disappointing losses due to flooding, the aggrieved Moland farmers rallied together to confront the mighty SPM&M. Close-knit bonds established through years of mutual cooperation and a common grievance prompted the farmers to pursue collective litigation against the SPM&M. On November 14, 1882, sixteen Moland farmers filed lawsuits in county court against the SPM&M for "wrongfully, unlawfully, and maliciously" diverting surface water onto their property and ruining their 1881 and 1882 crops.[59] The sixteen farmers were a diverse lot of homesteaders, timber culture claimants, and other small property-owners. All of the litigants owned (or had the potential under federal homestead and timber culture laws to own) at least a quarter section. Only one farmer was born in the United States (Hogenson), and his parents had emigrated from Norway. All of the farmers but one (William Lloyd) emigrated from Norway or Denmark. Land records indicate the farmers

[58] Petition "To the Honorable House of Representatives and Senate of Minnesota," March 1, 1881, Box 5, Folder "January-April, 1881," Solomon G. Comstock Papers (hereafter cited as Comstock Papers), Minnesota State University Archives, Moorhead, Minnesota. Nearly two dozen farmers expressed their antipathy towards unrestrained livestock by signing the petition.

[59] Since the farmers obtained the same lawyer, filed their suits on the same day, and, as we shall see, cooperated in the naturalization process, little doubt exists that the farmers collaborated in reaching the decision to seek redress through the legal system. See *State of Minnesota. County of Clay. District Court, 11th Judicial District. Calendar of Causes. November General Term, 1882.* (Moorhead: n. p., 1882), cases 26-41. Copy available at Minnesota State University Archives, Moorhead, Minnesota. The above source wrongly listed October 14 (instead of November 14) as the date when the farmers' filed suit against the StPM&M. Official court documents list November 14 as the first date of filing.

preferred living near people with their ethnicity. Ethnic clusters offered people an opportunity to reside next to someone who spoke the same language, shared a similar culture, exchanged stories from their home country, and discussed news from back home.

Agricultural census records for seven of the litigants shed insight into their husbandry practices for the year 1879. The Moland farmers practiced a diversified form of agriculture. They individually owned an average of 1.7 cattle and 1.6 oxen. A handful raised calves to sell for extra cash. Four of the seven farmers owned a total of eleven sheep, producing 52 lbs. of wool. Most farmers raised chickens. Records reveal that the farmers on average owned 8.1 chickens that dropped about 44 eggs each year. In 1879, all of the farmers who had cultivated one crop planted both wheat and potatoes. The farmers' wheat yields, which seldom exceeded 10 bushels per acre, probably remained low due to poor surface drainage. One of the litigants harvested 36 bushels of oats from 2 acres. Within a few years, many others supplemented their wheat crops with oats and potatoes. All of the farmers' few possessions, small quantity of cultivated acres, and unimpressive crop yields suggests that the farmers had a very narrow margin of success or failure. Indeed, the total or partial loss of one year's crops could have been enough for the farmers to become insolvent. It seems reasonable to conclude that the necessity of remaining afloat financially, in addition to a collective sense of injustice, motivated the farmers to pursue legal action.[60]

O. Mosness, the attorney representing the Moland farmers, feared that his clients' naturalization status might hamper their legal fight. Within weeks of filing suit, several of the farmers traveled together to Moorhead, the county seat of Clay County, to take the oath of citizenship to the United States at the courthouse. On November 27, 1882, Arne

[60] *Nonpopulation Census Schedule*, microfilm reel 4, frames 676-7.

Ostrem, Peder O. Boen, Ole Syverson, and Jens Pedersen collectively swore their fidelity to the Constitution, renounced their allegiance to the King of Sweden and Norway, and pledged that they had lived in the United States for at least five years and in Minnesota for twelve months. Over the next few months, several more of the farmers took the oath of citizenship, probably less out of sense of fidelity to their new homeland than to facilitate the successful outcome of their litigation.[61]

Mosness's predictions proved prophetic. During the next few years, railroad attorneys vigorously contested farmers' surface water claims throughout Clay County by utilizing every legal tactic at their disposal. Since Hogenson's 1881 petition to Hill, railroad leaders convinced themselves that the Moland farmers were conspiring to swindle the corporation out of large sums of money. Convinced that the railroad could not receive a fair trial in Clay County, SPM&M attorneys in late 1882 asked the county court to transfer the "flowage" cases to the U. S. Circuit Court for the District of Minnesota in St. Paul on the grounds that most of the plaintiffs were "aliens" and lacked standing to sue.[62] While the cases awaited adjudication in St. Paul, lawyers for both parties agreed to try the lawsuit of Hogenson, an American citizen, in county court. On April 3, 1883, a county judge ruled against Hogenson on a defense motion for judgment on the pleading and ordered him to pay the SPM&M's court costs. The verdict forced Mosness to ask for a continuance of the other cases while he studied the ruling and

---

[61] *Clay County Naturalization Records*, 1872-1954, vol. 1, Final Papers, 1874-1900 (St. Paul: Minnesota Historical Society, 1996), frames 276-9, 283, 287, 291, CCDCR, MHS. Ole Matisen, Halvor Rasmusson, and William Lloyd followed the first group of farmers and took the oath of citizenship before mid-January 1883.

[62] *Red River Valley News*, November 30, 1882. The affidavits for the transferred cases are in RG 21, Records of the U. S. Circuit Court for the District of Minnesota, Third Division (St. Paul), Law "C" Cases (1879-84), box 25, cases 398-404, and box 26, cases 405-12, National Archives and Records Administration, Kansas City, Missouri.

considered appeal options. In the meantime, a different Clay County judge ruled against the SPM&M in a similar case brought by Andrew N. Forsyth. Judge W. K. Gould ordered the SPM&M to pay Forsyth $308 plus court costs for damaging his crops in 1881 and 1882 by diverting surface water onto his property via the Moland ditch. The split rulings ensured that the Minnesota Supreme Court would have the last say on the cases.[63]

Once the Minnesota Supreme Court agreed to hear Hogenson's case, attorneys for both parties submitted briefs. Mosness argued that neither the civil law rule nor the common enemy doctrine (he mistakenly called it the "common law") justified the railroad's actions. In his opinion, it did not matter which surface water rule the legislature had adopted. "It is a maxim that everyone must so use his own property as not to injure his neighbor's," Mosness argued, "and if the law of surface water is an exception, it violates a maxim as just, as broad and as universal as reason itself."[64] Since Minnesota had formally adopted the common enemy rule, Mosness insisted that justice and equity demanded that certain limitations be placed on the process by which an individual or corporation could remove of surface water. In directly transferring the burden of surface water from its railroad tracks to neighboring farmers, the SPM&M's recklessness far exceeded any other comparable case. "This case differs from most of those found in the books in that the magnitude of the offense is greater, greater damages

[63] *Red River Valley News*, April 19, 1883, August 30, 1883, and October 25, 1883; and "Hogen M. Hogenson, v. SPM&M," CCDCR, case 3611, MHS.

[64] "State of Minnesota, Supreme Court. October Term, A. D. 1833. Hogen M. Hogenson, Appellant, vs. The St. Paul, Minneapolis and Manitoba Railroad Company, Respondent. Apprellant's Brief," Law Department, GN Records.

are suffered. In this case a large stream of water is wantonly thrown upon a farm verdant with growing grain, done at a season when the same are most susceptible of injury."[65]

Railroad attorneys dismissed Mosness's reasoning and manipulated the language of existing statutes to justify the SPM&M's actions. First, they contended that surface water law generally applied to disputes between "neighbors," that is, adjacent proprietors. In the case at bar, Hogenson's farm was situated on higher land and 6 miles north of the ditch in question and, therefore, could not have been damaged by water discharged from distant ditches. Second, they maintained that company engineers had no choice but to convey the surface water onto the prairie instead of the Buffalo River. In the spring, tributaries of the Red River—including the Buffalo—flowed at their maximum capacity. Emptying the ditch into the Buffalo would have caused it to overflow its banks, something expressly forbidden by case law. It was far better to allow the water to disperse across the prairie than flood downstream riparian proprietors. With such tortured logic (it was acceptable to flood the land of farmers distant from rivers, but not the land of riparian landowners), the railroad appeared on shaky footing. Nevertheless, railroad attorneys recognized that the case essentially involved determining what constituted the more efficient use of property and benefitted society the most: the running or railroads or the growing of grain on a few isolated farms?[66]

In November 1883, the Minnesota Supreme Court sided with Hogenson. Absent an explicit agreement from property owners consenting to the disposal of surface on their

---

[65] Ibid.

[66] "State of Minnesota, Supreme Court. October Term, A. D. 1833. Hogen M. Hogenson, Appellant, vs. The St. Paul, Minneapolis and Manitoba Railroad Company, Respondent. Respondent's Points and Authorities," Law Department Records, GN Records.

land, the SPM&M had no right to commit the act in question. Writing for the majority, Justice C. J. Gilfillan concluded:

> The right of an owner to improve his land … does not include the right to gather the surface waters on one's land and turn them upon the land of another, to its damage, even though the former land may as a consequence thereof be improved. In other words, [a landowner] may not in this way improve his own land, by merely transferring to the land of another a burden which nature has imposed on his own land.[67]

The decision symbolized a sweeping victory for the farmers' year-long pursuit of environmental justice. Emboldened by the favorable verdict, dozens of additional Clay County farmers sued the SPM&M for property damage caused by the company's flawed system of drainage ditches. General Manager Manvel complained that the Supreme Court's decision placed the company in a vulnerable situation. As dozens of surface water lawsuits flooded the SPM&M's legal office, the company had to decide whether to fight the lawsuits, and alienate even more farmers, or negotiate out of court settlements. Although Manvel "deprecate[d] and dislike[d] any litigation with the farmers along our line," he initially favored fighting the lawsuits "because if we settle with one [farmer] the other [litigants] will think they are as much entitled" to monetary compensation.[68] In 1885, however, Manvel and SPM&M attorney and legal advisor Solomon G. Comstock recognized the futility and exorbitant costs of contesting every individual case in court, especially given the Supreme Court decision, and began the laborious process of reaching

[67] *Hogen M. Hogenson vs. St. Paul, Minneapolis & Manitoba*, 31 Minn. 224, quote at 226.

[68] Manvel to Solomon G. Comstock, Box 8, File "November-December, 1885," Comstock Papers.

out of court settlements. Over the course of the next decade, the SPM&M paid financial settlements to nearly four dozen Clay County farmers at a cost exceeding $100,000.[69]

Nothing angered Hill more than the actions of Clay County farmers towards his company. Dismissing the lawsuits' merits, Hill interpreted the farmers' litigiousness as a financially-motivated conspiracy to swindle his railroad out of large sums. Time and again he described the *Hogenson* verdict and consequent lawsuits as a frivolous attempt to "take advantage of any and everything that came their way for their personal benefit."[70] Solely motivated by financial gain, the famers had betrayed Hill's trust and perpetuated an egregious fraud. A man with a towering ego and volcanic temper, Hill provided a compelling insight into his character and temperament through his statements regarding the company's abortive drainage program. In dismissing every accusation of wrongdoing against his company as a dubious scam, Hill read conspiratorial ambitions into any person or institution contesting his actions. People did not challenge the Empire Builder without suffering his wrath and hostility, regardless of their allegation's merit.

The most significant legacy of the string of lawsuits was the SPM&M's decision to retreat into the background of environmental planning. Following the problems in Clay County, the company abruptly terminated the construction of new drainage ditches and disavowed future participation in direct environmental planning. "Under these

---

[69] For the SPM&M's legal strategy in the flowage cases, see especially Manvel's handling of the case involving Frederick and Mary Hennebohle. Manvel to Comstock, Box 8, File "November-December, 1885," and Manvel to Comstock, September 22, 1886, Box 9, "September-October, 1886," Comstock Papers. For records of the SPM&M's financial settlements with individual farmers, see Clay County Deed Record Books, vol. 5, 324, 486; vol. 9, 565, 591-2, 594-8; vol. 11, 124, 144, 153-4; vol. 13, 54; and Clay County Miscellaneous Record Books, vol. B, 619-20 623-26, 637-40; vol. C, 1-6, 8, 100-1, 291-5. Both volumes are in the Clay County Recorder's Office, Clay County Courthouse, Moorhead, Minnesota. Hill gave the amount of $100,000 in Hill to H. W. Donaldson, June 19, 1893, Hyman File, Hill Papers.

[70] Hill to E. D. Childs, May 13, 1886, SPM&M Letterbook No. 8, "February 14, 1885—June 15, 1886," Hill Papers.

circumstances," Hill informed a Polk County farmer in 1886, the SPM&M "cannot undertake to do any more ditching or improve any ditches we have already made."[71] By early 1886, Hill shifted his wetlands management strategy from direct involvement to one where his company remained in the background while local communities took the lead. To avoid new suits, the SPM&M dismantled many of its existing ditches and let others fill up with sediment. The courageous efforts of the Moland farmers in standing up to the mighty SPM&M ironically proved detrimental to other Valley farmers who benefitted from the company's drainage program. In early 1886, the extent and pace of Valley drainage was little better than at the beginning of the Red River Boom.

Grassroots Mobilization: Holding the Legislature's Feet to the Fire

In late 1885 or early 1886, Elias Steenerson made a fateful trip from his Polk County farmstead to the town of Fisher. Born on November 4, 1856, in Houston County, Minnesota, Steenerson was one of nine children raised by Steenrson Knutson and Birgit Liefson Roholt, both Norwegian immigrants. In September 1876, Steenerson followed his father to the Red River Valley. After purchasing 160 acres from the railroad and homesteading on another quarter section, Steenerson established a farm near the Sand Hill River that he named "Walhalla." After a brief stint as a public school teacher, Steenerson took a part-time job selling farm machinery in nearby Grand Forks, Dakota Territory. In 1881, he opened two machinery businesses with his brother, Christopher, in Fisher and Crookston, selling the famous twine binders and other implements. Despite his entrepreneurial instincts, Steenerson remained focused on farming at the time he made the above trip. While hauling a load of wheat to Fisher, which was some 15 miles

[71] Hill to Henry H. Oberg, July 28, 1886, Hill Papers.

from home, Steenerson's wagon and oxen became struck in a marsh. Unable to pull the wagon from the mire, Steenerson had to unload all eighteen sacks of wheat, dissemble the entire wagon, and reassemble it on dry land. Exhausted and annoyed, he finally reached Fisher just before dusk. The difficult trip reinforced Steenerson's belief that northwestern Minnesota would never become prosperous without better roads and a comprehensive system of drainage.[72]

Steenerson returned home resolute and purposeful. Farmers in the vicinity of the Sand Hill River, Steenerson recognized, were at a "disadvantage" because wetlands isolated their farms from markets. The journey to Fisher was treacherous, but so, too, was the trek to Crookston. The Beltrami Swamp, a marshy area that existed where the Sand Hill River lost its course and spread out over the prairie, forced Steenerson and his neighbors to take a circuitous 30-mile trip to reach Crookston, which on a straight line was only 15 miles away. In early 1886, the Sand Hill farmers held a "mass meeting" at the home of Elias's brother, Christopher, to discuss options for draining western Polk County. "All agreed that something out to be done," Steenerson recalled, "but what to do was the question."[73] Vaguely remembering that the SPM&M had built numerous drainage mains, attendees implored Christopher to write Hill in the hopes that "he could help us out."[74] In his poignant letter to Hill, Christopher described how as the Sand Hill River crossed the flattest portion of the former bed of Lake Agassiz it lost its course, creating the Beltrami Swamp. "The Sand Hill River from Beltrami eastward is quite a

[72] Elias Steenerson, "Memoirs of Pioneer Days," unpaginated mimeograph, Elias Steenerson Papers, Norwegian-American Historical Association Library, Northfield, Minnesota. For Biographical information on Steenerson, see R. I. Holcombe and William H. Bingham, *Compendium of History and Biography of Polk County, Minnesota* (Minneapolis: W. H. Bingham & Co., 1916), 167-9.

[73] Steenerson, "Memoirs of Pioneer Days."

[74] Ibid.

large and rapid stream capable of running mills," Christopher explained, until "the chanel [sic.] disappears [sic.] and all its waters spreads over the prairies. About 4 miles from the Red River the chanel [sic.] forms again and is quite deep and wide." The Beltrami Swamp, which was the name local citizens gave the overflowed section of prairie, constituted "at least 4 or 5 townships of what otherwise would be the most fertile and well settled part of this country."[75] Christopher told Hill that he was the Sand Hill farmers last hope since county officials had ignored their requests for help. Since the drainage of the Beltrami Swamp would enhance the SPM&M's carrying trade, the Sand Hill farmers hoped that Hill would provide financial support or at least send an engineer to take levels and provide advice.

Steenerson's letter reached Hill's desk at a time when he was still brooding over the Clay County lawsuits. He responded that his company had invested significant sums in trying to open up the Sand Hill River's middle channel and other Valley watercourses. "After spending several thousand dollars and getting the work well under way," Hill complained, "we found ourselves the object of several suits for damage at the hands of parties whose lands were benefitted by the better drainage facilities." Farmers' ungratefulness and hostility convinced him that "we are not the proper parties to move in any enterprise of that kind."[76] Elias Steenerson later recalled that Hill encouraged him to reapply for assistance from the county. In May 1886, their renewed efforts met with success when the Polk County Board of Commissioners appropriated $500 for a drainage survey of the townships between the Sand Hill River and Red Lake River on the

[75] Christopher Steenerson to Hill, February 22, 1886, President's Office, GN Records.

[76] Hill to C. Steenerson, March 17, 1886, SPM&M Letterbook No. 8, "February 14, 1885—June 15, 1886," Hill Papers.

condition that the SPM&M contribute matching funds. On May 12, E. D. Childs, a grain elevator proprietor and large land owner in Polk County, contacted Hill on behalf of county officials regarding the potential survey. Guarded enthusiasm marked Hill's response. He agreed to provide up to $1,500 as long as the contribution was proportional to the amount of railroad land surveyed. Before consenting, Hill warned Childs that any additional litigation directed at his railroad's drainage program would result in the abrupt termination of his cooperation:

> This company does not desire to shirk its share of any improvement, or any common burden that is to be borne on the frontier. At the same time, while we feel that in these matters we have been very liberal in the past, our efforts in that direction have been met by a disposition on the part of some localities to take advantage of any and everything that came their way for their personal benefit, and if this is to continue, the Railway company will have absolutely nothing whatever to do with any of these local enterprises.[77]

Popular enthusiasm for a comprehensive drainage program grew during May. On June 5, 1886, a committee of five leading Valley residents, including Childs and Halvor Steenerson, the brother of Elias and Christopher and northwestern Minnesota's state senator, published a call for township, municipality, and county representatives from throughout the Minnesota side of the Valley to attend a drainage convention in Crookston. Set to convene in early July, the meeting intended to consider "the subject of drainage in said section generally, and to devise a means for the accomplishment of a thoroughly effectual and general system of drainage for said section of country."[78]

---

[77] Hill to E. D. Childs, May 13, 1886, SPM&M Letterbook No. 8, "February 14, 1885—June 15, 1886," and Childs to Hill May 12, 1886, General Correspondence, Hill Papers; and Steenerson, "Memoirs of Pioneer Days."

[78] "Call for a Drainage Convention for the Red River Valley," *Crookston Times*, June 5, 1886.

Unable to abandon his passion for drainage, Hill agreed at the last minute to attend the convention and provided cheap fares for delegates.[79]

The mobilization of Valley business leaders and farmers represented one of hundreds of local drainage movements that, when viewed as a whole, comprised a key segment of the American conservation movement, which emerged during the late nineteenth century. For too long scholars have narrowly defined the conservation movement as a top-down social movement directed by national elites wielding new authorities vested in them by the emergent bureaucratic state. Yet government grew at all levels in response to heightened popular interest in environmental matters before 1900. It makes more sense to see conservation as a series of discreet local movements in which citizens collectively demanded government solutions to specific environmental problems than a unitary movement directed and dominated by elites. The establishment of drainage districts, the creation of county or township drainage programs, and the formation of citizen organizations dedicated to securing appropriations for land drainage constituted local conservation movements where citizens crafted collective solutions to environmental problems. Casting conservation as an elite crusade trivializes the broad and diverse involvement of local citizens, interest groups, corporations, and communities involved in natural resource planning prior to the twentieth century. The social basis of support for land conservation was extensive and built from the ground up.[80]

In July 1886, delegates from Clay, Kittson, Marshall, Norman, Polk, and Wilkin counties assembled at the Crookston opera house. During the drainage convention,

---

[79] C. E. Page to Hill, July 8, 1886, President's Office, GN Records; Hill to Page, July 9, 1886, Hill to Childs, July 23, 1886, SPM&M Letterbook No. 9, "June 15—November 26, 1886," Hill Papers; and W. S. Alexander to Comstock, June 28, 1886, Box 9, File "June 1886," Comstock Papers.

[80] See the discussion in the Preface.

delegates agreed to a number of resolutions. The most important resolution authorized a topographical survey of all six Minnesota Valley counties as "preliminary to the adoption of such a [drainage] system by the people of the Red River Valley." Hill, who attended the convention as the SPM&M's representative, offered to pay for half of the survey if the counties raised the other half. Since his company still owned 1,013,000 acres of land in Clay, Kittson, Marshall, Norman, and Polk counties, the survey would benefit the SPM&M. Before adjourning, delegates requested the formation of a permanent "executive committee" consisting of three individuals appointed by Hill and one individual from each of the six counties to supervise the survey, publish maps, and draft a general plan of action by December 5.[81]

Representatives of Kittson County put up the only opposition. In his study of the wetlands of the American Midwest, Hugh Prince found that nineteenth-century "landowners who opposed drainage schemes were treated as reactionaries and obstructionists; they were not to be allowed to stand in the way of agricultural and economic progress."[82] The pattern held true in the Red River Valley. As the most northern Minnesota county on the American side of the international boundary, Kittson County delegates feared that upstream drainage projects, by conveying large quantities of surface water into the Red River, might elevate the river's volume to such an extent that riparian properties in their county would be subjected to chronic flooding. William F. Kelso and a "Mr. Hanson" argued that surface water should be stored in artificial reservoirs—rather than conveyed into the Red River—and that the increased tax burden

[81] "The Great Drainage Convention!," *Crookston Times*, July 3, 1886; and Hill to Childs, July 23, 1886, SPM&M Letterbook No. 9, "June 15—November 26, 1886," Hill Papers.

[82] Prince, *Wetlands of the American Midwest*, 208.

for Valley-wide drainage would be unsustainable. Hill and Elias Steenerson did not tolerate dissent. A strong-willed man, Steenerson insisted that drainage opponents should immediately leave the opera house and form their own "anti-drainage convention." The will of the majority, he fulminated, should not be sacrificed to accommodate a downstream minority.[83]

In December 1886, delegates and farmers again congregated in Crookston to discuss the completed topographical survey and plan a future course of action. Charles G. Elliott, a drainage engineer from Illinois who later rose to become the head of the United States Department of Agriculture's Office of Drainage Investigations, and J. T. Fanning, a hydraulic engineer from Minneapolis, conducted the survey. During the summer and fall, Elliott and Fanning surveyed 82 townships in five counties. Since Kittson County refused to pony up its share of the contribution, it was excluded from the survey. According to Fanning, the six Valley counties embraced a total area of 5.25 million acres. The survey found that at least 2 million acres required drainage to maximize agricultural output. Fanning theorized that draining the Red River Valley, unlike many other sections of the country, was cost prohibitive for individual communities because a comprehensive plan could not proceed until the Red River's tributaries were improved so they could handle the influx of diverted surface water. "A prominent financial difficulty," the final report explained, "is the fact that the heaviest work must be done first, such as the opening of the natural streams where the channels

[83] "The Great Drainage Convention!," *Crookston Times*, July 3, 1886. According to one Kittson County newspaper, the opposition of Kittson delegates "was practically the only opposition manifested." See "The Red River Drainage Convention at Crookston, Minn.," *Kittson County Enterprise*, July 10, 1886.

are not well defined."[84] The Sand Hill, Middle, Tamarac, and Snake Rivers, at some point during their westerly descent towards the Red River, lost themselves on the prairie, creating large "swamps" and marshes. Conveying surface water into these rivers would be counterproductive since it promised to enlarge the areas of inundation on the prairie to the detriment of countless farmers. Elliott estimated that improving those watercourses so that they remained within a narrow channel would require the princely sum of $191,066.00. Until the outlets were improved, it made little sense for farmers to form drainage institutions or secure resources from county and township authorities.[85]

Fanning concluded that it was the state of Minnesota's responsibility to improve and clear the watercourses of obstructions. Under the 1860 Swamp Land Act, the federal government donated 249,588 acres of "swamp and overflowed" lands in the six Valley counties to Minnesota on the condition that the state sell the lands and invest the revenue in building drainage projects. Instead of complying with the laws, Minnesota subsidized the construction of public works and internal improvements in other sections of the state. Justice and equity, Fanning declared, required Minnesota to live up to its responsibilities by returning those lands to the counties to facilitate "the object for which the State received them in trust."[86] Fanning urged the passage of a constitutional amendment that authorized the retrocession of an equivalent amount of state land in those counties that

---

[84] *Red River Valley Drainage in Minnesota. Report of the Drainage Commission to the Drainage Convention, Held at Crookston, Minn. December 8, 1886* (Minneapolis: Harrison & Smith, 1887), 21. On the statistics previous to Fanning's quote, see pp. 6, 9, 13. See also "Drainage Convention," *Crookston Times*, December 11, 1886.

[85] Ibid., 21, 24.

[86] Ibid., 21-2, quote on 21. Minnesota claimed the following amounts of land in the six Valley counties as "swamp and overflowed": Clay (11,564 acres), Kittson (49,952), Marshall, (73,386), Norman (39,774), Polk (69,912), and Wilkin (5,000). Commission reports consistently misstated that Minnesota received its grant in 1850 instead of 1860.

could then be sold by local authorities to defray the expenses of improving the Red River's tributaries.

Delegates at the December convention heartily endorsed Fanning's recommendations. They appointed a "committee on legislation" and a "committee on national and state aid for the drainage of the Red River Valley" comprised primarily of regional business elites and civic leaders. The convention voted to call on Governor Lucius F. Hubbard and Governor-elect Andrew R. McGill to "call attention to the urgent need of careful and judicious legislation upon this subject of drainage, also upon the justice and necessity of a very liberal appropriation from the state to open up the obstructed river channels of this section and of the wisdom of the State lending her credit to forward the scheme."[87]

Conspicuously absent from the December convention was James J. Hill. Lingering animosity and feelings of betrayal dominated Hill's attitude towards Valley farmers even after his July rapprochement with the drainage movement. During the spring and summer of 1886, the SPM&M received a petition signed by 36 Polk County residents claiming that one of the company's "large and valuable" ditches had an insufficient capacity. Every spring, water from the ditch overflowed the surrounding prairie, flooding countless fields and meadows. In addition, the SPM&M"s roadside ditches in Clay County had proven too popular. So many farmers connected their field ditches to the railroad's mains that they overflowed adjacent properties. In November, Hill informed John M. Martin, a member of the Executive Committee on Drainage for the Red River Valley, that he would skip the upcoming convention because there was a "feeling on the part of the people of the Valley that the Railway Co. has some pecuniary

[87] "Drainage Convention," *Crookston Times*, December 11, 1886.

end to accomplish in this matter beyond the general good of the Valley."[88] Skepticism regarding the SPM&M's motivations for underwriting the drainage survey, along with the threat of additional litigation, prompted Hill to eschew all further responsibility for drainage. Or so it seemed.

The Red River Valley Board of Audit

The alienation of the SPM&M inflicted a crippling blow to the Valley's drainage movement. As the movement's primary corporate sponsor and most visible supporter, the SPM&M contributed invaluable financial resources. Despite the loss, the drainage commission's committee on national and state aid pushed ahead. Led by Ezra G. Valentine, a lawyer from Breckenridge, the committee unsuccessfully lobbied the state legislature for an appropriation to open up the Valley's watercourses in 1887, 1889, and 1891. Constitutional scruples dissuaded Governor Hubbard from endorsing state drainage aid for the Red River Valley. In 1887, Hubbard conceded that Minnesota subverted the 1860 Swamp land Act by "grant[ing] [ceded federal swamplands] as a gratuity to corporations to encourage the building of railroads in sections of the State remote from where they are located."[89] Fidelity to the original law would have rendered the current dilemma unnecessary. "If these lands were now available for the purpose for which they were granted by Congress," Hubbard admitted, "the means would be at hand

[88] Hill to John M. Martin, November 26, 1886, SPM&M Letterbook No. 10, "November 26, 1886—June 6, 1887," Hill Papers. On the additional flowage problems in Polk and Clay Counties, see R. H. Osborn to Hill, May 6, 1886, June 6, 1886, and "Petition to the Officials of the Manitoba Road," June 1, 1886, President's Office, GN Records.

[89] *Executive Documents of the State of Minnesota for the Fiscal Year Ending July 31, 1886*, vol. 1 (St. Paul: The Pioneer Press Company, 1887), 30.

for the prosecution of the contemplated work."[90] Despite Hubbard's sympathy for Valley farmers, he feared that the state constitution prohibited the legislature from making an appropriation. Section 5 of Article 10 prevented the state from contracting "any debts for works of internal improvement" or acting as "a party in carrying on such works except in cases when grants of land or other property shall have been made to the state specially dedicated by the grant to specific purposes."[91] Section 10 of Article 9 presented an even greater obstacle: "the credit of the State shall never be given or loaned in aid of any individual, association or corporation."[92] Since the drainage movement's mission was to enable drainage districts, counties, townships, individual farmers, and the SPM&M to drain their land into suitable outlets, the constitutional prohibition against extending state resources to certain entities, as expressed in Article 9, delivered a staggering blow.

During the next six years, Valley drainage proponents asserted that nothing in the state constitution impeded the legislature from belatedly fulfilling its responsibilities under the Swamp Land Acts. Compliance with federal law trumped state constitutional scruples. Congress gave Minnesota lavish grants of "swamp and overflowed lands" with the understanding that the legislature invest revenue generated from the sale of those lands to drainage projects. Valentine and other leaders of the drainage movement also tried to allay the legislature's fears that the SPM&M would be the chief beneficiary of a regional drainage program by inserting a provision into bills they presented to the legislature that required the company to contribute at least one-quarter of the total appropriation. In 1887, 1889, and 1891, constitutional worries and intrastate sectionalism

[90] Ibid.

[91] Ibid.

[92] Ibid.

doomed the proposals. In 1891, for instance, State Sen. Frank Arah Day of Martin County in southern Minnesota objected to a bill allocating $12,000 annually for Red River Valley drainage because his constituents were "as much entitled to drainage as northern counties."[93] It was unfair for the state to create a new agency supervising the construction of drainage projects, using general tax revenues, in one region but not others.[94]

The string of failures left Valentine undeterred. After the Red River Valley drainage commission convened in St. Paul in early 1893, he made one final push. At his own expense, Valentine published and then circulated a pamphlet amongst influential state legislatures explaining the unique topographical conditions that complicated surface water removal on the former bottom of Lake Agassiz. The pamphlet emphasized that Valley residents had not asked the state "to drain the lands of anyone, but simply to put the natural channels and streams in condition to receive and carry off the water."[95] Valentine reminded legislators that the disposition of ceded "swamp and overflowed lands" was inimical to the interests of northwestern Minnesotans. Policymakers had given 261,163.28 acres of the 270,740.98 acres of swamplands ceded by Congress in Valley counties to railroad corporations in other sections of Minnesota. The 1881 constitutional amendment mandated that the remaining 9,577.70 acres be donated to

---

[93] "Minnesota Legislative Doings," *Bismarck (Dakota Territory) Tribune*, March 26, 1891.

[94] On the repeated failures of the Red River Valley Drainage Commission to secure a state appropriation before 1893, see esp. Ezra G. Valentine to Hill, May 4, 1893, Hyman File, and Hill to Levi S. Myers, March 9, 1887, SPM&M Letterbook No. 10, ""November 26, 1886—June 6, 1887," Hill Papers; and *The Legislative Manual of the State of Minnesota* (St. Paul: n. p., 1907), 287-8.

[95] [Ezra G. Valentine], *Statement and Statistics Relating to the Bill Entitled "An Act to Appropriate Monies for the Purpose of Opening of Closed Water Courses Leading into the Red River, and its Tributaries, and for Opening Existing Streams in the Red River Valley in the Counties of Wilkin, Clay, Norman, Polk, Marshall and Kittson in this State." Respectfully Submitted: Red River Valley Drainage Commission* (Breckenridge, Minn.: Gazette Press Print, 1893), 3, in Hyman File, Hill Papers. On Valentine's authorship of the pamphlet, see Valentine to Hill, May 11, 1893, Hyman File, Hill Papers.

educational or charitable purposes. "The unjust course of Minnesota in this matter," Valentine pointedly stated, "diverted these lands and the proceeds thereof from the purpose to which they were dedicated by Congress. We now ask that the State, in a small measure, make good to our people the loss sustained by depriving them of these lands at a time when we were too weak to make serious objection."[96] Valentine estimated that most of the 129,062 acres of Valley lands still owned by the state required better drainage. Furthermore, farmers cultivated less than half of the 2.5 million acres of lands in the Valley. Improving the Red River's tributaries would open much of this land to settlement and fill the state's coffers with new revenue.

Written by Valentine, the 1893 bill was S. F. 182, entitled "An Act to Appropriate Moneys for the Purpose of Opening of Closed Water-Courses Leading into the Red River and its Tributaries, and for Opening Existing Streams in the Red River Valley." It varied little in its language, content, and scope from previous bills. The bill appropriated $100,000 over four years for a Board of Audit to spend in the "opening of closed water-courses leading into the Red River … and for opening existing streams in the Red River Valley … for drainage purposes" in Clay, Kittson, Marshall, Norman, Polk, and Wilkin Counties. A later amendment added the counties of Grant and Traverse to the Board's jurisdiction. Empowered with plenary authority over the selection, location, and design of projects, the Board of Audit would be composed of four members: the governor, secretary of state, an individual appointed by the boards of county commissioners of the eight counties under the bill's jurisdiction, and a final person chosen by the Great Northern Railroad (GN). As in previous years, the bill stipulated that the GN (the

[96] Valentine, *Statement and Statistics*, 3-4, quote on 4. Since 1886, Minnesota had apparently received additional federal grants from Congress in the counties in question.

predecessor of the SPM&M) contribute an amount equal to one-quarter of the legislative appropriation as a precondition for the disbursement of $100,000 from the state.[97]

Unlike previous years, the bill authorizing the creation of the Red River Board of Audit sailed though both houses of the state legislature and became law on April 17, 1893.[98] The state Senate passed the bill by a vote of 41-3; the House by a final tally of 85 to 5. What led to the dramatic change in fortune? Valentine's pamphlet apparently convinced legislators that Minnesota's disposition of ceded "swamp and overflowed lands" had been particularly unfavorable to Valley residents. As one state newspaper outside of the Valley editorialized, "the general government had made grants of swamp lands to the state, to be used in draining and reclaiming these lands, but the proceeds arising from the sale had been diverted to the southern and eastern part of the state or the lands had been granted to railroads, while the counties in which the lands are located had received no benefit."[99] By portraying the legislation as a sincere attempt to bring Minnesota into compliance with federal law and showing how the disposition of former federal wetlands had benefited other sections of the state, Valentine shrewdly undercut the opposition of southern and eastern representatives.

Despite the turn of events, Valentine had committed a fateful blunder. Since 1887, every bill that he submitted to the legislature mandated that the SPM&M contribute part of the total appropriation since submerged railroad lands would benefit handsomely from a state program. In 1889, Hill formed a new company called the GN. The

---

[97] S. F. 182, "AN ACT to appropriate Moneys for the purpose of opening of closed Water-courses leading into the Red River and its Tributaries, and for opening existing streams in the Red River Valley in the counties of Wilkin, Clay, Norman, Polk, Marshall, Kittson, Grant, and Traverse, in this State," and Valentine to Hill, May 4 and May 6, 1893, Hyman File, Hill Papers.

[98] *General Laws of Minnesota for 1893*, chapter 221, 371.

[99] "Elevator Bill a Go," *Duluth News Tribune*, March 31, 1893.

following year the GN completed a 999-year lease of the SPM&M. The lease enabled the companies to operate in tandem as a single entity although they officially remained separate corporations governed by two sets of stockholders. Before introducing his bill to the legislature in 1893, Valentine apparently inserted "GN" in place of "SPM&M." Upon learning of the bill's passage, Hill flew into a blind rage. Since Hill had been away from St. Paul when the Red River Valley commission introduced the bill, they had not consulted with him as in previous years. Nonetheless, since 1887 he had opposed an additional tax on the SPM&M to defray the costs of creating a new state agency. "The public should understand," Hill scolded Valentine and newly-elected Governor Knute Nelson, "that it has no more right to appropriate the Company's property or money than it has of any other citizen of the State."[100] Giving in to self-pity, Hill defended his opposition on the grounds that Clay County farmers had responded to the SPM&M's previous efforts with insolence and avarice. "We have made several efforts to open up these water courses on our own lands, and these efforts have resulted in an attempt through law-suits, to collect heavy damages."[101] Hogenson's actions still riled Hill:

> Years ago the Manitoba Company undertook to show the benefits of drainage in several localities, and to that end opened some considerable ditches, which to-day are doing an immense amount of good. The Railway Company's efforts, however, were met with suits for damages. I recollect one man (Hogenson) who brought suit for injuring his hay meadow, situated six miles away from the ditch … These suits for damages aggregated an amount of nearly $100,000, and the Company was forced to a heavy expense in defending them.[102]

---

[100] Hill to Valentine, May 8, 1893, Hyman File, Hill Papers. See also Hill to Knute Nelson, May 2 and May 8, 1893, Hyman File, Hill Papers. W. P. Clough, the GN's vice president, remarked that the 1893 bill "is in the same form as that in which it appeared on previous years, except the blunder of the [railroad] name." See Clough to Hill, April 28, 1893, Hyman File, Hill Papers.

[101] Hill to Nelson, May 8, 1893, Hyman File, Hill Papers.

[102] Hill to H. W. Donaldson, June 19, 1893, Hyman File, Hill Papers.

Hill's primary source of contention centered on the fact that the law imposed a de facto tax on the GN to improve the SPM&M's land grant. Since the GN did not own any lands in the Valley, its stockholders would receive no benefit for contributing the requisite $25,000. The SPM&M, which still owned 363,450 acres in the Valley, would have been the proper party to participate.[103]

Backroom deals persuaded Hill to abandon his opposition. In June 1893, H. M Donaldson, one of Hill's corporate point men in the Valley, met with Governor Nelson in St. Paul. Donaldson secured promises from Nelson that if Hill followed through and made the contribution he would be given control over the Board of Audit's operations. Donaldson told Hill that the governor "gave me to understand in plain language that the board of Audit would be composed of men of your choice and that he would allow their wishes to control the action of the board and in that way YOU would—through your representatives on the board—have the direction of the expenditure of the whole appropriation."[104] Intrigued by the prospects of directing land drainage without the prospect of incurring liability, Hill acquiesced and put up $25,000. Directing drainage work under the umbrella of a state agency now shielded Hill from potential lawsuits. The Board of Audit initially consisted of Nelson, Minnesota Secretary of State Frederick P. Brown, GN chief engineer N. D. Miller, and Valentine, who served as the counties' representative.[105]

---

[103] Hill to Donaldson, June 19, 1893, Hill to Nelson, June 19, 1893, and Hill to Valentine, June 19, 1893, Hyman File, Hill Papers.

[104] Emphasis in original. Donaldson to Hill, June 16, 1893, Hyman File, Hill Papers.

[105] On the Board of Audit's initial composition and organization, see Nelson to Hill, July 15, 1893, Hyman File, Hill Papers.

During its four short years of operation, the Red River Valley Board of Audit served as the GN's personal land drainage company. Just as the Swamp Land Acts subsidized the building of railroads in southern and eastern Minnesota, the Board of Audit subsidized the drainage of the SPM&M's unsold land grant. In 1893 and 1894, the Board expended $69,515.18 to build 37 miles of large ditches in five counties. The first project completed was the Sand Hill River Ditch in Polk County. Like several other ditches authorized by the Board of Audit, the Sand Hill Ditch was dug through the middle plane of the Valley where the Sand Hill River lost its course on the prairie and created the Beltrami Swamp. Since the ditch drained one of the last large blocks of SPM&M land, it was payback for Hill's generosity and covered 34% of the board's total expenditures prior to January 1, 1895. Nonetheless, the project also benefited farmers like Elias and Christopher Steenerson whose actions launched the grassroots drainage movement and convinced the SPM&M to reemerge from the background of environmental planning. Completed in October 1895, the Otter Tail River ditch was the fourth ditch constructed by the commission and also proved valuable in draining railroad lands. Towards the end of 1895, Hill heaped praise on the "exceptionally good" work done by Board of Audit in stretching its limited funds as far as possible.[106] In 1895, the legislature recognized the Board's progress and allocated an additional $50,000. The bill passed with the caveat that the Board spend the additional appropriation to "reclaim swamp lands granted to the state of Minnesota by [the 1860] act of congress … and lands owned by the state of Minnesota."[107] After focusing its initial energy on addressing the SPM&M's drainage needs, the Board of Audit directed its energies toward "bring[ing] relief as speedily as

[106] Hill to Valentine, November 26, 1895, President's Subject Series, File 2922, GN Records.

[107] *General Laws of Minnesota for 1895*, chapter 164, 372.

possible to the greatest number and at minimum final cost."[108] Up to February 2, 1899, the Board of Audit had constructed 117 miles of ditches at a cost of $162,412.62 across the 8 counties. Board members estimated that the ditches improved more than one million acres and increased the median value of Valley agricultural lands from $5 to $20. Provided with suitable outlets, several Valley counties appropriated money to build supplementary lateral ditches. Polk County, for instance, expended $100,000 between 1893-1901 towards that end.[109]

Historians have not adequately examined the complex relationship of western railroads to the environment. They portray railroads as either rapacious consumers of natural resources or enlightened advocates of wilderness preservation; the railroad's environmental impact is straightforward and unambiguous. Yet in the late nineteenth and early twentieth centuries, many western railroads, including the SPM&M, developed natural resource strategies that resist such crude categorization. The company's experiences in promoting wetlands drainage in Minnesota—and later in North Dakota and Washington—which blended support or opposition for initiatives based on its own self-interest and previous experiences, suggests that it embraced a pragmatic environmental agenda that defied such a dichotomous model. Indeed, the SPM&M's involvement in land drainage does not bear out the conclusion of some historians that the GN system resembled a "giant octopus with its head centered in St. Paul" whose leaders

---

[108] *Report of the State Drainage Commission of Minnesota to the Governor and State Legislature on the Condition of the State Ditches Located in the Red River Valley for the Biennial Period Ending Feb. 1st, 1899* (Minneapolis: University Press of Minnesota, 1899), 15; and N. D. Miller to Hill, December 31, 1894, Hyman File, Hill Papers.

[109] For statistics on the ditches built by the Board of Audit, see *Report of the Board of Drainage Commissioners of the State of Minnesota to the Governor of Minnesota on the Condition of the State Ditches Located in the Red River Valley for the Year Ending December 31st, 1901* (Crookston, Minn.: The Crookston Journal, 1902), 12, 16.

imposed their will on western communities with a "ruthlessness matched [by] that of … Napoleon and Genghis Khan"[110] Indeed, such sweeping morality tales distort history by obscuring how complex and unanticipated local events frustrated the grandiose plans of railroad managers. After the SPM&M's brief, disastrous experiment in direct environmental planning, which alienated local communities and subjected the company to costly, lengthy, and embarrassing litigation, it retreated into the background of surface water removal and deferred to the will of local communities and drainage districts. Partnering with local communities was a pragmatic strategy that enabled the company to shield itself from future lawsuits, forge working relationships with residents along its line, and share the costs and burdens of environmental planning. Small wonder that SPM&M/GN drainage policy before 1910 was shaped far more from the ground up than from the top down.

Nevertheless, in 1897, the Minnesota state legislature allowed the Board of Audit to expire. During the same year, legislators created a Board of State Drainage Commissioners responsible for overseeing the maintenance and repair of state ditches built under the Board of Audit's supervision. Appointed by the governor, the three commissioners served without compensation and were not authorized to construct new projects. The Board's primary duty involved using its $500 annual appropriation to employ a professional engineer to examine the state's ditches and recommend repairs. Routine maintenance included the removal of debris and obstructions, the prevention of

[110] A recent study which bucks the dichotomous model is Richard J. Orsi, *Sunset Limited: The Southern Pacific Railroad and the Development of the American West, 1850-1930* (Berkeley: University of California Press, 2005). The quotes are respectively from William G. Robbins, *Colony and Empire: The Capitalist Transformation of the American West* (Lawrence: University Press of Kansas, 1994), 125; and Dee Brown, *Hear that Lonesome Whistle Blow: Railroads in the West* (New York: Holt, Rinehart and Winston, 1977), 267.

caving banks, and the eradication of weeds such as flags, reeds, and rushes. The 1897 law transferred the burden of maintenance from the state government to the counties. Once the Board of State Drainage Commissioners instructed county governments regarding repairs recommended by its engineer, the counties had 60 days to comply. In devolving responsibility to the counties, the legislature eschewed future responsibility for drainage outside of lands owned by Minnesota. In 1901 and 1902, the legislature refused to approve further appropriations for the inspection of the state ditches. Angered by the state's parsimony, Valentine donated $1,000 of his own money so the surveys could be completed and a report published regarding the ditches' condition.[111]

Conclusion

Scholars of American wetlands have not studied the responses of individual communities to the failure of the Swamp Land Acts. As long as local institutions such as drainage districts or county governments were capable of handling land drainage, communities had little reason to demand that state governments fulfill their obligations under the law. In some places of the county, such as the Valley of the Red River of the North, drainage required broader coordination, centralized planning, and greater capital expenditures than local institutions could provide. In the 1880s, Valley residents sought assistance from the SPM&M—the only private entity capable of providing the manpower, finances, and expertise to drain the Valley. The SPM&M's failed experiment

[111] *Report of the State Drainage Commission of Minnesota to the Governor and State Legislature on the Condition of the State Ditches Located in the Red River Valley for the Biennial Period Ending Feb. 1st, 1899*, 3-4, 13, 17, 23, 47-8, 57; *Report of the Board of Drainage Commissioners of the State of Minnesota to the Governor of Minnesota on the Condition of the State Ditches Located in the Red River Valley for the Year Ending December 31st, 1901*, 14; and Valentine to Hill, President's Subject Series, File 3776, GN Records.

in direct environment planning, which subjected it to costly litigation, prompted farmers to clamor for the state to live up to its responsibilities under the 1860 Swamp Land Act.

Farmers eagerly welcomed intervention by state government into wetlands management on the scale originally envisioned by Congress. Elias Steenerson, whose daunting experiences hauling wheat to Fisher persuaded him to rally his neighbors in support for state involvement, applauded Minnesota's assumption of greater environmental responsibilities. "I am no socialist," Steenerson reflected in his memoir, "but I have learned from my observation of the development of these times that there are certain enterprises which the State should take hold of, and among them are Drainage."[112] Steenerson touted the beneficial environmental outcomes—a landscape bereft of surface water—that accompanied the enlargement of state and local governments. "State drainage has been and is recognized as one of the proper functions of the State, and has worked untold benefit in developing [Minnesota], especially in the northern part. Large tracts of swamp lands have been reclaimed, and the Sand Hill ditch, and its tributaries have transformed a dismal swamp into cultivated fields."[113]

Steenerson's actions (as well as those of his brother and neighbors) indicate that late nineteenth-century farmers perceived natural resource management—and especially wetlands drainage—as a legitimate and appropriate state function no less instrumental in building stable rural communities than the regulation of the railroad and financial industries. Elizabeth Sanders has adeptly demonstrated how the expansion of the national regulatory and administrative state between the end of Reconstruction and World War I occurred largely as a response to farmers' demands for increased federal

[112] Steenerson, "Memoirs of Pioneer Days."

[113] Ibid.

supervision of railroad corporations and financial institutions.[114] Yet Sanders' and other scholars' narrow focus on national state building obscures a broader and more complex process of state formation that encompassed the creation of thousands of autonomous local institutions and state agencies. Farmers' pursuit of a drained landscape to enhance their agricultural production and shield their families from miasmas was the catalyst that promoted an expansion of local power rivaling the national state's growth. Government grew at all levels before 1900 in response to farmers' attempt to cope with a changing world where powerful national and transnational corporations wielded unprecedented authority over the rural economy and population growth pushed more and more people onto marginal lands. Farmers identified government institutions—be they federal, state, or local—as an indispensible ally in carving out farms able to withstand the test of time in a society and natural environment that seemed cruel, unfriendly, and unforgiving.

[114] Elizabeth Sanders, *Roots of Reform: Farmers, Workers, and the American State, 1877-1917* (Chicago: University of Chicago Press, 1999).

CHAPTER 5: "THE EXTENSION AND PERPETUATION OF A CLASS OF SMALL LANDOWNERS": WETLANDS DRAINAGE IN AN AGE OF *NATIONAL* WATER POLICITCS AND SOCIAL REFORM, 1902-1917

By 1900, ordinary Americans identified wetlands drainage as an indispensable element of wise environmental stewardship. The eighteenth-century Hippocratic revival, the predominance of miasmatic theories of disease, the belief that wetlands possessed no intrinsic or ecological value, and the desire of farmers in Midwestern, southern and Mississippi Valley states following the Civil War to build healthy and stable rural communities dictated the rapid removal of surface water. The turn-of-the-century discovery that anopheles mosquitoes, and not miasmas, were the true vectors of malaria intensified Americans' antipathy towards wetlands. The breakthrough produced a tangible, scientific link between wetlands and public health since the anopheles prefers breeding in stagnant waters shielded from wave action by vegetation. The broad consensus that every wetland should be drained for reasons related to health, agricultural progress, and rural stability led increasing numbers of farmers, like those described in the previous chapter, to form local institutions dedicated to land drainage or demand action from township, county, or state authorities.

Despite the popular aversion towards wetlands and the unprecedented involvement of the national state in natural resource management during the 1890s and early 1900s, the central government did not intervene in drainage. Responding to a host of cultural fears regarding the closing of the frontier, an imminent national timber famine, the rise of big business, and the decline of rural America, a new generation of university-

trained experts and scientists appropriated the powers of the embryonic administrative and regulatory state to promote national land conservation initiatives. The Reclamation Act of 1902 was one of the most important and far-ranging laws passed during the Progressive conservation movement. The law created a new agency, the Reclamation Service, to irrigate the public domain in the western sixteen states and territories (initially excluding Texas) using revenue generated by public land sales. Optimistic and confident conservationists in the national government predicted that the law would lead to an exodus of factory workers and wage earners from eastern cities to the West, revive the Homestead ideal, revitalize democratic institutions, and preserve the United States' agrarian heritage. Conservationists never acknowledged the obvious contradictions inherent in perpetuating the family farm. Restoring the "independent" family farm in a rain-starved region required enhancing the power and influence of the federal government and creating a bureaucratic class of university-trained elites, experts, and professionals. The enduring specter of class conflict was enough to resolve all incongruities in the pursuit of achieving what one scholar describes as "Jeffersonian ends through Hamiltonian means."[1]

The national irrigation program revealed serious divisions within the conservation coalition. As early as 1904, congressmen from southern and Midwestern states demanded to know why Congress had subsidized irrigation in the American West but not wetlands drainage in the humid half of the continent. In 1906, Halvor Steenerson, a second-term Republican from Minnesota who participated in the Red River Valley grassroots drainage movement and was the brother of Elias and Christopher, insisted that

[1] Samuel P. Hays, *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920* (Cambridge, Mass.: Harvard University Press, 1959), 269.

drainage deserved federal subsidization no less than irrigation. Steenerson's proposal set of a veritable mania for federal involvement in land drainage. Policymakers from states with significant quantities of undrained wetlands attempted to divert revenue earmarked for western irrigation to drainage projects in their home states. The requests ignited a political firestorm. Western communities, the Reclamation Service, and national conservation organizations fiercely opposed the diversions and accused easterners of trying to undermine the irrigation program and keep the West in a state of economic vassalage. Shifting tactics, Steenerson and Sen. Frank P. Flint from California implored Congress to pass a second reclamation act, modeled after the 1902 law, dedicated to wetlands drainage. This chapter traces how a diverse coalition of federal bureaucrats, social reformers, southern and Midwestern congressmen, western irrigators, entomologists, and anti-mosquito activists rallied behind the proposed nationalization of drainage. They heralded the program as the best means to expand the conservation program into the eastern United States, extirpate malarial mosquitoes, improve the health of rural Americans, convert the nation's "wastelands" into homes, and finally spark an exodus of city dwellers into the countryside, which the Reclamation Act had failed to accomplish. This chapter attempts to resolve an obvious paradox. If support for nationalization received such overwhelming support from scientists and national conservationists, why did the campaign fail to shift control over drainage to the central government? The answer to the paradox is complicated but has to do with sectional, bureaucratic, and political divisions within the American state itself and the tension between centralization and decentralization within the American federal system.

National Water Policy at the Turn of the Century

The Reclamation Act of 1902 was the crowning achievement of the Progressive conservation movement. The origins of the law were complex and diverse. First, lingering fears about the return of the 1893 economic depression, skepticism about the assimilability of waves of Eastern European immigrants, population growth, nostalgia for the frontier (which Frederick Jackson Turner famously declared in 1893 was finally closed), the rise of big business, and doubts about the future of rural America elicited support for the law's home building mission. Second, the admission of Idaho, Montana, North Dakota, South Dakota, Washington, Utah, and Wyoming between 1889-1896 bolstered the political clout of western states by giving the region 3 out of every 10 Senate seats. Since the Civil War, westerners had cried foul over the inequitable distribution of annual river and harbor appropriations. In 1901, the chorus of discontent reached a crescendo when Montana Sen. Thomas Carter filibustered to death the annual river and harbor bill after a conference committee stripped provisions favorable to the West. The filibuster demonstrated the West's newfound political power and insistence on receiving a more equitable share of the nation's wealth. Third, western transcontinental railroads desirous of disposing their land grants, increasing their carrying trade, and slowing the migration of Americans to Canada (which from 1896-1914 exceeded 600,000 American) supported national irrigation. In 1899, the Great Northern (GN), Northern Pacific, Santa Fe, and Southern Pacific each pledged $500 per month to California lawyer George H. Maxwell's publicity campaign on behalf of federal irrigation. Fourth, southern support proved crucial to the bill's passage. Favoring western reclamation by a margin of 4 to 1, states-rights southern Democrats welcomed the law as

a prelude to a more comprehensive reclamation program that included western deserts, forest cutover lands around the Great Lakes, and southern wetlands. In 1902, all of these factors contributed to the Reclamation Act becoming law.[2]

The Reclamation Act directed a newly-created Reclamation Service in the Department of Interior's United States Geological Survey (USGS) to construct irrigation projects in the sixteen western states and territories (initially excluding Texas) using revenue raised by western public land sales. The law stipulated that at least 51% of the proceeds generated by each state or territory's land sales be spent on projects within their boundaries. The terms of the Act were liberal and straightforward. Settlers could claim up to 160 acres of public land within a reclamation project based on the optimum size of project farms as determined by the Reclamation Service and Secretary of Interior. Except for a filing fee, settlers received the land for free and were only required to repay their share of construction costs for dams, storage reservoirs, and canals within ten years (at no interest). Supporters envisioned reclamation as a self-supporting program. Revenue from public land sales and repayment costs would make money constantly available to build new projects. Under the law, the Secretary of Interior enjoyed full discretion to select project sites and to spend the agency's money, but he usually rubberstamped decisions made the Reclamation Service. Under the leadership of first director Charles D. Walcott and chief engineer Frederick Haynes Newell, the Reclamation Service hoped to irrigate between 60 million and 100 million acres of land. In the words of political

[2] There is a voluminous literature on the events leading up to the passage of the Reclamation Act. My discussion draws primarily on Donald J. Pisani, *To Reclaim a Divided West: Water, Law, and Public Policy, 1848-1902* (Albuquerque: University of New Mexico Press, 1992), 273-325; and Pisani, "George Maxwell, the Railroads, and American Land Policy, 1899-1904," *Pacific Historical Review* 63 (May 1994): 177-202. The statistics for the number of Americans emigrating to Canada are from John W. Bennett and Seena B. Kohl, *Settling the Canadian-American West, 1890-1915: Pioneer Adaptation and Community Building* (Lincoln: University of Nebraska Press, 1995), 20.

scientist Daniel Carpenter, "there was no more autonomous bureau in the American state than the Reclamation Service."[3]

The agency wasted little time in tackling its homebuilding mission. By the start of 1908, the Reclamation Service had approved 24 projects in each of the original 16 states and territories (excluding Oklahoma) in addition to Texas, which Congress added to the Reclamation Service's jurisdiction in 1905-6. Starting as many projects at once, the Service intended to curry political support across a wide geographic spectrum rather than building according to the dictates of efficiency and science. Nonetheless, the initial flurry of action caught the attention of envious policymakers in the eastern half of the country who asserted that wetlands drainage constituted a "meritorious" homemaking activity no less important to relieving urban congestion and revivifying rural America than arid land reclamation.[4]

Beyond the Hundredth Meridian

Few national policymakers played a more decisive role in shaping national water policy east of the hundredth meridian than Minnesota's Halvor Steenerson. Born on June 30, 1852 at Pleasant Springs, Wisconsin, Steenerson was the fourth child of Steener Knutson and Birgit Liefson Roholt. In 1853, Steenerson's parents moved the family to Houston County, Minnesota, and finally to Polk County in the valley of the Red River of the North. As a young man, Steenerson worked as a farm laborer and rural school

[3] Daniel P. Carpenter, *The Forging of Bureaucratic Autonomy: Reputations, Networks, and Policy Innovation in Executive Agencies, 1862-1928* (Princeton: Princeton University Press, 2001), 326. On the terms of the 1902 Reclamation Act, see Pisani, *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935* (Berkeley: University of California Press, 2002), 1.

[4] For a list of initial reclamation projects, see William D. Rowley, *The Bureau of Reclamation: Origins and Growth to 1945* (Denver: Bureau of Reclamation, 2006), 129-30.

teacher. He eventually saved enough money to move to Chicago and study law. In 1878, he enrolled at the Union College of Law, completed the curriculum, and within a short period of time was admitted to the Illinois bar. In the spring of 1880, Steenerson moved back to Crookston, Minnesota, and, upon passing the Minnesota bar, opened his own law practice. Steenerson's rise to civic prominence was meteoric. Within six months of arriving in Crookston, Steenerson was elected as Polk County Attorney. In 1883, northwestern Minnesotans elected him to the state senate, a position he held until 1887. A vigorous proponent of railroad and warehouse regulation, Steenerson was the youngest member of the state legislature and helped secure the 1885 passage of Minnesota's Board of Railroad and Warehouse Commissioners. In 1884 and 1888, he served as a delegate to the Republican National Convention. A large, physically-imposing man, Steenerson returned to Crookston after his senate term expired and practiced law. In 1886, he helped organize the drainage campaign that resulted in the creation of the Red River Valley Board of Audit. As a former farm laborer, attorney in several surface water cases before the Minnesota Supreme Court, and the brother of farmers, Steenerson had an intimate knowledge of the hardships swamps and flooded land imposed on rural Americans. In 1903, northwestern Minnesotans elected Steenerson to the 58th Congress and reelected him to nine consecutive terms.[5]

Steenerson devoted his early congressional career to wetlands drainage. In January 1906, he met with Walcott, the titular head of the Reclamation Service, and criticized the shortcomings and unfairness of federal water policy. Minnesota's failure to comply with the 1860 Swamp Land Act, Congress's hesitancy to enforce the program's

[5] The best biographical sketch of Steenerson appears in *Compendium of History and Biography of Polk County, Minnesota* (Minneapolis: W. H. Bingham & Co., 1916), 263-6, 344-45.

reclamation provision, the fact that large areas of northern Minnesota's swamp and peat lands languished without drainage, and the unfair subsidization of western irrigation but not drainage influenced Steenerson's harsh critique. He recommended expanding the operations of the Reclamation Service into Minnesota under the same financial arrangement as the West's reclamation program. Steenerson argued it was unfair to subsidize irrigation in the West, but not drainage in Minnesota. "I can see no reason why the proceeds of the public lands remaining undisposed of in the State of Minnesota should not be devoted to drainage in like manner as public lands in arid land states are devoted to reclamation by irrigation. The one method of reclamation is as meritorious as the other." An equitable national water policy, Steenerson lectured Walcott, must transcend sectional favoritism and provide for the reclamation of all "waste lands."[6]

Steenerson saw federal control as the best means of coordinating the drainage of northern Minnesota's patchwork of state, federal, and especially ceded Indian wetlands. In 1889, Congress applied its general allotment policy to Minnesota's Ojibwe Indians. Allotment envisioned extinguishing Indian cultures by privatizing their communal land bases. The policy prescribed giving individual Indians small plots of land and selling the remainder of tribal reservations to white Americans. Allotment intended to teach Indians to become sedentary, self-sufficient farmers and inculcate an appreciation for private property. The 1889 law provided for the transfer of some 3,000,000 acres of Ojibwe land in Minnesota to the federal government. In 1904, the Red Lake Ojibwe band, in order to *avoid* allotment and retain communal ownership of a reduced portion of their reservation,

[6] Halvor Steenerson to Charles D. Walcott, January 3, 1906, RG 115, Records of the Bureau of Reclamation, General Administrative and Project Records, 1902-1919, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Lands," National Archives and Records Administration (hereafter NARA), Denver, Colorado.

ceded an additional 255,000 acres to the federal government. To the great dismay of northern Minnesota's business community, the string of Red Lake Ojibwe cessions did not spark a land run. According to Steenerson, the area's landownership pattern and ecology undermined previous drainage efforts, leaving half of the ceded lands unsettled by 1906. It made little sense for farmers to invest in drainage if adjacent federal and ceded Indian lands remained overflowed. In northern Minnesota, drainage required constructing long ditches to convey water from farmers' fields to distant streams, rivers, and lakes. But since most ditches had to intersect a combination of state, public, and ceded Indian lands, most drainage attempts failed since drainage districts lacked the statutory authority to encroach on federal or ceded Indian lands. Encouraged by Duluth businesses, which envisioned profiting from the settlement of the ceded Ojibwe lands, Steenerson pursued federal intervention as the only means to prepare lands for settlement, tilt the balance of power in American society back to the countryside, and redistribute the nation's natural resources and wealth to rural communities. Periodic episodes of fear regarding the decline of rural America punctuated Steenerson's political career. In 1913, for instance, he broke with the national conservation coalition and criticized San Francisco's attempt to dam Hetch Hetchy Valley because he was "opposed to the eternal drawing upon the Federal Government resources and of the people to make cities more attractive at the expense of the country."[7]

[7] Quoted in 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), 122. On the diminished Red Lake Indian reservation, see *Drainage of Certain Lands Held in Trust for the Chippewa Indians in Minnesota* (Washington: Government Printing Office, 1908), 3-20; Melissa L. Meyer, "The Red Lake Ojibwe," in *The Patterned Peatlands of Minnesota*, eds. H. E. Wright, Jr., Barbara A. Coffin, and Norman E. Aaseng (Minneapolis: University of Minnesota Press, 1992), 251-61; and Meyer, *The White Earth Tragedy: Ethnicity and Dispossession at a Minnesota Anishinaabe Reservation* (Lincoln: University of Nebraska Press, 1994), 51-7, 198. For the federal government's allotment policy, see Frederick E. Hoxie, *A Final Promise: The Campaign to Assimilate the Indians, 1880-1920* (Lincoln: University of

In January 1906, Steenerson introduced legislation applying the Newlands Act's principles to Minnesota. Rather than raise westerners' ire by tapping the reclamation fund, his bill dedicated revenue from the sale of Minnesota's public lands to a "Drainage Reclamation Fund" to be used by the Secretary of the Interior to drain Minnesota's public and ceded Indian wetlands. During the previous fiscal year, the sale of public lands in Minnesota brought $346,000 into the general treasury, which was enough revenue to initiate surveys and general drainage plans for limited areas. The bill empowered the Secretary to make surveys and examinations, withdraw public and ceded Indian lands from entry, select project locations, and condemn lands in preparation for project construction. By entrusting the Secretary with such broad powers, the bill terminated Minnesota's participation in the Swamp Land program. Steenerson's measure required that settlers pay for one-fifth of their proportion of construction costs at the time of entry and their remaining debt in four annual installments to limit land speculation.[8]

Steenerson and a growing number of conservationists came to believe that federal reclamation should have started with Midwestern swamps and proceeded to arid western lands only as population pressures demanded. Settling factory workers and tenement dwellers on drained swamps was wiser, cheaper, and more efficient. Compared to the remote West, the Midwest had a denser population, accessible major markets, integrated transportation networks, more stable communities, and established social institutions like schools and churches. Steenerson's opinion that drainage constituted a more judicious

---

Nebraska Press, 1984); and Leonard A. Carlson, *Indians, Bureaucrats, and Land: The Dawes Act and the Decline of Indian Farming*. (Westport, Conn.: Greenwood Press, 1981). The Duluth Commercial Club dedicated $1,000 to promoting federal drainage in northern Minnesota and dispatched lobbyists to Washington in support Steenerson's plan for federal drainage. See, for instance, "Lands for Farming and Power Plant are Factors," *Duluth News-Tribune*, November 19, 1905.

[8] H. R. 10062 (Steenerson), 59th Congress, 1st Session, introduced on 4 January 1906; and "Bill for Swamp Land Drainage," *Duluth News-Tribune*, January 5, 1906.

form of land conservation drew upon arguments first articulated by Nathaniel S. Shaler two decades earlier. In 1888, when Congress appropriated funds for the USGS to conduct an irrigation survey of the American West, Shaler, a former director of the Kentucky Geological Survey, paleontology professor at Harvard, and head of the USGS's Atlantic division, questioned the wisdom irrigating isolated western deserts. In 1885 and again in 1890, he submitted reports that evaluated the extent and potential agricultural productiveness of coastal and interior wetlands. Shaler's second report estimated that freshwater wetlands, which were scattered throughout the eastern half of the United States, covered at least 105,000 square miles with Florida, Louisiana, Mississippi, Arkansas, Michigan, Minnesota, Wisconsin, and Maine having the largest quantity. Since Shaler feared that all of the nation's arable lands had already passed into private ownership, Americans had no choice but to bring land of "inferior fertility" into cultivation. Although Shaler did not criticize Congress's decision to fund the irrigation survey, he boldly emphasized that drainage represented a more sensible and prudent form of land conservation than irrigation due to wetlands' proximity to population centers, transportation networks, eastern seaports, and food markets.

> The arid but irrigable lands are in the main remote from the seashore, and therefore commercially at a disadvantage as far as our greater cities and foreign markets are concerned. A large part of the swamp lands are situated near the Atlantic coast or in the immediate neighborhood of the greater rivers, and on that account are well placed for conveniently marketing their products… [I]t is an open question whether the drainable lands do not contain the most important part of our agricultural reserves. Estimating the drainage area at a total of 100,000 square miles, it seems to me likely that the aggregate value of the district measured in terms of production will be not less than that afforded by the fertile lands comprised in the States of Ohio, Indiana, and Illinois.[9]

[9] Nathaniel Southgate Shaler, "General Account of the Fresh-Water Morasses of the United States, with a Description of the Dismal Swamp District of Virginia and North Carolina," in *Tenth Annual Report of the United States Geological Survey to the Secretary of the Interior 1888-'89* (Washington: Government Printing Office, 1890), 310. For Shaler's first, and far more limited report, see Shaler, "Preliminary Report

Even though Shaler's assessment did not reverse the building momentum for nationalized irrigation, it anticipated the rivalry that developed between proponents of federal wetlands drainage and western irrigation after 1906.

Steenerson's drainage proposal received a warm reception from leaders of the USGS and Reclamation Service. Walcott, Newell, and chief legal officer Morris Bien envisioned administering an enlarged reclamation program that provided the Reclamation Service with a national constituency, substituted the rational and disinterested decision-making of bureaucrats and engineers for parochial drainage districts, increased the farm population, alleviated potential food shortages, expanded their agency's responsibilities at the expense of the Department of Agriculture (USDA), and made reclaiming deserts and wetlands equal priorities. "Reclamation," Newell later explained, "means regulation of water supply, putting it on where there is a deficiency, and taking it away where there is excess; substituting the will of man for the unregulated natural forces."[10] Since the Swamp Land program exposed the corruption, dishonesty, and inefficiency of state administration, Walcott—like many Progressives—touted the benefits of federal control. Yet he criticized the narrowness of Steenerson's bill since Minnesota had a comparatively small amount of wetlands. It had received only 4.5 million of the estimated 70 million acres ceded under the swamp land program. Envisioning a comprehensive national program, as opposed to Steenerson's single-state scheme,

---

on Sea-Coast Swamps of the Eastern United States," in *Sixth Annual Report of the United States Geological Survey to the Secretary of the Interior* (Washington: Government Printing Office, 1886), 353-98.

[10] Frederick H. Newell, "The Undrained Empire of the South," March 2, 1911, Box 6, Frederick Haynes Newell Papers, Library of Congress, Washington. See also Newell, "What May Be Accomplished by Reclamation," *Annals of the American Academy of Political and Social Science* 33 (May 1909): 174-79.

Walcott argued it was "inadvisable to enact legislation of this kind which would be applicable to but one State when the provisions of the bill might be applied to a number of other States."[11]

The Department of Interior's General Land Office (GLO) reached far different conclusions. The GLO's commissioner, W. A. Richards, maintained that the Swamp Land program delegated drainage responsibilities to the states. As the swamp land program's administrator, GLO officials understood the difficulty of identifying what lands qualified as being "swamp" and merited inclusion in Steenerson's program. Richards feared the proposal would create additional confusion and conflicting responsibilities within the program. He doubted the federal government's authority to engage in such a scheme, emphasized drainage's place as a state responsibility under American federalism, and urged the bill's defeat. Once word of the bill reached other congressmen, the commissioner gloomily predicted, they would demand similar privileges for their constituents. Defending his agency's turf, Richards insisted that "the legislation proposed is local in its effect, being applicable to but a single State, while any reasons which may support its enactment as to swamp lands in Minnesota would exist to a greater or less [sic.] extent in other States."[12]

---

[11] Walcott to Steenerson, February 23, 1906, RG 115, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Lands."

[12] W. A. Richards to Ethan Allen Hitchcock, February 15, 1906, RG 115, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Lands." The eminent land historian Paul Wallace Gates argues that "few problems have absorbed as much of the time and attention of Land Office officials …as the original swampland acts." Richards feared federal drainage initiatives would complicate the already problematic administration of the program by creating new, unwieldy, and contradictory tasks. See Gates, *History of Public Land Law Development* (Washington: Public Land Law Review Commission, 1968), 334-5.

North Dakota and North Carolina Join the Crusade

Richards' forebodings proved prophetic. Less than a month after Steenerson introduced his bill, Representative Asle Gronna and Senator Henry C. Hansbrough introduced legislation diverting the next $1 million generated by sales of North Dakota's public lands to wet prairie drainage in the state's valley of the Red River of the North instead of the reclamation fund. Unlike Steenerson, Gronna and Hansbrough saw federalized drainage as a means to protest what regional boosters perceived as the Reclamation Service's bias against North Dakota. In 1904, for instance, Louis W. Hill, the son of James J. Hill and GN's vice president, learned that Newell confided to another railroad leader that "there is no considerable irrigation project practicable in North Dakota."[13] The Great Northern, which helped bankroll Maxwell's publicity campaign on behalf of federal reclamation, expected the Reclamation Service to reward its diligence by building projects across the northern plains. Since none of the first eleven projects authorized by the Reclamation Service in 1903-4 were in North Dakota, Hill concluded that "the question of irrigation is being sidetracked along our line in Montana and through the State of North Dakota" because Newell's "interests are all in the southwest."[14]

North Dakotans endorsed Hill's grim appraisal. In 1905, the legislature petitioned Congress to let the state use a portion of its share of the reclamation fund for the drainage

[13] D. Miller to Louis W. Hill, August 10, 1904, President's Subject Series, file 4013, Great Northern Railroad Corporate Records (hereafter GN Records), Minnesota Historical Society, St. Paul, Minnesota.

[14] Hill to J. W. Blabon, August 22, 1904, President's Subject Series, file 4013, GN Records. In a later letter to Arthur P. Davis of the Reclamation Service, Hill boldly stated his expectations about the Reclamation Service and the northern United States: "It was the Great Northern's work that started this [reclamation] fund and naturally we want to see a fair proportion of the development in our section of the county." See Hill to Davis, March 14, 1910, in the same file. The congressional bills are H. R. 13197 (Gronna), 59th Congress, 1st Session, introduced on 25 January 1906; and S. 3687 (Hansbrough), 59th Congress, 1st Session, introduced on 25 January 1906.

of wet and overflow lands in the valley of the Red River of the North and alongside the Mouse River. A year later a statewide drainage convention held in Grand Forks, organized by the city's commercial club, voted to ask Congress to divert $1 million from the irrigation fund to drainage. Gronna and Hansbrough also saw drainage as the only way for the Reclamation Service to comply with the Reclamation Act's 51% provision. By 1906, sales of North Dakota's public lands had contributed $5 million to the reclamation fund—one-sixth of its total. Lacking deep canyons and solid gorges, the state had few suitable sites for dams and the Reclamation Service, according to Hansbrough, found it "impossible … to expend there for irrigation more than $500,000," far short of the required amount. Gronna and Hansbrough sought to fulfill the law's 51% clause and embarrass the Reclamation Service since they entrusted the USDA with the drainage duties.[15]

Democratic southerners looked upon the North Dakota bills as the perfect opportunity to participate in the federal reclamation program. As early as January 1905, South Carolina congressmen approached Charles Q. Tirrell of Massachusetts, the chairman of the House Committee on the Irrigation of Arid Lands, to discuss borrowing money from the reclamation fund to drain southern swamps. Though there is no evidence of how they justified the request and nothing came of the conversation, the meeting signaled that some southerners were ready to be rewarded for supporting the

[15] "The Irrigation Convention," *Grand Forks Herald*, October 1, 1903; "Hansbrough Roasts Newell," *Grand Forks Herald*, September 25, 1904; Webster Ballinger, "Funds for Drainage," *Grand Forks Herald*, February 11, 1905; "A Drainage Convention," *Grand Forks Herald*, November 21, 1905; "A Drainage Talk," *Grand Forks Herald*, January 12, 1906; *Second Biennial Report of the State Engineer to the Governor of North Dakota for the Years 1905 and 1906* (Bismarck: Tribune, State Printers and Binders, 1906), 82-102; and *Congressional Record*, Senate, 59th Congress, 1st Session, June 15, 1906, p. 8534. On the Reclamation Service's pessimistic outlook for North Dakota, see Louis N. Hafermehl, "To Make the Desert Bloom: The Politics and Promotion of Early Irrigation Schemes in North Dakota," *North Dakota History: Journal of the Northern Plains* 59 (Summer 1992): 20.

Reclamation Act.[16] In March 1906, North Carolina Rep. John Humphrey Small introduced legislation diverting $3 million from the reclamation fund to drain the Dismal Swamp. The bill required project settlers to repay their share of the loan to the reclamation fund within ten years. "I was not aware that the reclamation fund could be turned to such a practical use," Small told the *Washington Post*, until Gronna and Hansbrough introduced their bills.[17] Draining the Dismal Swamp would bring a large return to the government's coffers and better fulfill reclamation's homebuilding mission since it promised to create new farms and not benefit existing landowners. Another southern Democrat, Sen. Asbury Latimer of South Carolina, promised constituents that he would request a loan to drain his state's abandoned rice fields should the North Dakota or Dismal Swamp bills succeed. Before the end of 1907, Democratic Sen. Lee S. Overman and Rep. Claude Kitchin, both of North Carolina, corresponded with Newell about potential wetlands drainage projects in their state's northern counties of Bertie, Halifax, and Warren.[18]

The Angry and Uncompromising Backlash

Western politicians and communities fiercely opposed splitting the reclamation fund. Samuel P. Hays identifies 1906-7 as the moment when western opposition to national conservation galvanized due to the implementation of policies levying fees for

[16] See *House Document No. 381*, 58th Congress, 3rd Session, p. 44.

[17] "To Drain Dismal Swamp," *Washington Post,* March 16, 1906. Small's bill was H. R. 16804 (Small), 59th Congress, 1st Session, introduced on 15 March 1906.

[18] "To Redeem the Rice Lands," *The State (Columbia, South Carolina)*, May 30, 1906; Newell to George Otis Smith, December 12, 1907, RG 115, Entry 3, Box 207, File 676-2, "National Drainage Assn. Meetings"; and Walcott to George H. Maxwell, March 19, 1906, Box 2, Charles D. Walcott Collection, Smithsonian Institution Archives, Washington, D. C.

grazing in the national forests and the leasing of water power and coal sites. The proposed raids on the reclamation fund intensified the backlash. Influential western Republicans like Wyoming's Frank W. Mondell, the chairman of the House Committee on the Irrigation of Arid Lands, opposed the North Dakota and Dismal Swamp bills because they threatened to imperil the completion of unfinished reclamation projects, lure home seekers to the Midwest instead of the West, and perpetuate the West's dependence on extractive and range industries. Anger about the proposed diversions ran high in western newspapers. The *Idaho Statesmen* and *Olympia Record* editorialized against the bills because they "open[ed] the way for a general onslaught on the reclamation fund, and will lead to the demolition of the reclamation service." According to the *Anaconda (Mont.) Standard*, the raids jeopardized the completion of government projects by throwing open the door for easterners to borrow money for "queer things" such as dredging eastern harbors, exterminating mosquitoes, and reclaiming other wastelands. *The Bellingham (Wash.) Herald* criticized the propriety of using public land proceeds to improve private property since most wetlands were owned privately. The *Oregonian* excoriated Hansbrough for initiating an "unjust" raid on the reclamation fund by southerners. "The South is not entitled to a cent out of the reclamation fund for draining swamps," editors lectured, "for the South never contributed a cent to the reclamation fund, and never will." Dominated by westerners, the annual National Irrigation Congress also heaped scorn on the proposed diversions. The president of the 1906 Congress, California Governor George Pardee, crowed that the federal reclamation of arid lands was "first in time and should be first in right." The central government should

avoid expanding federal reclamation into southern swamplands until western irrigation proved successful.[19]

Westerners' hostile reaction demonstrates that they took a pragmatic approach towards federal conservation that blended support or opposition for initiatives based on a narrow calculation of self-interest. Western communities did not view the Progressive conservation movement as a monolithic set of policies that were either beneficial or inimical to their interests. They cherry picked which conservation policies to support based on local loyalties and, in doing so, fragmented the West into rival communities. Small wonder Hansbrough saw his proposal as an attempt to get North Dakotans their fair share of the reclamation fund rather than an assault on the interests of the entire western bloc of states. As the historian Richard White explains, "the battles over conservation seemed to pit eastern experts and bureaucrats against western settlers and entrepreneurs, but both westerners and their opponents turned out to be divided. Indeed, many westerners never thought of conservation as a unified set of programs. They supported or opposed particular programs not out of ideology but according to calculations of how those programs affected their own immediate interests. They supported some programs

[19] Hays, *Conservation and the Gospel of Efficiency*, 256-7. For a sampling of western newspapers' and periodicals' hostile reaction, see T. O. Monk, "Not Likely to be Passed: Drainage Bill Will Probably Be Pigeon-Holed," *Grand Forks Herald*, February 2, 1906; "An Extra Session," *Grand Forks Herald*, February 22, 1906; "Opposes Swamp Drainage Feature," *Idaho Statesman* (Boise, Idaho), September 5, 1906; "Loaded Bill Passed Senate," *Idaho Statesman*, February 18, 1906; "May be Death Blow to Reclamation," February 27, 1906, *Olympia Record*; "Funds to Drain Dakota Swamps," *Idaho Statesman*, March 23, 1906; "They're Making Raids on Reclamation Fund," *Anaconda (Montana) Standard*, March 27, 1906; "South Wants Slice," *Bellingham (Wash.) Herald*, May 8, 1906; "Menace to Reclamation," *Idaho Statesman,* June 26, 1906; "Want to Drain Swamps," May 13, 1906, "Great Danger to Irrigation Work," July 23, 1906, and "Irrigation Grant has no Chance," September 8, 1906, *Oregonian (Portland)*; "Conversion of Speaker Cannon," *Nevada State Journal*, July 14, 1906; and Ira E. Bennett, "Western Affairs at Washington," *Pacific Monthly* 18 (November 1907): 610-20, esp. 620.

and sought to derail others."[20] National conservation policies did as much to fragment the West into competing communities than to foster regional unity and a collective sense of purpose.

National conservation organizations steered a middle course. The editors of *Forestry and Irrigation*, one of the nation's leading conservation periodicals, worried that raids on the reclamation fund would be "disastrous to the West," delivering a "mighty serious setback" to its economic development. They opposed diverting money from the reclamation fund for drainage, but they endorsed a national drainage act for wetlands as a fair compromise. Led by Maxwell, the National Irrigation Association also opposed reclamation fund diversions but supported integrating drainage into the existing federal reclamation program on an incremental basis. Maxwell recommended amending the Newlands Act so it included Minnesota and, over time, additional public land states with swamps.[21]

Localism thus had the ironic and unintended consequence of making water resource proposals grow progressively larger over time. The West's hostile backlash, Walcott's call for a wider program, and southerners' demands for inclusion compelled Steenerson to write a broader bill that provided something for everyone. Introduced in March, the wider proposal sought to restore the grand alliance between the South, West, and Midwest the Newlands Act fostered. It created a "drainage fund" from public land proceeds in Alabama, Arkansas, Florida, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Ohio, and Wisconsin to reclaim wetlands in *any* state

---

[20] Richard White, *"It's Your Misfortune and None of My Own": A New History of the American West* (Norman: University of Oklahoma Press, 1991), 407.

[21] *Forestry and Irrigation* 12 (March 1906): 112-3; and "Drainage in Congress," *Grand Forks Herald*, January 12, 1906.

or territory and in ceded Indian lands in states contributing to the fund. It pleased USGS leaders for investing the Secretary of Interior and USGS director with plenary control over the selection of project sites and the process of surveying, examining, and withdrawing public lands from entry. Unlike the Newlands Act, Steenerson's bill did not prescribe specific limitations on the distribution of funds other than giving preference "as far as practicable to projects in the States in which the proceeds of sales and disposal of public lands have been greatest." The bill empowered the Secretary of Interior to accept cessions of land from states and to include drainage districts and other private lands in projects—as long as no plots exceeded 160 acres—if they agreed to repay their share of construction costs. It effectively terminated the Swamp Land program and transferred responsibility for drainage to the USGS (and Reclamation Service).[22]

Bureaucratic rivalries hampered nationalization no less than conflicts between communities. The creation of new federal agencies around the turn of the century ironically fostered localism. Bureaucracies often pursued contradictory agendas, waged protracted battles over new responsibilities, and undermined centralization if their rivals stood to benefit from such a shift in power. In early months of 1906, the rift between the USGS and GLO over the future direction of national wetlands policy remained heated, bitter, and unresolved. Steenerson's newest bill did nothing to overcome Richard's objections that state governments bore responsibility for surface water removal since the Swamp Land Acts had "made ample and liberal provision for the reclamation of swamp lands."[23] The GLO remained wedded to the status quo. Nevertheless, the

[22] H. R. 16550 (Steenerson), 59th Congress, 1st Session, introduced on 1 March 1906.

[23] Richards to Ethan Allen Hitchcock, March 6, 1906, RG 115, Entry 3, Box 148, Folder 286-3, "House Bills, 59th Congress, 1st Session."

intradepartmental feud became so disruptive that Secretary of Interior Ethan Allen Hitchcock was finally forced to intervene. In early March, Hitchcock instructed John F. Lacey, the chairman of the House Committee on Public Lands, that he opposed Steenerson's legislation. By siding with the GLO, Hitchcock temporarily undercut the prospects for reforming national wetlands policy.[24]

Tension also dominated the relationship between the USGS and USDA. Created in 1895 and 1898, the USGS's Hydrographic Division and USDA's Office of Irrigation Investigations in the Division of Experiment Stations frequently clashed over irrigation responsibilities. The turf war manifested itself most clearly in the rivalry between Newell and Elwood Mead, the Office of Irrigation Investigation's director. Newell perceived Mead's agency as a subversive entity that duplicated the USGS's work, undermined federal reclamation's effectiveness by favoring states' water rights, and after 1902 sought to displace the Reclamation Service as the West's irrigator. For his part Mead accused Newell of exaggerating the number of western acres available for reclamation and of knowing too much about engineering and too little about soils, farming, water rights, and the economy.[25]

The USDA envisioned itself as the administrator of a national wetlands drainage program. Mead and A. C. True, the director of the USDA's Office of Experiment Stations, interpreted Congress's 1903 decision to change the name of the Office of Irrigation Investigations to the Office of Irrigation and Drainage Investigations (OIDI) as evidence that it, and not the USGS, was positioned to drain the nation's wetlands, an area

[24] Hitchcock to John F. Lacey, March 8, 1906, RG 115, Entry 3, Box 148, Folder 286-3, "House Bills, 59th Congress, 1st Session."

[25] James R. Kluger, *Turning on Water with a Shovel: The Career of Elwood Mead* (Albuquerque: University of New Mexico Press, 1992), 28-38; and Pisani, *Water and American Government,* 46-50.

it estimated to be about 80 million acres. Although the OIDI's responsibilities were demonstrational and educational, including helping farmers organize drainage districts, surveying and locating ditches, and disseminating information about proper drainage techniques, Mead and True anticipated building actual drainage projects. After 1906 this ambitious agenda brought the OIDI into conflict with the USGS. The turf war became so contentious that the Senate failed throughout 1906-7 to pass a resolution directing the Secretary of Agriculture to study the quantity and location of U. S. wetlands. Perceiving the resolution as a backdoor attempt to position the USDA to assume drainage responsibilities, the USGS's Senate allies repeatedly blocked its passage. As the third party to this dispute, the GLO opposed any overhaul of the Swamp Land program and continued to work behind the scenes to undermine both agencies. Rather than ushering in an era of efficient, coordinated, and scientific decision-making, bureaucratization held the national state hostage to administrative rivalries, local jealousies, and confusion about institutional responsibilities.[26]

Loyalty to localism—not loyalty to science, efficiency, or disinterested administration by a technical intelligentsia—remained the basis by which the state mediated society's relationship with the environment. Though Steenerson's national bill allowed every state to benefit from the drainage program, western politicians did not budge. Behind their opposition was the persistent nineteenth-century fear that what

[26] A. C. True to Gifford Pinchot, December 10, 1903, Box 602, Gifford Pinchot Papers, Library of Congress, Washington; "Reclaiming Our Swamp Lands," undated memorandum discussing True's reclamation views, Box 61, Folder 3, "Articles, Memos, Letters (1908)—Forestry, Floods, Swamps, National Forests," American Forestry Association Records, Forest History Society Archives, Durham, North Carolina; and Pisani, *Water and American Government*, 46. On the GLO's persistent opposition to all drainage proposals, see Richards to Hitchcock, January 18, 1907, RG 49, "Press Copies of Letters Sent Concerning Swamplands," Entry 673, Letter Press Books, Book 213 (January 2, 1907 to April 30, 1907), NARA. George Maxwell vigorously opposed giving drainage responsibilities to the USDA. See Walcott to Maxwell, March 10, 1906, Walcott Collection, Box 2.

benefited one section harmed another. Progressive water policies did far more to intensify these fears than displace them. In May, Mondell and reclamation state representatives, supported by Hitchcock and GLO leaders, defeated Steenerson's bill in committee by suggesting that the sum available from Midwestern public land sales was a meager $5 million. "It is idle to talk of starting this great work with this small amount of money," Mondell cautioned. "It would be all frittered away in making surveys and nothing would be left for actual work." If this proved true, swamp states might demand appropriations from the general treasury or, even worse, tap the reclamation fund.[27]

The North Dakota and Dismal Swamp bills fared similarly. Hansbrough's bill slipped through the upper chamber with Senators unaware of what they had approved, and it passed the House Committee on Public Lands in the early summer. Committee dissenters from Nebraska, Idaho, and other states issued a scathing minority report criticizing the bill for creating a large and expensive new program, reversing the tradition of local control over drainage by shifting those responsibilities to the federal government, privileging private over public land development, benefiting landowners at the expense of home seekers, and postponing the completion of federal irrigation projects. The same committee's decision to scold western parochialism, favorably report the Dismal Swamp bill, and challenge "those States which expect such great benefits from irrigation [to] join with other States and sections in the reclamation of our fertile swamp lands" excited similar passions. Fearful of a second reclamation act's divisive impact on the Republican

[27] Jackson, "Drainage Bill is Advanced," *Duluth News Tribune*, May 17, 1906; and "Mondell is Opposed to Drainage Bill," *Duluth News Tribune*, May 27, 1906.

Party's unity and distributive program, which included western reclamation, Speaker Joe Cannon refused to allow an up or down vote on either bill.[28]

Forging a National Consensus: The Oklahoma City Drainage Convention

The string of setbacks did not deter supporters of national drainage. Thomas L. Cannon, the executive secretary of the St. Louis sector of the National Irrigation Association, corresponded in length with Steenerson during the summer months regarding his proposal. Like Mondell, Cannon doubted the legislation's potential effectiveness because the quantity of public lands available to entry in Alabama, Arkansas, Florida, Illinois, Indian, Iowa, Louisiana, Michigan, Minnesota, Mississippi, Ohio, and Wisconsin would "not provide a drainage fund of sufficient magnitude to make drainage a question of importance."[29] Cannon recommended that Steenerson scrap the bill, forge a coalition with western states, and focus on amending the Reclamation Act so that Midwestern and southern states could gain access to the reclamation fund. Money from the reclamation fund could immediately open 16 million acres of wetlands in Missouri, Arkansas, Louisiana, Illinois, southern Kentucky, western Tennessee, and Mississippi to at least 3 million settlers, quadruple the value of drained lands, and quintuple the crop yields of lands presently suffering from poor drainage. Cannon

[28] *House Report No. 4929*, pt. 2, 59th Congress, 1st Session, pp.1-2; and *House Report No. 4994*, 59th Congress, 1st Session, pp.1-4. Several newspapers discussed Cannon's persistent opposition to drainage-related diversions from the reclamation fund. See, for instance, "Conversion of Speaker Cannon," *Idaho Statesman* Jul 10,y 1906; and "Swamp Drainage is a National Issue," *Bellingham (Wash.) Herald*, December 7, 1906. On the Republican Party's distributive program, see Robert Harrison, *Congress, Progressive Reform, and the New American State* (Cambridge: Cambridge University Press, 2004), 24-5; and Richard L. McCormick, "The Party Period and Public Policy: An Exploratory Hypothesis," *Journal of American History* 66 (September 1979): 279-98.

[29] "For a Drainage Act," *Dallas News*, August 28, 1906.

emphasized that the national reclamation program should transcend localism, rise above partisanship, and include both desert and swamp lands.[30]

Steenerson would not budge. In response, Cannon took his campaign for modifying the Reclamation Act to Oklahoma Territory. In 1905, J. B. Thoburn, the secretary of the Oklahoma Territorial Board of Agriculture, instructed residents that they might be better served if the territory's share of the reclamation fund was used to build drainage projects. At the very least, Thoburn encouraged farmers living in the low-lying and flood prone watersheds of the Washita, Little River, and Deep Fork Branch of the North Canadian River to demand that the USGS survey those lands and distribute topographical maps to community leaders.[31] In August 1906, Cannon echoed Thoburn's suggestions during a speech in Chandler, Oklahoma, to the Deep Fork Drainage Association. During the presentation, Cannon lambasted the Reclamation Service for bypassing Oklahoma Territory despite its significant contributions to the reclamation fund. Public land sales in Oklahoma had contributed $4 million to the reclamation fund but not a penny had been spent on irrigation projects inside the territory. Cannon encouraged Oklahomans to clamor for the revision of the 1902 law. "By stretching the text of the act," he maintained, "land might also be reclaimed by drainage. If the reclamation of land by irrigation is constitutional and right, then the reclamation of land by drainage is equally so."[32] Cannon estimated that more than 1 million acres of land in Lincoln, Oklahoma, and Pottawatomie counties—many of which were probably owned by the railroad corporations Cannon represented—stood ready to benefit from drainage.

---

[30] Ibid.

[31] J. B. Thoburn, *First Biennial Report of the Oklahoma Territorial Board of Agriculture, 1903-1904* (Guthrie: The State Capital Co., 1905), 29.

[32] Ibid.

By October 1906, Cannon's publicity tour caught the attention of the Oklahoma City Chamber of Commerce. Along with the Oklahoma territorial government, led by Governor Frank Frantz, the Chamber of Commerce voted to organize the United States' first national drainage congress. The Chamber of Commerce invited state governors, mayors, agricultural societies, commercial and industrial organizations, county and township representatives, drainage district administrators, railroad executives, and federal natural resource agencies to attend a December congress. According to a circular disseminated by the Chamber and signed by Frantz, the congress's objective was to discuss:

> Those phases of the drainage question which are of common interest to all, the consideration of ways and means for the inauguration of a general movement for the reclamation of lands by the construction of drainage works, and to start a campaign of education for the purpose of enlightening the popular mind upon this very important subject to the end that public sentiment may be prepared to endorse and support the adoption of a practical and definite line of policy pertaining thereto.[33]

Like commercial organizations in Duluth and Grand Forks, the Oklahoma City Chamber of Commerce deplored Congress's bias towards arid land reclamation. Taking its cue from Cannon, the Chamber asserted that all of the attention heaped on the subject of western irrigation obscured the significance of wetlands drainage. A campaign of education and publicity offered the only means of leveling the playing field. The circular that announced the impending drainage congress publicized the tangible benefits of drainage. In "A Few Drainage Queries," the circular asked:

1. Do you know that while the population of the United States doubles itself about once every thirty years, its total land area remains unchanged?

[33] Circular, "First Annual Session, National Drainage Congress," RG 115, Entry 3, Box 207, Folder 676-2, "National Drainage Assn. Meetings." See also A. W. McKeand to Newell in the same file.

2. Do you know that there are more acres of land in the humid region to be reclaimed by drainage than there are acres of arid land that can be reclaimed by irrigation with the available water supply?
3. Do you know what land drainage would mean to your state in the way of increased agricultural production and added capacity for the support of its growing population?
4. Do you know that drained lands are always fertile and productive?
5. Do you know that lands which have been drained never suffer from drouth [sic.]?
6. Do you know that drainage of land enhances its value many fold?
7. Do you know that drainage would be a paying proposition from the viewpoint of public health if no other interests were involved?
8. Do you know that proper drainage means the solution of the good roads problem?
9. Do you know that the people of the arid region secured the creation of a national reclamation fund by means of which irrigation development on a large scale has been inaugurated under the auspices of the general government?
10. Do you know that such a progressive step is the result of organization and concerted action on the part of people interested and do you not think it about time for the drainage people to get together for united action?[34]

On December 5-7, 1906, the first annual drainage congress assembled in Oklahoma City. Sponsored by Oklahoma territorial government and the Oklahoma City Chamber of Commerce, the congress attracted seventy-five representatives from seventeen states, railroad corporations, and four national agencies (the Reclamation

[34] Circular, "First Annual Session, National Drainage Congress," RG 115, Entry 3, Box 207, Folder 676-2, "National Drainage Assn. Meetings."

Service, USDA, USGS, and Forest Service). Acrimony plagued the early proceedings. Representing a consortium of business interests centered in St. Louis, Cannon persuaded a sizable number of delegates to support a resolution calling on Congress to amend the 1902 Reclamation Act so that money from the reclamation fund would be available for wetlands drainage projects in any state or territory. The Reclamation Service's official representatives—assistant chief engineer Arthur Powell Davis and chief statistician C. J. Blanchard—vigorously opposed Cannon's proposal. They objected that diverting money from the reclamation fund would jeopardize the completion of unfinished reclamation projects, alienate western communities, and redistribute public land revenue to states who had not contributed to the fund. The Reclamation Service favored the creation of a national drainage law applicable to all states and modeled after the 1902 law. Dissension finally subsided when Davis and Blanchard convinced enough delegates to endorse a resolution recommending the speedy passage of a bill authored by Sen. Frank P. Flint of California, which was largely a replica of Steenerson's initial national bill. After approving another resolution praising Steenerson for making drainage a national priority, agreeing to hold another meeting in 1907, and forming a permanent national association dedicated to securing the passage of a national drainage law, the congress adjourned.[35]

The Last Great Hope for Social Engineering: Drainage and the Disappointment of Arid Land Reclamation

Enacted with lofty hopes and optimism, the Reclamation Act of 1902 failed to live up to the dreams of its supporters. By 1907, the Reclamation Service was in big

[35] A. P. Davis to Newell, December 11,1906, RG 115, Box 207, File 676-2, "National Drainage Assn. Meetings"; B. Campbell to Louis W. Hill, December 15, 1906, President's Subject Series, file 4013, GN Records; and "New Drainage Association," *Duluth News-Tribune*, December 12, 1906.

trouble as public land sales failed to meet expectations; western projects did not attract an exodus of eastern factory workers, tenement dwellers, and farmers; project construction costs soared to over six times initial estimates; the price of private land on government projects increased 759% between 1902-13; the authorization of 23 projects in four years stretched the agency's resources too thin; and by year's end the reclamation fund was broke. In its haste to start as many projects as quickly as possible, the Reclamation Service overextended itself and eroded public confidence.[36]

No one was more disappointed in the reclamation program's chronic shortcomings than Frederick Haynes Newell. Born on March 5, 1862, in Bradford, Pennsylvania, Newell's childhood was punctuated by stays with different relatives as a result of his mother's 1863 death in childbirth. A smart and diligent student, Newell excelled in school and, in 1880, enrolled in the Massachusetts Institute of Technology. Five years later he graduated with a B. A. in mining engineering, worked for his one of his father's businesses, and then joined the Ohio Geological Survey, where he researched oil-bearing rocks. In 1888, the course of Newell's life changed when he met John Wesley Powell, the head of the USGS, and other prominent leaders of the scientific agency. Powell, who gained national fame during his daring run down the Colorado River decades earlier, had charge of the USGS's Irrigation Survey, which intended to locate, map, and segregate potential dam and canal locations. Powell was so impressed with Newell's talents that he hired him to lead a group of recent engineering graduates to study the volume, velocity, and features of western streams and rivers. Upset with the leisurely pace of Powell's survey, Congress revoked the Irrigation Survey's funding in

[36] On the Reclamation Service's early shortcomings, see Pisani, *Water and American Government*, 8, 58; and Pisani, "Water Planning in the Progressive Era: The Inland Waterways Commission Reconsidered," *Journal of Policy History* 18 (2006): 396-7.

1890 and dramatically slashed the USGS's budget in 1892. Despite the setbacks to the USGS, Newell remained active in Washington scientific circles. In the 1890s, he participated in the Cosmos Club, the National Geographic Society, the American Geographical Society, and the American Forestry Association and gave numerous lectures on natural resource matters. Newell also befriended the forester Gifford Pinchot, who in 1900 introduced him to the rising governor of New York, Theodore Roosevelt, who soon became the Republican Party's Vice President. When an assassin's bullet claimed the life of President William McKinley in 1901, Roosevelt was elevated to the Presidency. Pinchot and Newell became his closest advisors on natural resource policy. It was thus no surprise that Newell was selected to become the first chief engineer of the Reclamation Service. In 1907, Newell became the second director of the Reclamation Service after Walcott resigned to become the secretary of the Smithsonian Institution.[37]

The early twentieth-century conservation movement blossomed during a period of epochal social and political reform known as Progressivism. One of the core missions of Progressive reformers was confronting the corruption, inequity, and social ills spawned by the rise of big business and urban political machines. According to the historian Shelton Stromquist, the Progressive movement, with its varied, diverse, and often contradictory goals, "defined its enemies … as parochial, corrupt, and antisocial 'interests' that bred the twin evils of greed and inefficiency. The corrupting influences, represented by urban boss rule and corporate 'robber barons,' threatened democratic institutions and the expansion of economic opportunity. These interests conspired to

[37] Pisani, "A Tale of Two Commissioners: Frederick Newell and Floyd Dominy," in *The Bureau of Reclamation: History Essays from the Centennial Symposium* (Denver: U. S. Department of the Interior, Bureau of Reclamation, 2008), 2:637-43. An excellent study of Newell's career in the Reclamation Service is Donald C. Jackson, "Engineering in the Progressive Era: A New Look at Frederick Haynes Newell and the U. S. Reclamation Service," *Technology and Culture* 34 (July 1993): 539-74.

produce a dysfunctional industrial society that eroded public virtue."[38] Progressives eagerly enlisted the support of the embryonic administrative state to purge corruption from the democratic process and revitalize democratic institutions by promoting enlightened political participation by individual citizens. Unfortunately, Stromquist's study completely ignores the most obvious manifestation of the reform sentiment he describes as the ideological basis of Progressivism: federal reclamation.

Newell's political and social sensibilities were enmeshed in his intense ambivalence and apprehension about the fate of American democracy. Between 1870 and 1900, the population of the United States, bolstered by unprecedented immigration and natural increase, doubled from 38 million to 76 million. During the same three decades, the industrial workforce increased to a third of the entire population. Foreign-born Americans accounted for a third of the population increase from 1860 to 1900; in the period between 1870 and 1920, one out of every three industrial laborers was an immigrant (the ratio stayed unchanged during the period). By 1920, the national population jumped to 105 million and the census reported that, for the first time in U. S. history, more people lived in urban areas than on farms. The demographic upheaval troubled Newell. He regretted that the concentration of people in cities and their dependence on venal and corrupt industrial and political bosses was slowly eroding the character traits that had long defined American character—industry, individualism, and self-reliance. Nothing less than the wholesale relocation of people from the city to the farm could preserve American democracy, revitalize its institutions, and breed the hardiness and independence for which Newell expressed nostalgia. Newell insisted that

[38] Shelton Stromquist, *Reinventing "The People": The Progressive Movement, the Class Problem, and the Origins of Modern Liberalism* (Urbana: University of Illinois Press, 2006), 4.

the federal government had a sincere responsibility to "promote land-owning citizenship." As the western irrigation movement sputtered along, the Flint drainage bill became the last best hope of social engineers to suspend the ascendancy of the city. "In any scheme the part played by the United States and its employees is that of initiating, guiding, and securing … the best use of the [drainage] fund in securing what is vital to the life of the commonwealth, namely, the extension and perpetuation of a class of small landowners."[39] The destiny of democratic society depended on turning wasted lands into rural homes for wasted people. "The success of democratic institutions is tied up with this class of citizens and the largest menace to the maintenance of the institutions of a free country," Newell insisted, "come from the concentration of citizens in a few large industries, crowded in big cities, and under the control of a few capitalists."[40] Rather than constituting a latter-day Jeffersonianism, Newell's sweeping vision represented a grand utopian scheme dedicated to preserving the virtue of ordinary Americans by buffering them from economic vicissitudes, avaricious factory owners, and selfish political bosses. "The safeguard [to political corruption] is … the securing of able, independent men throughout the country, each as an independent owner of a small tract of land from which he is deriving his living."[41]

Newell was not a solitary voice crying out in the wilderness. As Laura Lovett demonstrates, several leaders of the conservation movement shared his views about the

---

[39] Frederick H. Newell, "Drainage," undated memorandum, RG 115, Entry 3, Box 207, File 676-2, "National Drainage Assn. Meetings." The population statistics are drawn come from Alan Trachtenberg, *The Incorporation of America: Culture and Society in the Gilded Age* (New York: Hill and Wang, 1982), 87-88; and Benjamin Kline, *First Along the River: A Brief History of the U. S. Environmental Movement*, 3rd ed. (Lanham: Rowman & Littlefield Publishers, Inc., 2007), 52.

[40] Ibid.

[41] Ibid.

human junk produced by industrialization. Lovett argues that George Maxwell, who spearheaded the campaign for the passage of the Reclamation Act, envisioned federal reclamation and the creation of "homecrofts" as a means to shield American families from the ebb and flows of the market economy, relieve urban congestion, eliminate class strife, and promote an ideology of pronatalism. Disturbed that the rise of grocery chains and national distribution networks eroded familial self-sufficiency, Maxwell touted federal reclamation and homecrofts as the best strategy for transforming the American home back into a site of production rather than consumption. "The rise of the suburban life and the emergence of domestic science," Lovett contends, "shifted the home and the woman in it from a domestic manager who oversaw the production of household goods into one of educated consumer."[42] Maxwell brooded over this transition because it made American families perilously dependent on the husband's wages and vulnerable to market forces that were unpredictable. His family producer ethic revised the notion of an exclusive male breadwinner by introducing the idea that "women's responsibilities included productive labor in the garden, the orchard, and the livestock yard as well as the guildhall and community center. This labor by women was interpreted as freeing the family from total dependence on industrial wages." "Reclaiming the land was a means of reclaiming the family."[43]

---

[42] Laura L. Lovett, *Conceiving the Future: Pronatalism, Reproduction, and the Family in the United States, 18901-1938* (Chapel Hill: University of North Carolina Press, 2007), 67. See also Robert Autobee, "Every Child in a Garden: George H. Maxwell and the American Homecroft Society," *Prologue: The Journal of the National Archives* 28 (1996): 195-206; Lovett, "Land Reclamation as Family Reclamation: The Family Ideal in George Maxwell's Reclamation and Resettlement Campaigns, 1897-1933," *Social Politics* 7 (Spring 2000): 80-100; and Lovett, " 'Rooted in the Soil': Family Ideals, Land Reclamation, and Irrigation Resettlement as Welfare in the United States, 1897-1933," in *Families of a New World: Gender, Politics, and State Development in a Global Context*, eds. Lynne Haney and Lisa Pollard (New York: Routledge, 2003), 85-98.

[43] Lovett, *Conceiving the Future*, 76, 75.

Anti-Mosquito Hysteria, Wetlands, and Public Health

The Progressive conservation movement coincided with a national crusade for mosquito eradication. In 1897, English physician Ronald Ross discovered that the anopheles mosquito—and not miasmatic vapors rising from stagnant marshes and swamps—was the true vector of malaria. As a result of the discovery, anti-mosquito hysteria swept the nation. Communities directed much of their hostility towards wetlands since the anopheles and many other mosquito species preferred laying larvae in interior and coastal wetlands shielded from wave action. The consignment of the miasmatic theory of disease to the dustbin of history and the gradual acceptance of the germ theory intensified Americans' antipathy towards wetlands, led to the proliferation of local and national interest groups dedicated to mosquito extirpation, and prompted several state governments to create mosquito control agencies that generally involved draining wetlands or dumping kerosene into them to kill larvae.[44]

Early twentieth-century entomologists touted wetlands drainage as an effective strategy of mosquito control. During the last quarter of the nineteenth century, the field of medical entomology took shape and emerged as the servant of local and state governments influenced by anti-mosquito hysteria. Probably the most influential entomologist of the Progressive Era was John Bernhard Smith, who served as the state entomologist at New Jersey's Agricultural Experiment Station from 1889 until his death in 1912. Trained as an attorney, Smith was a self-educated entomologist whose 1883 hiring at the USDA's division of entomology jumpstarted his scientific career. After

[44] The historian William B. Meyer erroneously argues that the discrediting of the miasmatic theory of disease during the early twentieth century was of "immeasurable importance for wetland management" because "it meant that disease might be eradicated without any need for drainage." See Meyer, "From Past to Present: A Historical Perspective on Wetlands," in *Wetlands*, eds. Sharon L. Spray and Karen L. McGlothlin (Lanham: Rowman & Littlefield Publishers, Inc., 2001), 95-6.

1900, Smith persuaded the New Jersey legislature to appropriate money for his a study of the behavior, breeding habits, and species of New Jersey mosquitoes. Smith's *The Common Mosquitoes of New Jersey* (1904) proved an instant success and shaped the contours of the national mosquito extermination crusade. Rather than employing kerosene as a larvicide, which was popular in many communities, Smith favored drainage and the introduction of mosquito-devouring fish into breeding environments. Smith was just adept at politics as entomology. In 1904, he helped persuade the New Jersey legislature to pass an amendment to the state's 1887 health act that added the phase "waters in which mosquito larvae breed" to the section describing public nuisances. Soon thereafter, the legislature allocated money for Smith to drain New Jersey's salt marshes to control the mosquito population.[45]

Word of New Jersey's anti-mosquito crusades spread to other states. Influenced by Smith's experiments, affluent residents of the California cities of San Rafael and Burlingame formed improvement associations committed to mosquito control and subscribed money for drainage projects. In New York, the Long Island Railroad, New York City Health Department, and nearby horse racetracks donated money to exterminate the mosquitoes of Coney Island. Comfort, desire to enhance property values, and fears of malaria influenced the anti-mosquito hysteria. In late 1903, Henry Clay Weeks, the

[45] Gordon Patterson, *The Mosquito Crusades: A History of the American Anti-Mosquito Movement from the Reed Commission to the First Earth Day* (New Brunswick: Rutgers University Press, 2009), 19-57; and James E. McWilliams, *American Pests: The Losing War on Insects from Colonial Times to DDT* (New York: Columbia University Press, 2008), 121-25. For case studies of anti-mosquito hysteria and control in Florida, see Patterson, *The Mosquito Wars: A History of Mosquito Control in Florida* (Tallahassee: University Press of Florida, 2004); and Patterson, "The Trials and Tribulations of Amos Quito: The Creation of the Florida Anti-Mosquito Association," in *Paradise Lost? The Environmental History of Florida*, eds. Jack E. Davis and Raymond Arsenault (Gainesville: University Press of Florida, 2005), 160-76.

famous leader of New York's anti-mosquito campaign and Smith's rival, invited lawyers, physicians, politicians, business leaders, lawyers, and entomologists to New York city for the "First General Convention to Consider the Questions involved in Mosquito Extermination." Delegates chose a motto of "No Stagnant Water" and voted to form the National Mosquito Extermination Society. A year later the organization changed its name to the "American Mosquito Extermination Society" (AMES) to demonstrate its national ambitions. As the society's secretary and chief publicist, Weeks unsuccessfully attempted to persuade Congress to create a national mosquito commission. Despite AMES's best efforts, mosquito control remained the responsibility of local and state governments, where it flourished throughout the first half of the twentieth century. Prior to the outbreak of World War II, local anti-mosquito commissions were organized in New Jersey, California, Florida, Utah, and Illinois. Massachusetts, Rhode Island, Connecticut, New York, and Delaware also appropriated money to eradicate mosquitoes. By the close of 1907, the anti-mosquito crusade converged with the national wetlands drainage movement to form a formidable coalition.[46]

The Natural Resource State and Nationalization

In early 1907, the budding support for the creation of a second reclamation program attracted the attention of eastern farm journals. Ever since the 1902 passage of the Reclamation Act, the eastern rural press excoriated the wisdom, ineffectiveness, and exorbitant costs of nationalized irrigation. The Albany-based *Country Gentleman*, which was one of the nation's most respected and widely read farm periodicals, supported the principles of the Flint Bill. In 1907 and again in 1909, the journal ran a series of articles,

[46] Patterson, *The Mosquito Crusades*, 10, 58-79; and McWilliams, *American Pests*, 124.

authored by W. F. Massey, that compared the advantages and disadvantages of drainage and irrigation. Massey contended that Congress's decision to subsidize western irrigation constituted an act of "folly" because so much unimproved and abandoned farmland languished without settlers in the east. Citing a Department of Agriculture study, Massey complained that 170,000 acres of abandoned farmland existed in New York state alone. Furthermore, vast stretches of coastal wetlands in North and South Carolina, Virginia, Georgia, and Florida obviated the need to open up western land. "If this state of affairs … is really true," Massey asked, "where is the need for spending millions for the redemption of the deserts of the West?" "What is needed is not so much the reclamation of the arid West as the reclamation and settlement of the humid East."[47]

Massey elucidated three reasons why drainage constituted a more expedient form of land conservation than irrigation. First, wetlands contained "the most fertile soil[s] in the world."[48] Following ideas previously articulated in the antebellum rural press, Massey apparently attributed the unrivaled fecundity and "inexhaustib[ility]" of drained soils to the fact that they were the product of the slow accumulation of decomposing vegetable and animal matter.[49] Farmers who grew crops on fields improved by drainage enjoyed higher yields and belated soil exhaustion. Second, outside of scattered pockets in the American West, undeveloped wetlands were concentrated in the humid half of the United States. Reclamation projects constructed on former wetlands were closer to northern cities that had large food demands and transportation facilities like railroads and ports, which reduced farmers' shipping expenses. Finally, in addition to creating new

[47] W. F. Massey, "Arid West or Humid East?," *Country Gentleman* 72 (August 8, 1907): 736.

[48] Massey, "South Atlantic Swamp Lands," *Country Gentleman* 74 (September 23, 1909): 903.

[49] Massey, "Arid West or Humid East?," *Country Gentleman* 72 (August 8, 1907): 736.

farms, wetlands drainage destroyed the breeding habitat of anopheles mosquitoes while irrigation, by creating artificial water impoundments, potentially increased the range of malarial mosquitoes. Boosters of drainage often gloated that at the same time agricultural progress transformed the eastern United States into a salubrious and healthy paradise, irrigation degenerated the West into a malarial and pathogenic wasteland. In a final plea, Massey implored Congress to abandon its unwillingness to participate in drainage because of the legal precedent of the Swamp Land Acts: "As the swamp land now belongs largely to the states, having been transferred to them by the federal government, it might not be practicable for the central government to undertake its reclamation, but it could lend its aid to the states and hold a lien on the lands reclaimed till repaid."[50]

Ironically, the most vocal and enthusiastic support for some of Massey's ideas came from western policymakers. While scholars since Walter Prescott Webb have described the West's environment in terms of its aridity, pockets of wetlands scattered throughout the Pacific and Great Plains states reveal a diverse, complex, and varied landscape altered no less by people than arid lands. Sen. Hansbrough of North Dakota remained one of the most prominent proponents of a second program. Disappointed by the pace of federal reclamation in North Dakota, Hansbrough published an article in 1907 that laid out the case for a federal drainage program. Like many Progressive Era conservationists, he blamed the leisurely pace of drainage on the inability of local communities to administer land conservation in an effective, efficient, and timely manner. In particular, state legislatures had been dilatory in passing drainage laws that unleashed the collective energy of people against nature. As Hansbrough put it, the creation of drainage districts or county drainage boards, which had the ability to impose

[50] Massey, "Reclaiming Swamp Lands," *Country Gentleman* 72 (November 21, 1907): 1095.

assessments on lands included under their jurisdiction, often provoked disagreements that led to judicial gridlock and delay. "The question of drainage invariably becomes a sort of local political issue with one faction of the people in favor of drainage, another faction opposed to drainage, and still another faction hostile toward the drainage board." Local conflicts produced the kind of inefficiency and waste that Progressive Era conservationists abhorred. "Wherever these local feuds are engendered," he explained, "the courts are resorted to, and in the end little progress is made. It must be apparent to everybody that … there is great necessity for turning drainage work over to the steady hand of the Federal Government … In other words, the Federal Government can loan its credit, without interest charges, and proceed to drain the lands under a broad and comprehensive system which will accomplish results in the shortest possible time."[51]

Although future events revealed that Hansbrough's unfettered faith in Congress proved misguided, proponents of federal drainage predicted speedy passage of the Flint drainage bill after the Senate Committee on Public Lands unanimously approved it in March. The perceived need to open up more farmland for settlement and the nearness of many wetlands to large cities, which would facilitate the relocation of factory workers to reclamation projects, inspired the committee's favorable report.

> The demand for lands is increasing every year by the natural increase of native born and by the addition of 1,000,000 foreigners annually who must be provided with homes … These vast [swamplands] right at the doors of our great cities offer an ideal opportunity for relieving the overcrowding of cities. Their nearness to centers of population is assurance that when made habitable they will in a measure turn the pendulum of population from the city back to the farm. On these farms there will be no isolation, no loneliness. The fertility of the soil and the

[51] Henry C. Hansbrough, "Reclamation of Swamp Lands," *The Independent: A Weekly Magazine* (February 7, 1907): 321.

> nearness to markets assure dense population, with all the comforts and luxuries of the town and with the healthfulness and freedom of the farm.[52]

A faithful friend of Walcott and federal reclamation, Flint himself pushed the measure to fulfill the Reclamation Service's vision of institutional aggrandizement, receive a political payoff, and promote public health. He hoped Walcott and Newell would reward his diligence by appropriating money from the drainage fund to drain the overflowed lands of the Sacramento and San Joaquin Valleys—something for which he and Rep. James Norris Gillett of California a year earlier had tried unsuccessfully to convince Congress to appropriate. Nevertheless, Flint's bill passed the committee too late in the congressional session to be considered by the full Senate. Supporters would have to wait until the next congressional session.[53]

American Federalism, National Water Policy, and *Kansas v. Colorado*

The delay proved fateful. Since the summer of 1906, skeptical legislators and GLO officials reasoned that the Swamp Land Acts shut the central government out of surface water removal. Although those laws did not prohibit the federal government from draining the public domain, they severely limited the amount of federally-owned wetlands available for improvement. "In regard to the swamp lands," Oregon Senator Charles Fulton argued in 1906, "they occupy a very different position [than arid lands].

---

[52] *Senate Report No. 7342*, 59th Congress, 2nd Session, p. 2.

[53] "Help for Valleys," *Oakland Tribune*, May 5, 1906; "For Reclamation," *Woodland (Cal.) Daily Democrat*, March 20, 1906; and Donald J. Pisani, "A Conservation Myth: The Troubled Childhood of the Multiple-Use Idea," *Agricultural History* 76 (Spring 2002): 164-7. Earlier in 1906, the National Irrigation Association accused Flint of conspiring with Mead to have the Reclamation Service transferred to the USDA. The specious allegations so angered Flint, the chairman of the Senate Geological Survey Committee, that he sent a letter to Walcott denying the charges and reaffirming his devotion. There is little doubt Flint saw his drainage bill as a means to convince Walcott of his loyalty. See Flint to Walcott, April 4, 1906, Walcott Collection, Box 1.

The swamp lands have been given to the several States by Congress… Surely, it was not intended that Congress should go to work and reclaim the swamp lands."[54] Furthermore, policymakers did not dispute that the Constitution's property clause conferred unambiguous authority on Congress to improve its own property, but they were uncertain that Congress possessed the authority to improve private or state property. American federalism—the distribution of power to different and competing levels of government—intervened in the period between the 59th and 60th Congresses to help reinforce local control over drainage by rejecting a federal role.[55]

A 1907 Supreme Court case having little to do with drainage confirmed the doubts of those who demanded a limited federal role. *Kansas v. Colorado* stemmed from a dispute between Kansas and Colorado over the Arkansas River, which from its source in Colorado flows through Kansas, Oklahoma, and Arkansas before merging with the Mississippi River. Kansas argued that irrigation and manufacturing diversions in Colorado diminished the Arkansas's flow to the detriment of western Kansas farmers, and it asked the Court for relief. Kansas based its suit on riparian rights, the legal doctrine reserving an undiminished flow of water to riparian landowners. Claiming the right to appropriate water within its borders as it saw fit, Colorado invoked state sovereignty in defense of the diversions. Unsatisfied with both states' reasoning, the U. S. government intervened on behalf of the Reclamation Service. The agency attacked Kansas's argument since it imperiled the government's authority, under the property clause, to improve and dispose of its arid public lands by threatening the legality of

[54] *Congressional Record*, Senate, 59th Congress, 1st Session, June 26, 1906, p. 9248.

[55] The standard works on federalism remain Harry N. Scheiber, "American Federalism and the Diffusion of Power: Historical and Contemporary Perspectives," *University of Toledo Law Review* 9 (Summer 1978): 619-80; and Scheiber, "Federalism and the American Economic Order, 1887-1910," *Law and Society Review* 57 (Fall 1975): 57-118.

upstream dams. Riparian rights, the Reclamation Service contended, were not in tune with agricultural development of arid regions that required the storage and conveyance of water over long distances since they made it difficult to evaluate the quantity of water available for reclamation and threatened the federal government's monopolization of surplus water in interstate streams. The agency also balked at Colorado's claim of sovereignty since it violated the theory reserving control over unappropriated waters to the central government. The Reclamation Service's broader goal, however, was to have the Court invalidate riparian rights, the doctrine predominating in the eastern United States, so that it could pursue wetlands drainage and fulfill its vision of institutional aggrandizement.[56]

In May 1907, Justice David J. Brewer delivered the Court's unanimous decision. For the purpose of this essay Brewer's decision to uphold the diversions in Colorado was much less important than his dismissal of the United States' petition of intervention and warnings against expanding the reclamation program. Expounding a narrow view of federal power, Brewer emphasized the Court's "constant declaration … from the beginning that this Government is one of enumerated powers." Brewer admitted the commerce clause gave Congress broad authority to regulate and control navigable interstate streams, as he himself recognized in *United States v. Rio Grande Irrigation Company* (1899), but the case at bar differed because all parties agreed that the Arkansas

[56] *Kansas v. Colorado*, 206 U. S. 46 (1907). Insightful discussions of the case include Michael J. Brodhead, *David J. Brewer: The Life of a Supreme Court Justice, 1837-1910* (Carbondale: Southern Illinois University Press, 1994), 162-4; Donald J. Pisani, "State vs. Nation: Federal Reclamation and Water Rights in the Progressive Era," *Pacific Historical Review* 51 (August 1982): 265-82; and James Earl Sherow, *Watering the Valley: Development Along the High Plains Arkansas River, 1870-1950* (Lawrence: University Press of Kansas, 1990), 6, 103-19.

was not navigable.[57] Brewer next dismissed the idea that the property clause handed the central government a blank check to override or invalidate state laws in pursuit of the improvement or disposal of public lands. Though the Court had never fully evaluated the reach of the property clause, Brewer emphasized "it does not grant to Congress any legislative control over the States, and must, so far as they are concerned, be limited to authority over the property belonging to the United States." The Court clung to a narrow view of federal power based on the Tenth Amendment's reservation of all powers not specifically granted to the federal government by the Constitution. Brewer hinted, but did not explicitly declare, that the reclamation program was unconstitutional. But he was less ambiguous in asserting how the Court would look upon the extension of reclamation to other areas of the country: "While arid lands are to be found, mainly if not only in the Western and newer States, yet the powers of the National Government within the limits of those States are the same (no greater no less) than those within the limits of the original thirteen, and it would be strange if, in the absence of a definite grant of power, the National Government could enter the territory of the States along the Atlantic and legislate in respect to improving by irrigation or otherwise the lands within their borders. Nor do we understand that hitherto Congress has acted in disregard to this limitation."[58]

Brewer's ruling slammed the door shut on the implementation of a uniform federal wetlands policy since he denied that the national government possessed the right, either real or implied, to improve private land even if a project also involved the reclamation of some public lands. By devolving responsibility to the states and providing for the privatization of wetlands, the Swamp Land Acts blocked the implementation of

[57] *United States v. Rio Grande Dam and Irrigation Company*, 174 U. S. 690 (1899).

[58] *Kansas v. Colorado* 206 U. S. 46 (1907), quotes at 87, 89, and 92.

federal drainage. In 1907, the USDA estimated that the federal government owned only 5% of the 77,000,000 acres of wetlands east of the 115th meridian. Since the drainage of the scattered pockets of public wetlands depended upon compelling the participation of adjacent private landowners and drainage districts and, in many cases, required superseding state drainage laws, Bien took a dark view of the government's authority to engage in drainage, especially since reclamation was not perceived as an enumerated power after *Kansas*: "So far as the public lands of the United States are concerned, the question [of drainage] presents but little difficulty from a legal standpoint, but where a large portion of a project is not owned by the United States, the power of the Federal Government to engage in construction must be regarded as doubtful."[59]

National newspapers agreed that *Kansas v. Colorado* cast doubt on the constitutionality of federal drainage. Quoting from Justice Brewer's ruling, the *Washington Post* editorialized in September that "the authority of Congress within the States is limited to control over the property belonging to the United States within their limits. Congress cannot enact laws overriding State laws relating to reclamation and it

[59] J. O. Wright, "Swamp and Overflowed Lands in the United States: Ownership and Reclamation," United States Department of Agriculture, *Circular* 76 (Washington: Government Printing Office, 1907), 8; and Bien, "Memorandum," February 1, 1908, RG 115, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Land." The legal scholar Peter A. Appel argues that Congress, under the property clause, enjoys "the legislative authority to govern its own property as well as the property of others that may affect federal lands. Indeed, the [Supreme] Court has described the power broadly in almost every case discussing the Clause. These cases conclude that the federal government possesses both proprietary and sovereign powers over its property, can regulate activities on privately owned lands that affect its lands, and exercises the equivalent of the police power in this area." While this may be true for most of the twentieth century, government officials and legislators in 1907 were much less confident than Appel that the property clause conferred such sweeping powers. They suspected that *Kansas v. Colorado* barred Congress from draining public wetlands because such a program would necessarily require regulating the use of adjacent private wetlands—something they insisted Congress could not do. See Peter A. Appel, "The Power of Congress 'Without Limitation': The Property Clause and Federal Regulation of Private Property," *Minnesota Law Review* 86 (November 2001), 1-130, quote at 4.

cannot assume control of lands owned by the States."[60] As a result, the editors disputed that Congress could directly intervene in drainage unless the state governments agreed to retrocede their wetlands to the federal government. Although USGS staffers had explored the option of retrocession in an internal memo, it was unlikely that the states would accede to such a proposal since they had already disposed of the majority of their grants.[61]

The Baltimore Drainage Congress: Reconciliation and Compromise

On November 26 and 27, 1907, the National Drainage Association (NDA), which had adopted the motto "drain the swamps for health and homes," held its second annual meeting in Baltimore.[62] Congressmen, leaders of natural resource agencies, prominent entomologists, AMES leaders, and sanitarians congregated at Johns Hopkins University to hear lectures on a wide range of topics including drainage, home making, mosquito eradication, malaria reduction, and so forth. The meeting adjourned without endorsing a specific congressional bill or course of action. Napoleon Bonaparte Broward, the governor of Florida, newly-appointed NDA President, and firm proponent of draining the

[60] "The Swamp Lands Question," *Washington Post*, September 2, 1907.

[61] In the undated USGS memo, the author described the limitations the Swamp Land Acts imposed on federal legislators desirous of creating a national drainage program: "Unfortunately, many years ago the Legislature enacted and gave these [swamp] lands to the states provided the latter drained and reclaimed them. In practically no instance has this been done … While it is the belief that the Government is in a position to demand the recession of these swamp lands when it may be ready to undertake to drain them[,] it is doubtful if any such course will be desirable or necessary as arrangements can undoubtedly be made with the states, as has been done for irrigation, whereby general provision can be made for the carrying on of the necessary drainage work under Federal auspices." See "Drainage of Swamp Lands," undated memorandum, RG 57, Records of the United States Geological Survey, Topographical Division, General Administrative Files, 1890-1948, Entry 146, Box 5, Folder 20, pp. 3-4.

For other contemporary discussions on the option of retrocession, see "Drainage and Irrigation," *Washington Post*, September 17, 1907; and "The Swamp Lands Question," *Washington Post*, September 2, 1907.

[62] On the NDA's new motto, see "Drainage Legislation," *Galveston Daily News*, December 2, 1907.

Everglades, demanded that the organization should remain bipartisan and uncommitted to any specific piece of legislation. "It would be manifestly unjust and unwise for the National Drainage Association, or any of its members[,] to attempt any influence whatever in the legislative action of Congress." Broward encouraged proponents to "confine ourselves to urging national drainage as a general policy and not as any particular project."[63] Sen. Asbury Churchill Latimer of South Carolina, who had long fought to win federal drainage funding for his constituents, marveled that the sentiment in favor of nationalization at the conference was "stronger than I anticipated." Vexing constitutional questions nonetheless undermined the bill's prospects. Echoing the fears of the Reclamation Service, Latimer told the *Charlotte Observer* that "I fear some trouble on constitutional grounds. All the swamp lands held by the Federal government have been turned over to the States and the States have … disposed of them to corporations or individuals… In the reclamation service some private lands are being reclaimed, but the title to much of it still remains in the Federal government; while the government has title to none of the swamp lands."[64] Since the colonial period, Americans assumed that individuals or collections of individuals, who acted under the authority of a local court or legislature, bore the financial responsibility for drainage. Whatever his misgivings, Latimer consoled himself that "there are many good lawyers who take the position that

[63] Napoleon B. Broward to J. A. Dapray, Box 6, Folder "January 1908," Napoleon Bonaparte Broward Papers, University of Florida Special Collections, Gainesville, Florida. Also see "Drainage Legislation," *Galveston Daily News*, December 2, 1907. Elected to governor in 1905, Broward convinced the Florida legislature to create a special "Everglades drainage district" with the power to impose acreage assessments on landowners. The legislature passed Broward's plan, but it quickly came under attack. As the Everglades drainage district's largest ratepayers, Florida railroads challenged its constitutionality. On April 6, 1907, federal judge James W. Locke sided with the railroads and ruled that the district's taxing power was unconstitutional. Locke's ruling forced Broward to promote national control as the next best alternative for draining the Everglades, which remained the country's largest undrained wetland ecosystem. See David McCally, *The Everglades: An Environmental History* (Gainesville: University Press of Florida, 1999), 92.

[64] "Washington Gossip," *Charlotte Observer*, December 24, 1907.

the government has a right to co-operate with the [individual] State[s] in this enterprise."[65]

In a desperate act of arrogance and hubris, the Reclamation Service and its congressional allies tried to get around Brewer's ruling. On January 25 and February 1, 1908, Newell and Secretary of Interior James R. Garfield, the son of a former President and Theodore Roosevelt's choice to succeed Hitchcock the previous year, hosted two meetings with congressional allies to write a new drainage bill capable of passing a constitutional challenge. A staunch supporter of enlarging federal responsibilities over natural resource administration, Garfield ignored the GLO's repeated objections to nationalized drainage and touted surface water removal as a responsible strategy to promote public health and open up new farmland. The bill which emerged from the negotiations in Garfield's office, which Flint introduced on behalf of the Reclamation Service in early February, dedicated all of the proceeds of public and ceded Indian lands in Alabama, Arkansas, Florida, Illinois, Indiana, Iowa, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Ohio, and Wisconsin, since June 30, 1901, to a "drainage fund" to be used by the Secretary of the Interior to reclaim public wetlands in *any* state. The bill gave public land to settlers in plots not exceeding 160 acres and required them to cultivate half of that land and repay their share of construction costs in annual installments, not to exceed ten years, as set by the Secretary of Interior. Sections 5 and 6, inserted to accommodate southerners, constituted the bill's most controversial provisions. Those sections empowered the Secretary to loan money from the drainage fund to states, municipalities, drainage districts, or corporations engaged in reclaiming *private* wetlands by purchasing their bonds. A first lien on the land secured the loan, which the measure

[65] Ibid.

required to be repaid within ten years. The section instructed the Secretary to divide the private land into plots, not to exceed 160 acres, before settlement and to set the costs of the land. The conferees agreed to these provisions to attract support from North Carolina and Alabama congressmen whose respective states prohibited the issuance of bonds for drainage and had not passed drainage district legislation. The word "corporation" was specifically included to accommodate those states. The conferees also declined without comment to support the proposal of Sen. Newlands of Nevada, the original sponsor of the 1902 Reclamation Act, to create an Inland Waterways Commission to oversee the simultaneous and coordinated development of river basins from their sources to the sea, including wetlands drainage, arid land reclamation, navigation improvement, reservoir construction, and forest headwater preservation.[66]

During the conferences in Garfield's office, conferees agreed that the moment had arrived to strip local communities of their autonomy over drainage. In the tradition of Progressive Era conservation, Garfield, Newell, and the dozen congressmen and Senators in attendance touted the advantages of federal control. Local efforts at drainage, they insisted, had resulted in "confusion" and "delay." Only the federal government had the power to "make general surveys and broad plans of development, involving all questions of the use of the water from the headwaters down to the navigable portions of streams."

[66] Newell to James R. Garfield, January 21, 1908, RG 48, Records of the Office of the Secretary of the Interior, Central Classified Files, 1907-36, Entry 749, Box 734, File 2-9, NARA, College Park, Maryland; "Memorandum of meeting held in the office of the Secretary of the Interior at 10 a.m., January 25, 1908," Morris Bien, "Memorandum on conference held in the office of the Secretary of the Interior, 10 a. m., Saturday, February 1, 1908," and Bien, "Memorandum," February 1, 1908, all in RG 115, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Lands." S. 4855 (Flint), 60th Congress, 1st Session, introduced on 3 February 1908. Though Bien publicly told Flint that his bill met "the various difficult conditions in which this subject [drainage] is involved," he maintained personal doubts about federal drainage's constitutionality. See Bien to Flint, February 4, 1908, RG 115, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Lands."

Furthermore, only federal agencies had the ability to provide coordination in matters that involved states, counties, and drainage districts. The bill in question accomplished these goals by "leav[ing] to qualified men the solution" of the national drainage problem.[67] Conservationists in the Reclamation Service and Congress were disdainful of local communities and judged them to be inefficient, dilatory, and ineffective at removing surface water. But the facts on the ground belied their condescending conclusions. At the same time conferees drafted the Flint bill, a revolution was taking place in water resource management at the grassroots that shaped the contours of the national resource state and carved out a thriving role for local communities.

The confidence and cocksureness of conferees did not relieve tensions that were beginning to surface in the drainage coalition. As the leading Democratic supporter of nationalized drainage, Latimer acted as an intermediary between the Republican-dominated inner circle of drainage supporters and his own party. During the first meeting in Garfield's office, Flint presented a motion calling for the lawyers in attendance to be appointed as a committee to draft the bill that would go before the Senate. Since Latimer was not an attorney, the proposal excluded him from participating in drafting the final bill. Enraged and despondent, he confided to Broward, his close friend and ally, that Flint intended to "have the bill that passes the Senate go to the country as a republican measure."[68] Latimer's pointed accusations of partisanship compelled Flint to soften his stance. The California Senator finally realized that the alienation of southerners spelled doom for the bill since he could not count on many members of his own party from New

[67] All of the quotations are taken from an untitled and anonymous memorandum dated January 25, 1908. The memorandum begins with the phrase, "In accordance with a generally expressed with…" See RG 115, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Lands."

[68] Latimer to Broward, January 30, 1908, Box 6, Folder "January 1908," Broward Papers.

England for support. Although the historical record is sketchy, it is clear that Flint and Moses Clapp, a Republican Senator from Minnesota, smoothed over their differences with Latimer between the two meetings. Less than a week later, Latimer abandoned his opposition, predicted the bill's swift passage, and instructed Broward to write the governors of Iowa, Illinois, Ohio, Indiana, Maine, Massachusetts, New Jersey, New York, Rhode Island, and Vermont to lobby their congressional delegation to support the legislation. Latimer identified House Speaker Joe Cannon as the biggest potential obstacle to passage. If Cannon refused to allow the Senate bill to reach the House floor, drainage proponents would need to rally the support of two-thirds of the legislative body to take the bill up under the suspension of rules.[69]

As the NDA's president, Broward tried to cultivate a sense of urgency. He concluded that the 60th Congress represented the best, and perhaps final, opportunity for national drainage. The critical moment had arrived. In soliciting the support of governors throughout the country, Broward portrayed the Flint Drainage bill as a reasonable attempt to bridge the political and geographic divide produced by the nation's national water policy, which privileged western agriculture. "There has been a movement on foot," Broward told the governors, "that several localities of the country may be benefitted by swamp land reclamation by drainage through the United States Government, as are the persons, counties and states in the West benefitted by the reclamation of the arid and semi-arid lands by irrigation, done by the United States

[69] Latimer to Broward, February 4, 1908, Box 6, Folder "February 1908," Broward Papers.

Government."[70] Secretary of Interior Garfield, USDA Commissioner James Wilson, and President Roosevelt all supported some form of nationalized drainage. Indeed, Broward contended that a side-by-side comparison of drainage and irrigation demonstrated that the former was cheaper because it did not require a "constant outlay of money."[71] In building support for the bill, Broward gloomily predicted that the failure of the Flint drainage bill would forever doom national drainage. Hesitation, delay, and debate were unacceptable. The time to act was at hand.

Setbacks and Defeat

Supporters of nationalized drainage suffered a string of setbacks following the meetings in Garfield's office. First, the GLO continued to work behind the scenes to derail the Flint bill. Second, the bill opened old wounds between the Reclamation Service and USDA over who should be responsible for administering the new program. According to Broward, the bitter "rivalry" undermined supporters' momentum. Third, lingering doubts persisted over the constitutional propriety of placing the federal government in charge of draining private land, a task historically reserved for local communities. Fourth, states-rights Southerners increasingly looked upon federal drainage as a thinly-veiled attempt by Republicans and the Reclamation Service to profit at the expense of their constituents by funneling public land proceeds from Democratic sections of the country to drainage projects in Republican-dominated communities. These fears intensified on February 20, 1908, when Latimer died unexpectedly in

[70] Broward to Albert B. Cummins, Charles S. Deneen, Andrew L. Harris, J. Frank Hanly, James H. Higgins, Charles E. Hughes, William T. Cobb, T. F. Proctor, and Curtis Guild, February 10, 1908, Box 6, Folder "February 1908," Broward Papers.

[71] Ibid.

Washington, D. C. His death dealt the drainage movement a crippling blow by robbing it of its chief bipartisan intermediary at the critical moment.

Proponents pushed forward in spite of setbacks and opposition. When Flint's bill reached the floor in April 1908, Democratic Senators immediately raised constitutional issues and condemned the measure for jeopardizing the institutional framework for land drainage in place since colonial times. Colorado's Henry Teller regarded *Kansas v. Colorado* as proof that "the Government could not go into a State and improve lands that do not belong to the General Government." Georgia's Alexander Clay criticized the measure for going too far beyond the 1902 law. "The reclamation act," he insisted, "did not contemplate that the Government funds should be utilized for the purpose of loaning money to private individuals to develop and reclaim their lands." Georgia's other Senator, Augustus O. Bacon, described Section 5 as "one of the most stupendous and unlimited projects for emptying the Treasury that I have ever heard of" and dismissed Alabama's Joseph Johnston's explanation of why he requested including the word "corporation." James Clarke of Arkansas opposed the measure because it consolidated too much autonomy in the Secretary of the Interior, lacked a provision guaranteeing states contributing to the fund a proportionate return of their contribution, and departed from the Newlands Act's example of "using the public lands in a locality for the improvement of that particular locality." Clarke argued that the proposal set a dangerous precedent by replacing the sovereignty of hundreds of new drainage districts with that of a single administrator, the Secretary of Interior. Finally and most significantly, Clarke condemned the needlessness of a federal takeover. Drainage and levee districts in

Arkansas and throughout the South, he emphasized, had drained an immense quantity of wetlands, rendering federal intervention unnecessary and superfluous.[72]

Southern opposition doomed the bill. Flint was furious and accused southern Democrats of turning the debate into a partisan fracas by rejecting portions of the bill written to accommodate them. Yet he misidentified the source of their opposition. Southerners blocked nationalization less out of a desire to embarrass the Republican Party or Reclamation Service than out of their conviction that local control over drainage offered a more efficient, democratic, and wise solution than nationalization. Bacon, Clay, and Clarke articulated an alternative vision of water resource development at odds with the era's supposedly uncontested drift towards centralized water management. Accusations of hypocrisy also flew across the party aisle. By the second day of debate, southern Democrats cried foul over the West's unveiled hypocrisy and accused Republicans of trying to redistribute the proceeds of their public lands. In 1906, westerners flew into a rage when asked to share the reclamation fund during debate over Small's Dismal Swamp bill, but now they intended to benefit from other states' public lands. On Bacon's recommendation, the Senate struck out sections 5 and 6, narrowing the bill's scope so that it applied only to public wetlands. Bacon then offered an amendment to kill the entire bill, but the Senate rejected it by a near party line vote of 15-37. The amended bill never came up for another vote, and any hope Congress would nationalize drainage died that day on the Senate Floor.[73]

---

[72] The debates, quotes, and vote over Flint's bill are in the *Congressional Record*, Senate, 60th Congress, 1st Session, April 15, 1908, pp. 4769-74, April 17, 1908, pp. 4859-66, and April 20, 1908, pp. 4970-1.

[73] See the previous footnote.

Retrenchment and Capitulation

The defeat of Flint's bill revealed the primary lesson of Progressive water politics: the federal government proved more adept at dispersing power than consolidating it. By 1910, the NDA abandoned its long-cherished objective of federal control. The NDA's new goal was to persuade states that had not passed drainage district laws to enact enabling legislation. Broward, who was still the NDA's president, reluctantly acknowledged the foolishness of pursuing a uniform wetlands policy: "undoubtedly there is a difference between the irrigation of public lands and the drainage of private or state lands."[74] Congress was unlikely to approve a national drainage law during the current session for either the purpose of converting swamps into farms or "national sanitation." Rather than "wasting time … struggling for something which we have reason to believe is absolutely impracticable," Broward emphasized, "the wiser and better course to pursue would seem to be in the direction of state drainage—that is drainage under the authority of state laws and under the supervision of state officials."[75] Broward estimated that the nation's 80 million acres of "swamp and overflowed lands" were distributed throughout 40 different states but that only 26 had passed drainage laws. He encouraged the NDA to direct its energies towards convincing states to pass legislation authorizing the formation of drainage districts and overcoming the "indifference" of many communities to the matter at hand.

The NDA's policy shift reflected the crumbling political support for federal control. Few policymakers understood the lessons of Progressive Era water politics

[74] Broward to Newell, March 7, 1910, RG 115, Entry 3, Box 209, Folder 676-C1, "Corres. re. Meetings of the National Drainage Congress."

[75] Ibid.

better than John Humphrey Small. Between 1906, when Small first proposed nationalizing the drainage of the Dismal Swamp using money from the reclamation fund, and 1910, when he took to the floor of the House of Representatives to deny the wisdom and necessity of centralized control, Small underwent a profound ideological transformation. Small's anger towards western parochialism, the inequity of federal reclamation policy, and the subsidization of western agriculture with public land revenue remained unchanged. An attorney and member of the House Committee on Rivers and Harbors, Small by 1910 understood that federalism limited federal involvement with drainage.[76]

Small accepted the relationship between the Office of Drainage Investigations (formerly the OIDI) and drainage districts as an adequate accommodation between centralization and decentralization. During congressional debate in 1910 on a proposed $20 million bailout for the Reclamation Service, Small pledged his continued support for western reclamation as long as westerners agreed to fund the Office of Drainage Investigations: "There has been some movement in the past with a view of asking aid from Congress [for drainage], but I do not believe that is necessary. All that Congress will be asked to do [in the future] will be to survey these [swamp]lands and to loan engineers for that purpose; and this can well be accomplished through the Bureau of Drainage Investigation … . We will aid you to put water on your arid lands, but at the same time we will ask your support in removing the surplus water from out wet lands." Small's correspondence reveals the interworking of this federal-local partnership. Upon initiating the formation of a drainage district, farmers in Small's district petitioned him

[76] For Small's view on Congress's hesitancy to fund drainage and the legal problems associated with federal wetlands reclamation, see Small to John H. Carter, April 17, 1913, Box 2, Folder 23, John Humphrey Small Papers, University of North Carolina Special Collections, Chapel Hill, North Carolina.

for assistance from the Office of Drainage Investigations. If Office leaders approved the request, they dispatched engineers to conduct field surveys, run levels, recommend ditch locations, and estimate construction costs. The engineers did not interfere in legal proceedings and let the farmers work out the financing details. The program became so popular with southern and Midwestern farmers that in 1913 USDA leaders implemented a policy that required farmers and drainage districts to put up one-half of the costs before approving a request. Farmers did not want federal control; they only wanted logistical and engineering advice.[77]

Despite his agency's shortcomings (Congress approved a $20 million program bailout in 1910), declining reputation, rocky relationship with the Taft administration, and the fact that eastern and southern farmers were far more likely to see the Reclamation Service as an interloper than a useful ally, Newell in 1912 proposed to Joseph E. Ransdell of Louisiana, another member of the House Committee on Rivers and Harbors, that the Reclamation Service, in cooperation with states and drainage districts, set up a drainage demonstration project on an interstate swamp in the South. Newell hoped the project would attract support for federal drainage in the Mississippi River Valley. In 1911, the Louisiana Development League, a consortium of real estate developers, instigated the breakaway of drainage supporters from the National Irrigation Congress. Benjamin A. Fowler, president of the National Irrigation Congress, welcomed the split, agreeing that interests of irrigation and drainage advocates "can never be satisfactorily merged." Over the next decade, the National Drainage Congress advocated on behalf of federal drainage

[77] *Congressional Record*, House, 61st Congress, 2nd Session, January 29, 1910, pp. 1229-31, June 21, 1910, p. 8683; Small to S. H. McCrory, July 19, 1913, and Small to Harry McMullan, July 19, 1913, box 3, folder 46, Small Papers. On the popularity of the Bureau of Drainage Investigation's cooperative work, see E. W. Allen, "Memorandum for the Assistant Secretary," June 20, 1913, RG 16, Records of the Department of Agriculture, Entry 17, General Correspondence of the Secretary, 1906-70, Box 54, NARA, College Park.

and flood control. Ransdell, like Small, thought the central government possessed no authority to drain wetlands "except to clear out the navigable streams for purposes of navigation and thereby incidentally aid them in carrying off waters [from drainage ditches]." The Reclamation Service's dream of centralized control over drainage outlived Newell's tenure as director—which ended in 1914—as it considered southern expansion several times between 1912 and the beginning of the Great Depression. Sectionalism, American federalism, and the growth of the American state, which triggered turf wars and rampant confusion about responsibilities within the central government, conspired to defeat national control. By the close of 1912, nationalization was no longer a realistic policy option, and probably never had been. Drainage largely remained under the control of drainage districts and county governments for the rest of the century.[78]

A Revolutionary Expansion in Local Government

The absence of federal participation did not prove fatal. In the intervening period between the defeat of Flint's drainage bill and the end of World War I, the conversion of wetlands into cultivated monoculture fields occurred at a breakneck pace. The period between 1905-1919, which the agricultural historian David B. Danbom calls the "golden age of agriculture," witnessed a surge in the organization of drainage districts (and irrigation districts) across the United States.[79] High commodity prices, soaring farm incomes, and a growing population provided fertile conditions for the expansion of

[78] Joseph E. Ransdell to Newell, March 5, 1912, Newell to Ransdell, March 14, 1912, RG 115, Entry 3, Box 97, Folder 110-G, "General Correspondence re. Federal Legislation for Drainage of Swamp and Overflow Lands," NARA; "Fowler is Opposed to Absorption of Congress," *Albuquerque Journal*, November 28, 1911; Hays, *Conservation and the Gospel of Efficiency*, 222-25; and O'Neill, *Rivers By Design*, 119-22.

[79] David B. Danbom, *Born in the Country: A History of Rural America*, 2nd ed. (Baltimore: Johns Hopkins University Press, 2006), 161.

existing drainage districts and the organization of new units. During the debate on the Flint drainage bill, government bureaucrats rarely consulted with local communities about the real or perceived need for federal intervention. The social basis of support for a second reclamation program originated solely with the emerging technical intelligentsia.

From 1847 to 1917, 37 states approved laws establishing a procedure for drainage district formation. A few states, notably Arkansas, California, and Florida, passed laws establishing specific drainage districts. By 1920, when the federal government published the nation's first general census of land drainage, 69,419,859 acres—or 3.65% of the total surface area of the coterminous U. S.—had been organized into what the authors described as "drainage enterprises." In the census, drainage enterprises consisted of drainage districts, public drains operated by counties or townships, state drainage projects, western irrigation districts that drained irrigated water off the land, land companies or corporations draining vacant wetlands for eventual sale, and individual farmers engaged in draining 500 acres or more. Drainage districts and county drains comprised 96% of the total land area serviced by drainage enterprises and accounted for 94% of the invested capital. Approximately 65,495,038 acres included in organized drainage operations, or 94.3% of the total, were already operational while the remainder awaited completion.[80]

The 1920 census did not evaluate the geographical distribution of drainage enterprises prior to its publication. By the end of 1919, however, the Midwest had the largest percentage of land organized into operating drainage enterprises. Indeed, 78% of

[80] The drainage statistics are taken from *Fourteenth Census of the United States Taken in the Year 1920*, vol. VII, "Irrigation and Drainage" (Washington: Government Printing Office, 1922), 353-5. The 1920 census certainly **undercounts** the number of drainage enterprise in the U. S. since it did not include information from Alabama, Virginia, West Virginia, and the states north of the Potomac River.

the land included in operating enterprises was located in the states east of the Rocky Mountains and north of the Missouri and Ohio Rivers, including Kansas and Missouri. The American South accounted for approximately 19% of the land included in functional enterprises. In 1920, Michigan, Indiana, and Minnesota each had over 9 million acres serviced by drainage enterprises. With 8.1 million acres organized into enterprises, Ohio had the fourth largest amount of land. Collectively, the amount of land included in drainage enterprises in the four states of Michigan, Indiana, Minnesota, and Ohio constituted 52.8% of the national total. Other states with a significant number of farms serviced by drainage enterprises included Iowa (5.2 million acres), Illinois (3.9 million acres), Arkansas (3.4 million acres), Missouri (2.6 million acres), Louisiana (2.7 million acres), and Texas (2.2 million acres). Florida, North Dakota, Mississippi, and California had over 1 million acres each. By 1920, one out of every ten American farms was improved by drainage or classified as needing additional improvement.[81]

Table 1:

Years	Number of Acres Organized into Drainage Enterprises
Before 1860	97,319
1860 to 1869	783,357
1870 to 1879	2,077,357
1880 to 1889	5,424,294
1890 to 1899	6,026,937
1900 to 1909	22,137,150
1910 to 1919	28,718,717
Unreported	229,547
TOTAL:	**65,495,038**

[81] Ibid., 353, 367, 373.

Table 2:

Years	Capital Invested in Drainage Enterprises
Before 1860	$182,716
1860 to 1869	1,689,852
1870 to 1879	8,126,391
1880 to 1889	23,934,330
1890 to 1899	24,498,861
1900 to 1909	102,778,784
1910 to 1919	207,648,598
Unreported	3,414,035
TOTAL:	**372,273,567**

Table 3:

Years	Number of Miles of Ditches Constructed by Drainage Enterprises
Before 1860	173.7 miles
1860 to 1869	2,295.5
1870 to 1879	6,671.9
1880 to 1889	14,763.2
1890 to 1899	12,747.3
1900 to 1909	32,847.2
1910 to 1919	41,773.2
Unreported	498.0
TOTAL:	**111,770.0**

Up to December 31, 1919, drainage enterprises had constructed 111,770 miles of ditches (enough ditches to wrap around the earth's equator four times) and 4,330 miles of levees. The formation of drainage districts occurred ploddingly following the Civil War but gained momentum afterwards as shortages of arable land, attributable to population growth, pushed more and more rural home seekers onto marginal land. The heyday of drainage district formation occurred between 1900 and 1919, when Americans organized more drainage enterprises, invested more capital in drainage, constructed more ditches

and tile drains, and transformed more wetlands into fields than at any previous point in American history.[82]

By the end of 1919, the 53 million acres of American farmland improved by drainage dwarfed the 19 million acres improved by irrigation despite the latter's tremendous federal subsidization. Although environmental historians have ignored drainage as a core element of Progressive Era land conservation, wetlands losses during the twentieth century's first two decades constituted the most significant environmental changes wrought by human activity. By early 1920, the administration of wetlands drainage, despite the best efforts of prominent national leaders, remained firmly under local control.

[82] The tables are derived from Ibid., 371.

CONCLUSION: WETLANDS DRAINAGE AND THE PROGRESSIVE ERA CONSERVATION MOVEMENT IN RETROSPECTIVE

Draining wetlands is one of the oldest forms of land modification in American history. Since the arrival of English colonists on the eastern seaboard, communities have waged a relentless and "successful" battle against landscapes characterized by an abundance of surface water. Colonial and later American farmers dug drainage ditches, buried underground clay tile networks, straightened watercourses, and removed obstructions from creeks and streams to drain riparian and inland wetlands for agriculture. In the second half of the eighteenth century, the revival of ancient Hippocratic medical theories in Europe, which were later disseminated in the United States by agricultural journals, lent a particular urgency to drainage. Formerly, stagnant surface waters had been stigmatized as an obstacle to agricultural progress and prosperity, but Hippocratic reformers vilified them for discharging miasmas and miasmata into the atmosphere attributed to the seasonal cycle of febrile illnesses that sickened and killed rural Americans every year. Economic and medical justifications for drainage reinforced one another and transformed hatred of wetlands into a fixture of nineteenth-century American environmental thought. By 1900, agricultural journalists, physicians, ordinary farmers, and political leaders celebrated land conservation by drainage as a form of enlightened land stewardship that rivaled forest preservation, regulating grazing on public lands, irrigating western deserts, preventing floods, and curtailing the wanton slaughter of animal and bird species in importance to the nation's economic and environmental future.

The removal of surface water became one of the paramount public policy objects in American history. Congress and local governments responded to the public's antipathy for wetlands by institutionalizing the principle that every wetland must be drained, occupied, and cultivated. In the Swamp Land Acts of 1849, 1850, and 1860, Congress took the unprecedented step of creating and subsidizing a water resource program dedicated to promoting wetlands drainage in public land states. Throughout United States history, Americans' water needs have shaped the contours of American federalism, and the passage of the Swamp Land Acts defined the relationship between the central and state governments in matters of surface water management by limiting Congress's role to ceding swamp and overflowed lands to the states. Although the laws did not bar Congress from paying to drain the public domain at a later time, most policymakers insisted that the laws precluded the federal government from doing anything to drain wetlands other than providing public land subsidies to the states. Plagued by fraud, corruption, and indifference, the Swamp Land program never met proponents' lofty expectations. And although the states' refusal to comply with the laws prompted them to assign drainage responsibilities to drainage districts and other local institutions, the national-state partnership envisioned under the Swamp Land Acts, despite its limited effectiveness, remained settled policy well into the twentieth century.

Congress revisited the issue of drainage during the Progressive Era. The early twentieth-century conservation movement, which occurred as part of a broader series of social and political reforms known as Progressivism, was a seminal moment in American environmental history when conservationists in Washington shifted responsibility over western irrigation, flood control, forest preservation, and the regulation of grazing and

mineral extraction on the public domain to the federal government. Wielding the authority of the embryonic administrative state, conservationists elevated science above politics, collectivism above individualism, and national control above localism. They maintained that "efficient" natural resource management flowed from the application of scientific principles to environmental problems by disinterested professionals and technocrats. Most scholars of the Progressive Era conservation movement identify centralization as the movement's primary historical theme. According to this interpretation, the genesis and evolution of the nascent administrative state in the early 1900s revolutionized natural resource administration by stripping local communities of control over the most basic and elemental decisions of natural resource allocation, regulation, and administration. As the most recent historian of the Progressive conservation movement blithely puts it, "conservation was controlled by the elites by 1900."[1]

Yet the story of wetlands drainage does not bear out this thesis. The centralizing currents of the Progressive Era, which proved instrumental in shaping the fate of so many other natural resources, did not influence drainage's future despite the broad political coalition that favored unifying the nation's water policy by putting irrigation and drainage on an equal footing. Indeed, the abortive effort to nationalize drainage offers several lessons about the limitations of federal power and the persistent tensions between decentralization and centralization, hinterland and metropolis, and localism and collectivism in a federal system of government where sovereignty is diffused and shared

[1] Thomas R. Wellock, *Preserving the Nation: The Conservation and Environmental Movements, 1870-2000* (Wheeling, IL: Harlan Davidson, Inc., 2007), 16. For a list of historical works that portray Progressive Era conservation from the perspective of national state building, see footnote four in the introductory chapter.

between competing levels of government. By reducing ideological disputes over complex policy decisions to a simple matter of efficiency, expertise, and modernization, conservationists (and many later historians) overstated that central state's ability to impose unified water resource policies on peripheral communities. As Progressive Era political battles over water reveal, the flows of power in a federal system go both ways and Congress has often been just as adept at dispersing power as consolidating it. By the end of World War I, for instance, the federal government assumed growing responsibilities over the irrigation of western public lands and flood control, but it proved unable, or unwilling, to compel local communities to relinquish their autonomy over drainage to distant administrators. The Progressive Era thus witnessed a surge in administrative authority at all levels of government to accommodate Americans' demands for more control and supervision over the nation's waters. Centralization was neither inevitable nor inexorable.

In the case of early twentieth-century drainage, three critical factors impeded the implementation of centralized control: initial western opposition, bureaucratic territorialism, and the dynamic robustness of American federalism in the policy area of drainage. First, western opposition to early proposals to incorporate drainage into the existing framework of federal reclamation forced proponents of nationalized drainage to accept a strategic compromise that limited their ability to forge a political consensus. On the heels of the Depression of 1893 and a century of federal favoritism towards eastern communities in the annual rivers and harbors appropriations, western communities applauded the passage of the Reclamation Act of 1902. Westerners predicted that federal irrigation projects would serve as a magnet for displaced eastern laborers and

immigrants, revive the rural West, liberate the western economy from its traditional dependence on range and extractive industries, and perpetuate a stable and prosperous class of small farmers. Given these lofty expectations, it is unsurprising that western policymakers perceived any attempt to divert revenue from the reclamation fund as a nefarious plot hatched by outsiders to perpetuate the region's "colonial" or "inferior" economic status for their own advantage.[2]

In 1906, this conspiratorial mindset required westerners to defend the reclamation fund as a sacrosanct entity and to respond to diversion attempts with suspicion and scorn. Echoing fears articulated by Charles D. Walcott, the first director of the Reclamation Service, western newspaper editors and influential politicians like Wyoming's Representative Frank Mondell worried that reclamation fund diversions would postpone the completion of unfinished irrigation projects and delay the diversification of the western economy. Yet Mondell and western periodicals were most irritated about the fact that *westerners* offered the most vocal and enthusiastic support for incorporating drainage into the framework of federal reclamation. Although scholars have traditionally looked on the western environment as a monolithic entity dominated by aridity, the West is a diverse region where riparian marshes, wet prairies, prairie potholes, tule lands, and other forms of wetlands sometimes imperiled agricultural progress and prosperity no less than aridity. The attempt of communities in North Dakota, California, and Oklahoma Territory to secure reclamation funds for drainage purposes revealed that the West itself was deeply divided over even the meaning and purpose of federal reclamation policy. In any case, western proponents of arid land reclamation were far better organized and

[2] The best study of the American West's economy before World War II remains Gerald D. Nash, *The American West Transformed: The Impact of the Second World War* (Bloomington: Indiana University Press, 1985), part I.

funded than their drainage counterparts and, at the 1906 Oklahoma City drainage convention, conspired with the Reclamation Service to block any proposal that tampered with the reclamation fund but agreed to support the creation of a second reclamation program dedicated to drainage. Although this compromise mollified westerners, it ultimately proved decisive since persuading national policymakers to create a second reclamation program before western irrigation had proven itself worthy of federal subsidization proved problematic.

Second, the genesis and growth of the administrative state also ironically hampered efforts to create comprehensive water resource programs. Federal agencies served different constituencies, pursued different and sometimes contradictory agendas, worked at cross-purposes, and had divergent institutional memories. In the apt judgment of Stephen Skowronek, early twentieth-century state building efforts, which led to the creation of new autonomous and centralized agencies, sometimes served as the handmaiden of inefficiency: "modern American state building progressed by replacing courts and parties with a national bureaucracy, and this dynamic yielded a hapless confusion of institutional purposes, authoritative control, and government boundaries."[3]

The case of wetlands drainage tested the embryonic administrative state's ability to take up new water resource responsibilities without succumbing to the kind of institutional fragmentation and confusion that Skowronek identifies as the unintended byproduct of the growth of federal administrative capabilities. The Progressive Era national state's inability to steer the public's wide support for federal drainage into a coherent centralized program stemmed primarily from bureaucratic territorialism and

[3] Stephen Skowronek, *Building a New American State: The Expansion of National Administrative Capacities, 1877-1920* (Cambridge: Cambridge University Press, 1982), 287.

conflicting institutional memories regarding the legacy of the 1849, 1850, and 1860 Swamp Land Acts. Infighting within and between the Interior Department and the United States Department of Agriculture (USDA) over who deserved to administer a second reclamation program, and whether such a program was indeed necessary, fragmented the state into an collection of quarreling agencies each staking their claim to new turf. Indeed, internecine strife between the Interior Department's Reclamation Service and General Land Office (GLO) over the wisdom of extending federal drainage aid to local communities, especially given the states' abysmal record of subversion and noncompliance under the Swamp Land Program, produced confusion, gridlock, and split institutional loyalties. Even more significantly, on the verge of the 1908 Senate vote on the Flint drainage bill, the basic question over whether the Interior Department or the USDA was better equipped to administer the new drainage program remained unresolved.

Third, American federalism was critical in buffering drainage from the Progressive Era's centralizing currents. Legislative precedent, the Supreme Court ruling in *Kansas v. Colorado*, chronic problems in the western reclamation program, and the impressive track record of drainage districts in converting wetlands into crop fields reinforced federalism's robustness in the policy area of drainage. Early in 1906, a good number of Congressmen joined with W. A. Richards, the GLO's commissioner, in protesting against any proposal aimed at overturning the half-century old swampland program. They argued that the clear intent of the Swamp Land Acts was for Congress to cede swamp and overflow lands, not drain them. In addition, opponents of federal intervention underscored that creating a national drainage program raised serious

constitutional issues. Few legislators doubted that Congress possessed the constitutional authority to improve the public domain, but by 1907 the Swamp Land Acts had privatized an estimated 95% of the country's wetlands east of the 115th meridian. Questions about the propriety of using federal money to drain private lands remain unanswered. But it was the Supreme Court's ruling in *Kansas v. Colorado*, delivered in 1907, that cast doubt on the constitutionality of the entire scheme. Numerous Senators, national newspaper editors, and Morris Bein, the Reclamation Service's chief legal officer, interpreted Justice David J. Brewer's ruling to disqualify Congress from paying to drain private lands. Constitutionally, American federalism reserved drainage responsibilities on private property for states, local communities, and individuals.

Plummeting political support for western reclamation fortified federalism's strength. By the end of 1907, the reclamation fund teetered on the brink of insolvency, public land sales had failed to meet expectations, projects had failed to attract an exodus of factory workers and tenement dwellers from eastern cities, construction costs soared to over six times initial estimates, the price of land on government projects increased 759% between 1902-13, and the authorization of 23 projects in four years stretched the agency's resources too thin. In 1910, Congress was forced to approve a $20 million bailout for the faltering program and project farmers fell behind on their repayment schedules. Small wonder that many legislators balked at launching a second reclamation program until and unless the western program yielded results. Furthermore, the track record of drainage districts and county drainage projects in draining wetlands before 1900 obviated the need for federal intervention. Unlike irrigation, for instance, drainage did not require the lengthy adjudication of water rights, the construction of large dams and

reservoirs, or the conveyance of water over long distances. According to United States Geological Survey estimates, drainage was at least 5 or 6 times cheaper than irrigation. While only the federal government had the time and resources to wait out the completion of irrigation projects, local communities proved adept at raising enough revenue for drainage by incurring bonded indebtedness. The drainage districts that did experience intractable engineering problems received assistance from the USDA's Bureau of Drainage Investigation, but very seldom did farmers clamor for the transfer of authority to distant administrators. Along with western opposition and bureaucratic territorialism, American federalism helped insulate drainage from the Progressive Era's centralizing currents and reserved a significant share of power over water to local communities, as the proliferation of drainage districts between 1905-1919 so clearly attests.

Conservationists' self-serving predictions that the pace of wetlands drainage would languish without federal involvement never materialized. By the end of 1919, drainage districts, county governments, and public corporations managed 107,468 miles of ditches, 42,311 miles of tile drains, 3,519 miles of levees, and had improved at least 34 million more acres of American farmland than irrigation. From an instrumental perspective emphasizing the rapid conversion of natural resources into marketable commodities, wetlands drainage was better off decentralized than centralized. By the end of World War I, local control constituted the most efficient administrative solution for drainage because of the degeneration of national water policy into a bitter and venal feud between local communities over federal funding. In the early twentieth century, reformers touted national irrigation and drainage programs as a panacea for the nation's perceived and real social ills, including urban poverty, overcrowding, crime, and

corruption. After 1910, however, the persistent nineteenth-century fear that what benefitted one community harmed another overwhelmed and displaced the lofty idealism that undergirded early twentieth-century national water policy. Localism had the benefit of avoiding these paralyzing disputes, as well as the fragmentation of the federal government, by keeping the power of the purse close to home.

Over the long run, however, local control constituted more of a curse than a blessing. As twentieth-century Americans slowly came to recognize that wetlands possessed intrinsic value, provided crucial habitat for wildlife and waterfowl, stored water and thus mitigated flood damage, renewed ground water supplies, filtered sediments and pollutants from water, protected shorelines from erosion, and promoted clean air by removing carbon and mercury from the atmosphere, the decentralized and fragmented structure of drainage undercut Congress's ability to implement uniform policies in response to new challenges and changing environmental values.

BIBLIOGRAPHY

Primary Sources

Manuscript Collections

American Forestry Association. Records. Forestry History Society Archives, Durham, North Carolina

Bede, J. Adam. Papers. Northeast Minnesota Historical Center, University of Minnesota-Duluth, Duluth, Minnesota

Broward, Napoleon Bonaparte. Papers. University of Florida Special Collections, Gainesville, Florida

Clay County (Minn.) Court Civil Case Files. Records. Minnesota Historical Society, St. Paul, Minnesota

Comstock, Solomon G. Papers. Minnesota State University Archives, Moorhead, Minnesota

Great Northern Railroad. Papers. Minnesota Historical Society, St. Paul, Minnesota

Garfield, James Rudolph. Papers. Library of Congress. Washington, D. C.

Hill, James J. Papers. James J. Hill Reference Library, St. Paul, Minnesota

Hill, Louie, W. Papers. James J. Hill Reference Library, St. Paul, Minnesota

Newell, Frederick Haynes. Papers. Library of Congress. Washington, D. C.

Pinchot, Gifford. Papers. Library of Congress. Washington, D. C.

Power, James B. Papers. North Dakota Institute for Regional Studies, Fargo, North Dakota

Records of the Bureau of Reclamation, National Archives and Records Administration, Denver, Colorado

Records of the General Land Office, National Archives and Records Administration, Washington, D. C.

Records of the Office of the Secretary of the Interior, National Archives and Records Administration, College Park, Maryland

Records of the United States Circuit Court, District of Minnesota, National Archives and Records Administration, Kansas City, Missouri

Records of the United States Geological Survey, National Archives and Records Administration, College Park, Maryland

Small, John Humphrey. Papers. University of North Carolina Special Collections, Chapel Hill, North Carolina.

Steenerson, Elias. Papers. Norwegian-American Historical Association Archives, St. Olaf College, Northfield, Minnesota

Walcott, Charles D. Collection. Smithsonian Institution Archives, Washington, D. C.

Government Documents

Executive Documents of the State of Minnesota for the Fiscal Year Ending July 31, 1886. Volume 1. St. Paul: The Pioneer Press Company, 1887.

Fourteenth Census of the United States Taken in the Year 1920. Vol. VII*, Irrigation and Drainag*e. Washington: Government Printing Office, 1922

The Legislative Manual of the State of Minnesota. St. Paul, 1907.

Second Biennial Report of the State Engineer to the Governor of North Dakota for the Years of 1905 and 1906. Bismarck: Tribune, State Printers and Binders, 1906.

Shaler, Nathaniel Southgate. "General Account of the Fresh-Water Morasses of the United States, with a Description of the Dismal Swamp District of Virginia and North Carolina." In *Tenth Annual Report of the United States Geological Survey to the Secretary of the Interior 1888-'89*, 255-339. Washington: Government Printing Office, 1890.

_____. "Preliminary Report on Sea-Coast Swamps of the Eastern United States." In *Sixth Annual Report of the United States Geological Survey to the Secretary of the Interior*, 353-98.

Thoburn, J. B. *First Biennial Report of the Oklahoma Territorial Board of Agriculture, 1903-1904*. Guthrie: The State Capital Co., 1905.

U. S. Congress. House. *Swamp Lands in Missouri and Arkansas*. 31st Cong., 1st sess., 20 February 1850. H. Rep. 108.

_____. *Drainage in North Dakota.* 59th Cong., 1st sess., 14 June 1906. H. Rep. 4929.

____. *Appropriating the Proceeds from Sale of Public Lands to Minnesota for Certain Purposes*. 59th Cong., 1 sess., 15 June 1906. H. Rep. 4940.

_____. *Drainage of Dismal Swamp in North Carolina and Virginia.* 59th Cong., 1st sess., 22 June 1906. H. Rep. 4994.

_____. *Drainage in North Dakota*. 59th Cong., 1st sess., 23 June 1906. H. Rep. 4929, part 2.

_____. *Drainage of Certain Lands in Minnesota*. 60th Cong., 1st sess., 2 April 1908. H. Rep. 1376.

_____. Senate. *Drainage of Certain Lands in North Dakota, Etc.* 59th Cong., 1st sess., 5 February 1906. S. Rep. 689.

_____. *Establishment of Drainage Fund, Etc.* 59th Cong., 2nd sess., 2 March 1907. S. Rep. 7349.

_____. *Drainage or Reclamation of Swamp or Overflowed Lands*. 60th Cong., 1st sess., 24 February 1908. S. Rep. 289.

_____. *Drainage or Reclamation of Swamp or Overflowed Lands*. 60th Cong., 1st sess., 14 April 1908. S. Rep. 506.

_____. *Drainage or Reclamation of Swamp or Overflowed Lands.* 60th Cong., 1st sess., 18 April 1908. S. Rep. 542.

____. *Swamplands of the United States*. 60th Cong., 1st sess., 21 April 1908. S. Doc. 443.

Newspapers and Farm Journals

Albuquerque Journal

American Farmer (Baltimore, Maryland)

Anaconda (Montana) Standard

Bellingham (Washington) Herald

Bismarck Daily Tribune

Boston Cultivator

Charlotte Observer

Chicago Daily Tribune

Cincinnati Daily Gazette

Cincinnati Weekly Herald and Philanthropist

Crookston (Minnesota) Northern Tier

Crookston Times

Country Gentleman (Albany, New York)

The Cultivator (Albany, New York)

DeBow's Review (New Orleans, Louisiana)

Duluth Tribune

Fargo Daily Republican

Farmer's Register (Petersburg, Virginia)

Fisher (Minnesota) Bulletin

Freeborn County Standard (Albert Lee, Minnesota)

Galveston Daily News

Genesee Farmer (Rochester, New York)

Grand Forks Herald

Idaho Statesman (Boise, Idaho)

Kittson County Enterprise (Hallock, Minnesota)

Minnesota Farmer (Minneapolis)

Moorhead (Minnesota) Weekly News

New England Farmer (Boston, Massachusetts)

Oakland Tribune

Ohio Cultivator (Columbus, Ohio)

Olympia (Washington) Record

Oregonian (Portland, Oregon)

Philadelphia Inquirer

Pittsfield (Massachusetts) Sun

Polk County Journal (Crookston, Minnesota)

Prairie Farmer (Chicago)

Red River Valley News (Glyndon, Minnesota)

St. Louis Commercial Bulletin and Missouri Literary Register

St. Paul Daily News

Southern Cultivator (Augusta, Georgia)

The State (Columbia, South Carolina)

Valley Farmer (St. Louis, Missouri)

Washington Post

Woodland (California) Democrat

Published Sources

Acts and Resolves, Public and Private, of the Province of the Massachusetts Bay: To Which are Prefixed the Charters of the Province. With Historical and Explanatory Notes, and an Appendix. Vol. 1. Boston: Wright & Potter, 1869.

Belknap, Jeremy. *The History of New-Hampshire*. Vol. III, *Containing a Geographical Description of the State; With Sketches of its Natural History, Productions, Improvements, and Present State of Society and Manners, Laws and Government.* Boston: Belknap and Young, 1792.

Bennett, Ira E. "Western Affairs at Washington." *Pacific Monthly* 18 (November 1907): 610-20.

Caldwell, Charles. "An Essay on the Nature and Sources of the Malaria or Noxious Miasma, from which originate the Family or Diseases, usually known by the denomination of Bilious Diseases; together with the best means of Preventing the Formation of Malaria, removing the Sources, and obviating their Effects on the

Human Constitution, when the Cause cannot be removed." *American Journal of the Medical Sciences* 8 (August 1831): 293-341.

_____. *An Oration on the Causes of the Difference, in Point of Frequency and Force, Between the Endemic Diseases of the United States of America, and Those of the Countries of Europe, Delivered, by Appointment, to the "Philadelphia Medical Society," on the Fifth Day of February, 1802*. Philadelphia: T. and William Bradford, 1802.

Chalmers, Lionel. *An Account of the Weather and Diseases of South-Carolina*. Vol. 1. London: Edward and Charles Dilly, 1776.

Colden, Cadwallader. "Account of the Climate and Diseases of New-York." *The American Medical and Philosophical Register; or, Annals of Medicine, natural history, agriculture, and the arts* (July 1810): 304-10.

_____. "Observations on the Fever which prevailed in the City of New-York in 1741 and 2, written in 1743, by the late Hon. Cadwallader Colden. Communicated to Dr. David Hosack by C. D. Colden, Esp." *The American Medical and Philosophical Register; or, Annals of Medicine, natural history, agriculture, and the arts* (July 1810): 310-30.

Currie, William. "An Enquiry into the Causes of the Insalubrity of Flat and Marshy Situations; and Directions for Preventing or Correcting the Effects thereof." *Transactions of the American Philosophical Society* 4 (1799): 127-42.

Hansbrough, Henry C. "Reclamation of Swamp Lands." *The Independent: A Weekly Magazine* (February 7, 1907): 320-22.

Hill, James J. *Highways of Progress*. New York: Doubleday, Page & Company, 1910.

Hoadly, Charles J., ed. *The Public Records of the Colony of Connecticut, From October, 1706, to October, 1716, With the Council Journal from October, 1710, to February, 1717*. Hartford: Press of Case, Lockwood and Brainard, 1870.

Jefferson, Thomas. *Notes on the State of Virginia*. Edited by William Peden. Chapel Hill: University of North Carolina Press, 1982.

Marsh, George Perkins. *Man and Nature; or Physical Geography as Modified by Human Action*. Edited by David Lowenthal. Seattle: University of Washington Press, 2003.

Mitchell, Guy Elliott. "To Farm America's Swamps." *The American Review of Reviews* 37 (April 1908): 433-49.

Newell, Frederick H. "What May Be Accomplished by Reclamation." *Annals of the American Academy of Political and Social Science* 33 (May 1909): 174-79.

Red River Valley Drainage in Minnesota. Report of the Drainage Commission to the Drainage Convention, Held at Crookston, Minn. December 8, 1886. Minneapolis: Harrison & Smith, 1887.

Report of the State Drainage Commission of Minnesota to the Governor and State Legislature on the Condition of the State Ditches Located in the Red River Valley for the Biennial Period Ending Feb. 1st, 1899. Minneapolis: University Press of Minnesota, 1899.

Roosevelt, Theodore. "Our National Inland Waterways Policy." *Annals of the American Academy of Political and Social Science* 31 (January 1908): 1-11.

Rush, Benjamin. "An Enquiry into the Cause of the Increase of Bilious and Intermitting Fevers in Pennsylvania, with Hints for Preventing Them." *Transactions of the American Philosophical Society* 2 (1786): 206-12.

Saint Paul, Minneapolis, and Manitoba Railroad Company. *Letters from Golden Latitudes*. St. Paul, 1885.

Short, Thomas. *A Comparative History of the Increase and Decrease of Mankind in England, and Several Countries Abroad, according to the Different Soils, Situations, Business of Life, Use of the Non-Naturals, &c. Faithfully Collected from, and Attested by, above Three Hundred Vouchers, and Many of Them for a Long Course of Years, in Two Different Periods. To which is Added, a Syllabus of the General States of Health, Air, Season, and Food for the Last Three Hundred Years; and also a Meteorological Discourse*. London: W. Nicoll, 1767.

Thompson, Charles. "An Essay on the Cultivation of the Vine, and the Making and Preserving of Wine, Suited to the Different Climates in North-America." *Transactions of the American Philosophical Society* 1 (1770): 117-97.

[Valentine, Ezra G.]. *Statement and Statistics Relating to the Bill Entitled "An Act to Appropriate Monies for the Purpose of Opening of Closed Water Courses Leading into the Red River, and its Tributaries, and for Opening Existing Streams in the Red River Valley in the Counties of Wilkin, Clay, Norman, Polk, Marshall and Kittson in this State." Respectfully Submitted: Red River Valley Drainage Commission.* Breckenridge, Minn.: Gazette Press Print, 1893.

White, William. "Experiments upon Air, and the Effects of Different Kinds of Effluvia upon it; Made at York." *Philosophical Transactions of the Royal Society of London* 68 (1778): 194-220.

Williamson, Hugh. "An Attempt to Account for the Change of Climate, which has been Observed in the Middle Colonies in North-America." *Transactions of the American Philosophical Society* 1 (1771): 272-80.

Wilson, H. M. "Swamp Lands and Their Reclamation." *Journal of the American Peat Society* 1 (1908): 8-10.

Wright, Thomas. "On the Mode of Most Easily and Effectually Practicable of Drying up the Marshes of the Maritime Parts of North America." *Transactions of the American Philosophical Society* 4 (1799): 243-6.

Secondary Sources

Books and Articles

Ackerknecht, Erwin H. "Anticontagionism Between 1821 and 1867." *Bulletin of the History of Medicine* 22 (1954): 562-93.

Allen, Phyllis. "Etiological Theory in America Prior to the Civil War." *Journal of the History of Medicine and Allied Sciences* 2 (1947): 489-520.

Angevine, Robert G. *The Railroad and the State: War, Politics, and Technology in Nineteenth-Century America*. Stanford: Stanford University Press, 2004.

Appel, Peter A. "The Power of Congress 'Without Limitation': The Property Clause and Federal Regulation of Private Property." *Minnesota Law Review* 86 (November 2001): 1-130.

Armitage, David. *The Ideological Origins of the British Empire*. Cambridge: Cambridge University Press, 2000.

Autobee, Robert. "Every Child in a Garden: George H. Maxwell and the American Homecroft Society." *Prologue: The Journal of the National Archives* 28 (1996): 195-206.

Bailyn, Bernard. *The Ideological Origins of the American Revolution*. Cambridge, Mass.: Harvard University Press, 1967.

Baldwin, Peter C. "How Night Air Became Good Air, 1776-1930." *Environmental History* 8 (July 2003): 412-29.

Barnett, LeRoy. "Roads, Railroads, and Recreation: Swamplands and the Building of Michigan." *Michigan History* 72 (July/August 1988): 28-34.

Barron, Hal S. *Mixed Harvest: The Second Great Transformation in the Rural North, 1870-1930*. Chapel Hill: University of North Carolina Press, 1997.

Barry, John M. *Rising Tide: The Great Mississippi Flood of 1927 and How it Changed America*. New York: Simon and Schuster, 1997.

Bates, J. Leonard. "Fulfilling American Democracy: The Conservation Movement, 1907-1921." *Mississippi Historical Review* 44 (June 1957): 29-57.

Baxter, Maurice G. *The Steamboat Monopoly: Gibbons v. Ogden, 1824*. New York: Alfred A. Knopf, 1972.

Beier, Lucinda McCray. *Health Culture in the Heartland, 1880-1980*: *An Oral History*. Urbana: University of Illinois Press, 2008.

Bennett, John W., and Seena B. Kohl. *Settling the Canadian-American West, 1890-1915: Pioneer Adaptation and Community Building*. Lincoln: University of Nebraska Press, 1995.

Bensel, Richard Franklin. *Yankee Leviathan: The Origins of Central State Authority in America, 1859-1877*. New York: Cambridge University Press, 1990.

Bewell, Alan. *Romanticism and Colonial Disease*. Baltimore: Johns Hopkins University Press, 1999.

Biebighauser, Thomas R. *Wetlands Drainage, Restoration, and Repair*. Lexington: University Press of Kentucky, 2007.

Blackstone, William. *Commentaries on the Laws of England: Book the Third*. 14th ed. London: A. Strahan, 1803.

Bogue, Margaret Beattie. "The Swamp Land Act and Wet Land Utilization in Illinois, 1850-1890." *Agricultural History* 25 (1951): 169-80.

Borca, Federico. "*Palus Omni Modo Vitanda*: A Liminal Space in Ancient Roman Culture." *The Classical Bulletin* 73 (1997): 3-12.

_____. "Towns and Marshes in the Ancient World." In *Death and Disease in the Ancient City*, eds. Valerie M. Hope and Eireann Marshall, 74-84. London: Routledge, 2000.

Bosselman, Fred P. "Limitations Inherent in the title to Wetlands at Common Law." *Stanford Environmental Law Journal* 15 (1996): 247-337.

Botkin, Daniel B. *Discordant Harmonies: A New Ecology for the Twenty-First Century*. New York: Oxford University Press, 1990.

_____. *Our Natural History: The Lessons of Lewis and Clark*. New York: Oxford University Press, 2004. First published 1995 by Grosset/Putnam.

Bower, Shannon Stunden. "Watersheds: Conceptualizing Manitoba's Drained Landscape, 1895-1950." *Environmental History* 12 (October 2007): 796-819.

Bowler, Peter J., and Iwan Rhys Morus. *Making Modern Science: A Historical Survey*. Chicago: University of Chicago Press, 2005.

Bradof, Kristine L. "Ditching of Red Lake Peatland During the Homestead Era." In *The Patterned Peatlands of Minnesota*, eds. H. E. Wright, Jr., Barbara A. Coffin, and Norman E. Aaseng, 263-84. Minneapolis: University of Minnesota Press, 1992.

Briggs, Harold E. "Early Bonanza Farming in the Red River Valley of the North." *Agricultural History* 6 (January 1932): 26-37.

Bright, Charles C. "The State in the United States During the Nineteenth Century." In *Statemaking and Social Movements: Essays in History and Theory*, eds. Charles Bright and Susan Harding, 121-58. Ann Arbor: University of Michigan Press, 1984.

Brodhead, Michael J. *David J. Brewer: The Life of a Supreme Court Justice, 1837-1910*. Carbondale, IL: Southern Illinois University Press, 1994.

Brown, Dee. *Hear that Lonesome Whistle Blow: Railroads in the West.* New York: Holt, Rinehart and Winston, 1977.

Brula, John J. *Some Phases of the Geography of Clay County*. Moorhead, Minn.: State Teacher's College, 1940.

Burton, Ian, and Robert W. Kates, eds. *Readings in Resource Management and Conservation*. Chicago: University of Chicago Press, 1960.

Calhoun, Charles W. "Political Economy in the Gilded Age: The Republican Party's Industrial Policy." *Journal of Policy History* 8 (1996): 291-309.

Camporesi, Piero. *The Fear of Hell: Images of Damnation and Salvation in Early Modern Europe*. Translated by Lucinda Byatt. University Park: Pennsylvania State University Press, 1991.

Carlyle, William J. "Water in the Red River Valley of the North." *Geographical Review* 74 (July 1984): 331-58.

Carpenter, Daniel P. *The Forging of Bureaucratic Autonomy: Reputations, Networks, and Policy Innovation in Executive Agencies, 1862-1928*. Princeton: Princeton University Press, 2001.

Cassedy, James H. "Meteorology and Medicine in Colonial America: Beginnings of the Experimental Approach." *Journal of the History of Medicine and Allied Sciences* 24 (1969): 193-204.

Chapman, Kim Alan, Adelheid Fischer, and Mary Kinsella Ziegenhagen. *Valley of Grass: Tallgrass Prairie and Parkland of the Red River Region*. St. Cloud, Minnesota: North Star Press, 1998.

Chinard, Gilbert. "Eighteenth Century Theories on America as a Human Habitat." *Proceedings of the American Philosophical Society* 91 (February 1947): 27-57.

Colden, Claudine. *The Fate of the Mammoth: Fossils, Myth, and History*. Translated by William Rodarmor. Chicago: University of Chicago Press, 2002.

Corbin, Alain. *The Foul and the Fragrant: Odor and the French Social Imagination*. Cambridge, Mass.: Harvard University Press, 1986.

Cowdrey, Albert E. *This Land, This South: An Environmental History*. Revised ed. Lexington: University Press of Kentucky, 1996.

Cronon, William. *Changes in the Land: Indians, Colonists, and the Ecology of New England*. New York: Hill and Wang, 1983.

_____. *Nature's Metropolis: Chicago and the Great West*. New York: W. W. Norton & Company, 1991.

Crosby, Alfred W. *Ecological Imperialism: The Biological Expansion of Europe, 900-1900*. New Edition. Cambridge: Cambridge University Press, 2004.

Cumbler, John T. *Northeast and Midwest United States: An Environmental History*. Santa Barbara: ABC-CLIO, 2005.

Dahl, T. E. *Wetlands Losses in the United States 1780's to 1980's*. Washington: U. S. Department of the Interior, Fish and Wildlife Service, 1990.

Danbom, David B. *Born in the Country: A History of Rural America*. 2nd ed. Baltimore: Johns Hopkins University Press, 2006.

_____. "Romantic Agrarianism in Twentieth-Century America." *Agricultural History* 65 (Autumn 1991): 1-12.

Darby, H. C. *The Changing Fenland*. Cambridge: Cambridge University Press, 1983.

_____. "The Draining of the Fens, A. D. 1600-1800." In *An Historical Geography of England Before A. D. 1800: Fourteen Studies*, ed. H. C. Darby, 444-64. Cambridge: Cambridge University Press, 1961.

Davis, Clifford. "The Law of Diffused Surface Water in Eastern Riparian States." *Connecticut Law Review* 6 (Winter 1973-4): 227-45.

Delbourgo, James. *A Most Amazing Scene of Wonders: Electricity and Enlightenment in Early America*. Cambridge, Mass.: Harvard University Press, 2006.

Destler, Chester McArthur. "Agricultural Readjustment and Agrarian Unrest in Illinois, 1800-1896." *Agricultural History* 21 (April 1947): 104-16.

De Vries, Wade. "How Michigan Handles Its State Owned Lands." *Journal of Land and Public Utility Economics* 6 (May 1930): 119-26.

Dick, Everett. *The Lure of the Land: A Social History of the Public Lands from the Articles of Confederation to the New Deal*. Lincoln: University of Nebraska Press, 1970.

Dobbins, Donald V. "Surface Water Drainage." *Notre Dame Law* 36 (August 1961): 518-526.

Dobson, Mary J. *Contours of Death and Disease in Early Modern England*. Cambridge: Cambridge University Press, 1997.

Dolson, William F. "Diffused Surface Water and Riparian Rights: Legal Doctrines in Conflict." *Wisconsin Law Review* 58 (1966): 58-120.

Donahue, Brian. " 'Dammed at Both Ends and Cursed in the Middle': The 'Flowage' of the Concord River Meadows, 1798-1862." In *Out of the Woods: Essays in Environmental History*, eds. Char Miller and Hal Rothman, 227-42. Pittsburg: University of Pittsburgh Press, 1997.

_____. *The Great Meadow: Farmers and the Land in Colonial Concord*. New Haven: Yale University Press, 2004.

Douglas, Lake. " 'To Improve the Soil and the Mind': Content and Context of Nineteenth-Century Agricultural Literature." *Landscape Journal* 25 (2006): 67-79.

Dovell, J. E. "The Railroads and the Public Lands of Florida, 1879-1905." *Florida Historical Quarterly* 34 (January 1956): 236-58.

Drache, Hiram M. *The Day of the Bonanza: A History of Bonanza Farming in the Red River Valley of the North*. Fargo: North Dakota Institute for Regional Studies, 1964.

Dupree, A. Hunter. *Science in the Federal Government: A History of Policies and Activities to 1940*. Cambridge, Mass.: Harvard University Press, 1957.

Echeverria, Durand. *Mirage in the West: A History of the French Image of American Society to 1815*. Princeton: Princeton University Press, 1957.

Edelson, S. Max. "Clearing Swamps, Harvesting Forests: Trees and the Making of a Plantation Landscape in the Colonial South." *Agricultural History* 81 (Summer 2007): 381-406.

Engelhardt, Carroll. *Gateway to the Northern Plains: Railroads and the Birth of Fargo and Moorhead*. Minneapolis: University of Minnesota Press, 2007.

Ely, James W., Jr. *Railroads and American Law*. Lawrence: University Press of Kansas, 2001.

Farnham, Wallace D. "Railroads in Western History: The View from the Union Pacific." In *The American West: A Reorientation*, ed. Gene M. Gressley, 95-109. Laramie: University of Wyoming, 1966.

_____. " 'The Weakened Spring of Government': A Study in Nineteenth-Century American History." *American Historical Review* 68 (April 1963): 662-680.

Feller, Daniel. *The Public Lands in Jacksonian Politics*. Madison: University of Wisconsin Press, 1984.

Fleming, James Rodger. *Historical Perspectives on Climate Change*. New York: Oxford University Press, 1998.

Fox, Stephen. *The American Conservation Movement: John Muir and His Legacy*. Madison: University of Wisconsin Press, 1981.

Gaddie, Ronald Keith, and James L. Regens. *Regulating Wetlands Protection: Environmental Federalism and the States*. Albany: State University of New York Press, 2000.

Gates, Paul W. "The Disposal of the Public Domain in Illinois, 1848-1856." *Journal of Economic and Business History* 3 (February 1931): 216-40.

_____. *History of Public Land Law Development*. Washington: Public Land Law Review Commission, 1968.

_____. "The Homestead Law in an Incongruous Land System." *American Historical Review* 41 (July 1936): 652-81.

_____. "The Promotion of Agriculture by the Illinois Central Railroad, 1855-1870." *Agricultural History* 5 (1931): 57-76.

Gerbi, Antonello. *The Dispute of the New World: The History of a Polemic, 1750-1900*. Translated by Jeremy Moyle. Pittsburgh: University of Pittsburgh Press, 1973.

Gilman, Rhoda R., Carolyn Gilman, and Deobrah M. Stultz. *The Red River Trails: Oxcart Routes between St. Paul and the Selkirk Settlement, 1820-1870*. St. Paul: Minnesota Historical Society, 1979.

Glacken, Clarence J. *Traces on the Rhodian Shore: Nature and Culture in Western Thought from Ancient Times to the End of the Eighteenth Century*. Berkeley: University of California Press, 1967.

Golinski, Jan. "American Climate and the Civilization of Nature." In *Science and Empire in the Atlantic World*, eds. James Delbourgo and Nicholas Dew, 153-74. New York: Routledge, 2008.

_____. *British Weather and the Climate of Enlightenment*. Chicago: University of Chicago Press, 2007.

_____. *Science as Public Culture: Chemistry and Enlightenment in Britain, 1760-1820*. Cambridge: Cambridge University Press, 1992.

Goodrich, Carter. "American Development Policy: The Case of Internal Improvements." *Journal of Economic History* 16 (December 1956): 449-60.

Graham, Jennifer S. "The Reasonable Use Rule in Surface Water Law." *Missouri Law Review* 57 (Winter 1992): 223-45.

Grunwald, Michael. *The Swamp: The Everglades, Florida, and the Politics of Paradise*. New York: Simon & Schuster, 2006.

Hafermehl, Louis N. "The Make the Desert Bloom: The Politics and Promotion of Early Irrigation Schemes in North Dakota." *North Dakota History: Journal of the Northern Plains* 59 (Summer 1992): 13-27.

Hallam, H. E. *Settlement and Society: A Study of the Early Agrarian History of South Lincolnshire*. Cambridge: Cambridge University Press, 1965.

Hamlin, Christopher. "Predisposing Causes and Public Health in Early Nineteenth-Century Medical Thought." *Social History of Medicine* 5 (1992): 43-70.

Hannaway, Caroline. "Environment and Miasmata." In *Companion Encyclopedia of the History of Medicine*, ed. W. F. Bynum and Roy Porter, 292-308. London: Routledge, 1993.

Harrison, Robert. *Congress, Progressive Reform, and the New American State*. Cambridge: Cambridge University Press, 2004.

_____. "The 'Weakened Spring of Government' Revisited: The Growth of Federal Power in the Late Nineteenth Century." In *The Growth of Federal Power in American History*, ed. Rhodri Jeffreys-Jones and Bruce Collins, 62-75. Dekalb: Northern Illinois University Press, 1983.

Harrison, Robert W. *Alluvial Empire: A Study of State and Local Efforts Toward Land Development in the Alluvial Valley of the Lower Mississippi River, Including Flood Control, Land Drainage, Land Clearing, Land Forming*. Little Rock, Ark.: Delta Fund in Cooperation with Economic Research Service, U. S. Department of Agriculture, 1961.

_____. "Early State Flood-Control Legislation in the Mississippi Alluvial Valley." *Journal of Mississippi History* 23 (April 1961): 104-26.

_____. "Levee Building in Mississippi before the Civil War." *Journal of Mississippi History* 12 (April 1950): 63-97.

_____. *Swamp Land Reclamation in Louisiana, 1849-1879: A Study of Flood Control and Land Drainage in Louisiana Under the Swamp Land Grant of 1849*. Baton Rogue, 1951.

_____, and Walter M. Kollmorgen. "Land Reclamation in Arkansas Under the Swamp Land Grant of 1850." *Arkansas Historical Quarterly* 6 (Winter 1947): 369-418.

Hart, John F. "Colonial Land Use Law and its Significance for Modern Takings Doctrine." *Harvard Law Review* 109 (April 1996): 1252-1300.

Havemeyer, Loomis., ed. *Conservation of Our Natural Resources*. New York: The Macmillan Company, 1930.

Hays, Samuel P. *Conservation and the Gospel of Efficiency: The Progressive Conservation Movement, 1890-1920*. Cambridge, Mass.: Harvard University Press, 1959.

Herget, James E. "Taming the Environment: The Drainage District in Illinois." *Illinois State Historical Society Journal* 71 (May 1978): 107-18.

Hewes, Leslie. "The Northern Wet Prairie of the United States: Nature, Sources of Information, and Extent." *Annals of the Association of American Geographers* 41 (December 1951): 307-23.

_____. "Some Features of Early Woodland and Prairie Settlement in a Central Iowa County." *Annals of the Association of American Geographers* (March 1950): 40-57.

_____, and Philip E. Frandson. "Occupying the Wet Prairie: The Role of Artificial Drainage in Story County, Iowa." *Annals of the Association of American Geographers* 42 (March 1952): 24-50.

Hibbard, Benjamin Horace. *A History of the Public Land Policies*. New York: The Macmillan Company, 1924.

Hidy, Ralph, W., Muriel E. Hidy, Roy V. Scott, and Don L. Hofsommer. *The Great Northern Railway: A History*. Cambridge: Harvard Business School, 1988.

Higgs, Robert. *Crisis and Leviathan: Critical Episodes in the Growth of American Government*. New York: Oxford University Press, 1987.

Hill, Christopher. *Intellectual Origins of the English Revolution Revisited*. Revised ed. Oxford: Oxford University Press, 1997.

Hodder, Frank Heywood. "The Railroad Background of the Nebraska-Kansas Act." *Mississippi Valley Historical Review* 5 (March 1919): 396-414.

Hoffer, Williamjames Hull. *To Enlarge the Machinery of Government: Congressional Debates and the Growth of the American State, 1858-1891*. Baltimore: Johns Hopkins University Press, 2007.

Holcombe, R. I., and William H. Bingham. *Compendium of History and Biography of Polk County, Minnesota*. Minneapolis: W. H. Bingham and Co., 1916.

Holmes, Oliver Wendell. *Boylston Prize Dissertations for the Years 1836 and 1837*. Boston: Charles C. Little and James Brown, 1838.

Horwitz, Morton J. *The Transformation of American Law, 1780-1860*. Cambridge, Mass.: Harvard University Press, 1977.

Howe, Daniel Walker. *What Hath God Wrought: The Transformation of America, 1815-1848*. New York: Oxford University Press, 2007.

Humphreys, Margaret. *Malaria: Poverty, Race, and Public Health in the United States*. Baltimore: Johns Hopkins University Press, 2001.

Hurt, R. Douglas. *American Agriculture: A Brief History*. Rev. ed. West Lafayette: Purdue University Press, 2002.

Igler, David. *Industrial Cowboys: Miller & Lux and the Transformation of the Far West, 1850-1920*. Berkeley: University of California Press, 2001.

Ihde, Aaron J. *The Development of Modern Chemistry*. New York: Harper & Row, 1964.

Jackson, Donald C. "Engineering in the Progressive Era: A New Look at Frederick Haynes Newell and the U. S. Reclamation Service." *Technology and Culture* 34 (July 1993): 539-74.

Jacoby, Karl. *Crimes Against Nature: Squatters, Poachers, Thieves, and the Hidden History of American Conservation*. Berkeley: University of California Press, 2001.

Jaffe, Louis L., and Edith G. Henderson. "Judicial Review and the Rule of Law: Historical Origins." *The Law Quarterly Review* 72 (July 1956): 345-64.

Jarcho, Saul. "Cadwallader Colden as a Student of Infectious Disease." *Bulletin of the History of Medicine* 29 (March-April 1955): 99-115.

Jensen, Laura. *Patriots, Settlers, and the Origins of American Social Policy*. Cambridge: Cambridge University Press, 2003.

Johnson, Benjamin Herber. "Conservation, Subsistence, and Class at the Birth of Superior National Forest." *Environmental History* 4 (January 1999): 80-99.

Johnson, Elden. "The Prehistory of the Red River Valley." *Minnesota History* 38 (December 1962): 157-65.

Judd, Richard W. *Common Lands, Common People: The Origins of Conservation in Northern New England*. Cambridge, Mass.: Harvard University Press, 1997.

Kaatz, Martin R. "The Black Swamp: A Study in Historical Geography." *Annals of the Association of American Geographers* 45 (March 1955): 1-35.

Kane, Lucile M. *The Waterfall that Built a City: The Falls of St. Anthony in Minneapolis*. St. Paul: Minnesota Historical Society, 1966.

Keller, Morton. *America's Three Regimes: A New Political History*. New York: Oxford University Press, 2007.

Kelley, Robert. *Battling the Inland Sea: Floods, Public Policy, and the Sacramento Valley*. Berkeley: University of California Press, 1989.

_____. "The Context and the Process: How They Have Changed Over Time." In *Water Resources Administration in the United States: Policy, Practice, and Emerging Issues*, eds. Martin Reuss, 10-22. East Lansing: American Water Resources Association and Michigan State University Press, 1993.

Kettleborough, Charles. "Drainage and Reclamation of Swamp and Overflowed Lands." *Bulletin* 2. Indiana Bureau of Legislative Information, Indianapolis, 1914.

_____. "Special Municipal Corporations." *American Political Science Review* 8 (November 1914): 614-21.

____. "Special Municipal Corporations." *American Political Science Review* 9 (November 1915): 751-9.

King, Lestor S. *Transformations in American Medicine: From Benjamin Rush to William Osler*. Baltimore: Johns Hopkins University Press, 1990.

Kinyon, Stanley V., and Robert C. McClure. "Interferences with Surface Waters." *Minnesota Law Review* 24 (June 1940): 891-939.

Kline, Benjamin. *First Along the River: A Brief History of the U. S. Environmental Movement*. 3rd ed. Lanham, MD: Rowman & Littlefield Publishers, Inc., 2007.

Koppes, Clayton R. "Efficiency/Equity/Esthetics: Towards a Reinterpretation of American Conservation." *Environmental Review* 11 (Summer 1987): 127-46.

Krueger, Lillian. "Motherhood on the Wisconsin Frontier (II)." *Wisconsin Magazine of History* 29 (March 1946): 333-46.

Kupperman, Karen Ordahl. "Hot Climates in the Anglo-American Colonial Experience." *William and Mary Quarterly*, 3rd series, 41 (April 1984): 213-40.

_____. "The Puzzle of the American Climate in the Early Colonial Period." *American Historical Review* 87 (December 1982): 1262-89.

Langston, Nancy. *Where Land and Water Meet: A Western Landscape Transformed*. Seattle: University of Washington Press, 2003.

Larson, John Lauritz. " 'Bind the Republic Together': The National Union and the Struggle for a System of Internal Improvements." *Journal of American History* 74 (September 1987): 363-87.

_____. *Internal Improvements: National Public Works and the Promise of Popular Government in the Early United States*. Chapel Hill: University of North Carolina Press, 2001.

Levere, Trevor H. "Measuring Gases and Measuring Goodness." In *Instruments and Experimentation in the History of Chemistry*, eds. Frederic L. Holmes and Trevor H. Levere, 105-35. Cambridge, Mass.: Massachusetts Institute of Technology Press, 2000.

Lewis, William M., Jr. *Wetlands Explained: Wetland Science, Policy, and Politics in America*. New York: Oxford University Press, 2001.

Lilly, J. Paul. "A History of Swamp Land Development in North Carolina." In *Pocosin Wetlands: An Integrated Analysis of Coastal Plain Freshwater Bogs in North Carolina*, eds. Curtis Richardson, Mary L. Matthews, and Stephen A. Anderson, 20-39. Stroudsburg, Penn.: Hutchinson Ross Publishing Company, 1981.

Lindemann, Mary. *Medicine and Society in Early Modern Europe*. Cambridge: Cambridge University Press, 1999.

Lovett, Laura L. *Conceiving of the Future: Pronatalism, Reproduction, and the Family in the United States, 1890-1938*. Chapel Hill: University of North Carolina Press, 2007.

_____. "Land Reclamation as Family Reclamation: The Family Ideal in George Maxwell's Reclamation and Resettlement Campaigns, 1897-1933." *Social Politics* 7 (Spring 2000): 80-100.

_____. " 'Rooted in the Soil': Family Ideals, Land Reclamation, and Irrigation Resettlement as Welfare in the United States, 1897-1933." In *Families of a New World: Gender, Politics, and State Development in a Global Context*, eds. Lynne Haney and Lisa Pollard, 85-98. New York: Routledge, 2003.

Lubetkin, M. John. *Jay Cooke's Gamble: The Northern Pacific Railroad, the Sioux, and the Panic of 1873*. Norman: University of Oklahoma Press, 2006.

M., H. H. "Surface Water—The Rights of Abutting Property Holders." *Virginia Law Review* 15 (January 1929): 288-93.

Maier, Pauline. "The Revolutionary Origins of the American Corporation." *William and Mary Quarterly*, 3rd Series, 50 (January 1993): 51-84.

Malone, Michael P. *James J. Hill: Empire Builder of the Northwest*. Norman: University of Oklahoma Press, 1996.

Mann, W. Howard. "The Marshall Court: Nationalization of Private Rights and Personal Liberty from the Authority of the Commerce Clause." *Indiana Law Journal* 38 (Winter 1963): 117-238.

Marti, Donald. "Agricultural Journalism and the Diffusion of Knowledge: The First Half-Century in America." *Agricultural History* 28-37.

Martin, Albro. *James J. Hill and the Opening of the Northwest*. Oxford: Oxford University Press, 1976.

McCally, David. *The Everglades: An Environmental History*. Gainesville: University Press of Florida, 1999.

McCormick, Richard L. "The Party Period and Public Policy: An Exploratory Hypothesis." *Journal of American History* 66 (September 1979): 279-98.

McCorvie, Mary R., and Christopher L. Lant. "Drainage District Formation and the Loss of Midwestern Wetlands, 1850-1930." *Agricultural History* 67 (Fall 1993): 13-39.

McCoy, Drew R. *The Elusive Republic: Political Economy in Jeffersonian America*. Chapel Hill: University of North Carolina Press, 1980.

McEvoy, Arthur F. *The Fisherman's Problem: Ecology and the Law in the California Fisheries, 1850-1980*. Cambridge: Cambridge University Press, 1986.

McMurry, Sally. "Who Read the Agricultural Journals? Evidence from Chenango County, New York, 1839-1865." *Agricultural History* 63 (Autumn 1989): 1-18.

McWilliams, James E. *American Pests: The Losing War on Insects from Colonial Times to DDT*. New York: Columbia University Press, 2008.

Meigs, William M. *The Life of Thomas Hart Benton*. Philadelphia: J. B. Lippincott Company, 1904.

Mercer, Lloyd J. *Railroads and Land Grant Policy: A Study in Government Intervention*. New York: Academic Press, 1982.

Merchant, Carolyn. *Ecological Revolutions: Nature, Gender, and Science in New England*. Chapel Hill: University of North Carolina Press, 1989.

Meyer, Melissa L. "The Red Lake Ojibwe." In *The Patterned Peatlands of Minnesota*, eds. H. E. Wright, Jr., Barbara A. Coffin, and Norman E. Aaseng, 251-61. Minneapolis: University of Minnesota Press, 1992.

_____. " 'We Can Not Get a Living as We Used to': Dispossession and the White Earth Anishinaabeg, 1889-1920." *American Historical Review* 96 (April 1991): 368-94.

_____. *The White Earth Tragedy: Ethnicity and Dispossession at a Minnesota Anishinaabe Reservation*. Lincoln: University of Nebraska Press, 1994.

Meyer, William B. "From Past to Present: A Historical Perspective on Wetlands." In *Wetlands*, eds. Sharon L. Spray and Karen L. McGlothlin, 84-100. Lanham: Rowman & Littlefield Publishers, Inc., 2004.

_____. *Human Impact on the Earth*. Cambridge: Cambridge University Press, 1996.

_____. "When Dismal Swamps Became Priceless Wetlands." *American Heritage* 45 (May/June 1994): 108-16.

Miller, Charles A. *Jefferson and Nature: An Interpretation*. Baltimore: Johns Hopkins University Press, 1988.

Miller, Ralph N. "American Nationalism as a Theory of Nature." *William and Mary Quarterly*, 3rd series, 12 (January 1955): 74-95.

Mimms, Sam. "Louisiana's Administration of Swamp Land Funds." *Louisiana Historical Quarterly* 28 (January 1945): 277-325.

Mitsch, William J., and James G. Gosselink. *Wetlands*. 4th ed. Hoboken, NJ: John Wiley & Sons, 2007.

Moehlman, Arthur Henry. "The Red River of the North." *Geographical Review* 25 (January 1935): 79-91.

Mulhern, Thomas D. "Lest We Forget!" *Mosquito News* 17 (March 1957): 52.

Murray, Keith A. "The Highline Canal: Irrigation Comes to Wenatchee." *Columbia* 9 (Winter 1995-6): 17-23.

Murray, Stanley N. "Railroads and the Agricultural Development of the Red River Valley of the North, 1870-1890." *Agricultural History* 31 (October 1957): 57-66.

_____. *The Valley Comes of Age: A History of Agriculture in the Valley of the Red River of the North, 1812-1920*. Fargo: North Dakota Institute for Regional Studies, 1967.

Nash, Gerald D. *The American West Transformed: The Impact of the Second World War*. Bloomington: Indiana University Press, 1985.

_____. "The California State Land Office, 1858-1898." *Huntington Library Quarterly* 27 (August 1964): 347-56.

Nash, Linda. *Inescapable Ecologies: A History of Environment, Disease, and Knowledge*. Berkeley: University of California Press, 2006.

Nelson, Megan Kate. "The Landscape of Disease: Swamps and Medical Discourse in the American Southeast, 1800-1880." *Mississippi Quarterly* 55 (Fall 2002): 535-67.

Newmyer, R. Kent. *John Marshall and the Heroic Age of the Supreme Court*. Baton Rogue: Louisiana State University Press, 2003.

"Obstruction, Repulsion and Discharge of Surface Water." *Columbia Law Review* 4 (November 1904): 506-7.

Ogilvie, Leon Parker. "Government Efforts at Reclamation in the Southeast Missouri Lowlands." *Missouri Historical Review* 64 (January 1970): 150-76.

O'Neill, Karen M. *Rivers by Design: State Power and the Origins of U. S. Flood Control*. Durham: Duke University Press, 2006.

Opie, John. *Nature's Nation: An Environmental History of the United States*. Fort Worth: Harcourt Brace & Company, 1998.

Orfield, Matthias Nordberg. "Federal Land Grants to the States with Special Reference to Minnesota." *Bulletin of the University of Minnesota* 2. University of Minnesota, Studies in the Social Sciences, March 1915.

Orsi, Richard J. *Sunset Limited: The Southern Pacific Railroad and the Development of the American West, 1850-1930*. Berkeley: University of California Press, 2005.

Otter, A. A. Den. "Adapting to the Environment: Ranching, Irrigation, and Dry Land Farming in Southern Alberta, 1880-1914." *Great Plains Quarterly* 6 (Summer 1986): 171-189.

Pabis, George S. "Delaying the Deluge: The Engineering Debate over Flood Control on the Lower Mississippi River, 1848-1861," *The Journal of Southern History* (August 1998): 421-54.

Palmer, Ben. "Swamp Land Drainage with Special Reference to Minnesota." *Bulletin of the University of Minnesota* 5. University of Minnesota, Studies in the Social Sciences, March 1915.

Parrish, Susan Scott. *American Curiosity: Cultures of Natural History in the Colonial British Atlantic World*. Chapel Hill: University of North Carolina Press, 2006.

Paskoff, Paul F. *Troubled Waters: Steamboat Disasters, River Improvements, and American Public Policy, 1821-1860*. Baton Rogue: Louisiana State University Press, 2007.

Patterson, Gordon. *The Mosquito Crusades: A History of the American Anti-Mosquito Movement from the Reed Commission to the First Earth Day*. New Brunswick: Rutgers University Press, 2009.

_____. *The Mosquito Wars: A History of Mosquito Control in Florida*. Tallahassee: University Press of Florida, 2004.

_____. "The Trials and Tribulations of Amos Quito: The Creation of the Florida Anti-Mosquito Association." In *Paradise Lost? The Environmental History of Florida*, eds. Jack E. Davis and Raymond Arsenault, 160-76. Gainesville: University Press of Florida, 2005.

Patterson, K. David. "Yellow Fever Epidemics and Mortality in the United States, 1693-1905." *Social Science and Medicine* 34 (April 1992): 855-65.

Pelling, Margaret. "Contagion/Germ Theory/Specificity." In *Companion Encyclopedia of the History of Medicine*, ed. W. F. Bynum and Roy Porter, 309-34. London: Routledge, 1993.

Pemble, Richard H. *The Natural History of the Red River Valley Region Before European Settlement*. Moorhead: Minnesota State University, 2005.

Penick, Jr. James. "The Progressives and the Environment: Three Themes from the First Conservation Movement." In *The Progressive Era*, ed. Lewis L. Gould, 115-31. Syracuse: Syracuse University Press, 1974.

Peterson, David L. "Recent Cases." *North Dakota Law Review* 44 (1967-68): 567-72.

Peterson, Richard H. "The Failure to Reclaim: California State Swamp Land Policy and the Sacramento Valley, 1850-1866." *Southern California Quarterly* 56 (Winter 1974): 45-60.

Pickstone, John V. "Dearth, Dirt and Fever Epidemics: Rewriting the History of British 'Public Health,' 1780-1850." In *Epidemics and Ideas: Essays on the Historical Perception of Pestilence*, eds. Terence Ranger and Paul Slack, 125-48. Cambridge: Cambridge University Press, 1992.

Pielou, E. C. *After the Ice Age: The Return of Life to Glaciated North America*. Chicago: University of Chicago Press, 1991.

Pisani, Donald J. "Beyond the Hundredth Meridian: Nationalizing the History of Water in the United States." *Environmental History* 5 (October 2000): 466-82.

_____. "A Conservation Myth: The Troubled Childhood of the Multiple-Use Idea." *Agricultural History* 76 (Spring 2002): 154-71.

_____. "Federalism and the American West, 1900-1940." In *Frontier and Region: Essays in Honor of Martin Ridge*, eds. Robert C. Ritchie and Paul Andrew Hutton, 83-108. San Marino: The Huntington Library Press, 1997.

_____. "Federalism, Water Law, and the American West, 1886-1928." In *Perspectives on Federalism: Papers from the First Berkeley Seminar on Federalism*, ed. Harry

N. Scheiber, 117-48. Berkeley: Institute of Government Studies and University of California, 1987.

_____. "George Maxwell, the Railroads, and American Land Policy, 1899-1904." *Pacific Historical Review* 63 (May 1994): 177-202.

_____. "The Irrigation District and the Federal Relationship: Neglected Aspects of Water History in the Twentieth Century." In *The Twentieth-Century West: Historical Interpretations*, eds. Gerald D. Nash and Richard W. Etulain, 257-92. Albuquerque: University of New Mexico Press, 1989.

_____. "The Many Faces of Conservation: Natural Resources and the American State, 1900-1940." In *Taking Stock: American Government in the Twentieth Century*, eds. Morton Keller and R. Shep Melnick, 123-55. New York: Woodrow Wilson Center and Cambridge University Press, 1999.

_____. *To Reclaim A Divided West: Water, Law, and Public Policy, 1848-1902*. Albuquerque: University of New Mexico Press, 1992.

_____. *Water and American Government: The Reclamation Bureau, National Water Policy, and the West, 1902-1935*. Berkeley: University of California Press, 2002.

_____. *Water, Land, and Law in the West: The Limits of Public Policy, 1850-1920*. Lawrence: University Press of Kansas, 1996.

_____. "Water Planning in the Progressive Era: The Inland Waterways Commission Reconsidered." *Journal of Policy History* 18 (2006): 389-418.

Porter, Roy. *The Greatest Benefit to Mankind: A Medical History of Humanity*. New York: W. W. Norton and Company, 1997.

Power, Richard Lyle. "Wetlands and the Hoosier Stereotype." *Mississippi Valley Historical Review* 22 (June 1935): 33-48.

Prince, Hugh. "A Marshland Chronicle, 1830-1960: From Artificial Drainage to Outdoor Recreation in Central Wisconsin." *Journal of Historical Geography* 21 (1995): 3-22.

_____. *Wetlands of the American Midwest: A Historical Geography of Changing Attitudes*. Chicago: University of Chicago Press, 1997.

Rae, John B. "The Great Northern's Land Grant." *Journal of Economic History* 12 (Spring 1952): 140-45.

Rabushka, Alvin. *Taxation in Colonial America*. Princeton: Princeton University Press, 2008.

Reese, Ronald. "Under the Weather: Climate and Disease, 1700-1900." *History Today* 46 (January 1996): 35-41.

Reid, Bill G. "Franklin K. Lane's Idea for Veterans' Colonization, 1918-1921." *Pacific Historical Review* 33 (November 1964): 447-61.

Reiger, John F. *American Sportsmen and the Origins of Conservation*, 3d ed. Corvallis: Oregon State University Press, 2001.

Reisner, Marc. *Cadillac Desert: The American West and its Disappearing Water*. New York: Viking, 1986.

Reuss, Martin. *Designing the Bayous: The Control of Water in the Atchafalaya Basin, 1800-1995*. College Station: Texas A&M University Press, 2004.

_____. "The Development of American Water Resources: Planners, Politicians, and Constitutional Interpretation." In *Managing Water Resources Past and Present*, eds. Julie Trottier and Paul Slack, 51-71. Oxford: Oxford University Press, 2004.

Richardson, H. G. "The Early History of Commissions of Sewers." *English Historical Review* 34 (July 1919): 385-93.

Rigby, Kate. *Topographies of the Sacred: The Poetics of Place in European Romanticism*. Charlottesville: University of Virginia Press, 2004.

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.

Riley, James C. *The Eighteenth-Century Campaign to Avoid Disease*. London: Macmillan, 1987.

Robbins, Roy M. *Our Landed Heritage: The Public Domain, 1776-1936*. Princeton: Princeton University Press, 1942.

Robbins, William G. *Colony and Empire: The Capitalist Transformation of the American West*. Lawrence: University Press of Kansas, 1994.

Robinson, Elwyn B. *History of North Dakota*. Lincoln: University of Nebraska Press, 1966.

Rodgers, Daniel T. *Atlantic Crossings: Social Politics in a Progressive Age*. Cambridge, Mass.: Harvard University Press, 1998.

Roger, Philippe. *The American Enemy: A Story of French Anti-Americanism*. Translated by Sharon Bowman. Chicago: University of Chicago Press, 2005.

Rosenberg, Charles E. *The Cholera Years: The United States in 1832, 1849, and 1866, with a New Afterward*. Chicago: University of Chicago Press, 1987.

Rothman, Hal K. *Saving the Planet: The American Response to the Environment in the Twentieth Century*. Chicago: Ivan R. Dee, 2000.

Rowley, William D. *The Bureau of Reclamation: Origins and Growth to 1945*. Denver: Bureau of Reclamation, 2006.

_____. "Introduction." *Agricultural History* 76 (Spring 2002): 137-41.

_____. *Reclaiming the Arid West: The Career of Francis Newlands*. Bloomington: University of Indiana Press, 1996.

Rumer, Tom. *Unearthing the Land: The Story of Ohio's Scioto Marsh*. Akron: University of Akron Press, 1999.

Rusnock, Andrea. "Hippocrates, Bacon, and Medical Meteorology at the Royal Society, 1700-1750." In *Reinventing Hippocrates*, ed. David Cantor, 136-53. Aldershot, Hampshire: Ashgate Press, 2002.

Saikku, Mikko. *This Delta, This Land: An Environmental History of the Yazoo-Mississippi Floodplain*. Athens: University of Georgia Press, 2005.

Sanders, Elizabeth. *Roots of Reform: Farmers, Workers, and the American State, 1877-1917*. Chicago: University of Chicago Press, 1999.

Scheiber, Harry N. "American Federalism and the Diffusion of Power: Historical and Contemporary Perspectives." *University of Toledo Law Review* 9 (1977-78): 619-80.

_____. "Federalism and the American Economic Order, 1987-1910." *Law and Society Review* 57 (1975-76): 57-118.

_____. "Federalism and the Constitution: The Original Understanding." In *American Law and the Constitutional Order: Historical Perspectives*, eds. Lawrence M. Friedman and Harry N. Scheiber, 85-98. Cambridge: Harvard University Press, 1988.

Schmid, James A. "Wetlands as Conserved Landscapes in the United States." In *Cultural Encounters with the Environment: Enduring and Evolving Geographic Themes*, eds. Alexander B. Murphy, Douglas L. Johnson, and Viola Haarmann, 133-55. Lanham: Rowman & Littlefield Publishers, Inc., 2000.

Schwantes, Carlos A., and James P. Ronda. *The West the Railroads Made*. Seattle: University of Washington Press and Washington State Historical Society, 2008.

Schwendeman, J. R. "Water Supply and Progress in the Red River Basin." *Economic Geography* 21 (October 1945): 286-307.

Scott, Roy V. "Land Use and American Railroads in the Twentieth Century." *Agricultural History* 53 (October 1979): 683-703.

_____. *Railroad Development Programs in the Twentieth Century*. Ames: Iowa State University Press, 1985.

Severson, Kieth E., and Carolyn Hull Sieg. *The Nature of Eastern North Dakota: Pre-1880 Historical Ecology*. Fargo: North Dakota Institute for Regional Studies, 2006.

Shabecoff, Philip. *A Fierce Green Fire: The American Environmental Movement*. Rev. ed. Washington: Island Press, 2003.

Shallat, Todd. *Structures in the Stream: Water, Science, and the Rise of the U. S. Corps of Engineers*. Austin: University of Texas Press, 1994.

Sherow, James Earl. *Watering the Valley: Development along the High Plains Arkansas River, 1870-1950.* Lawrence: University Press of Kansas, 1990.

Shulman, Stuart W. "The Business of Soil Fertility: A Convergence of Urban-Agrarian Concern in the Early 20th Century." *Organization and Environment* 12 (December 1999): 401-24.

Siegan, Bernard H. *Property Rights: From Magna Carta to the Fourteenth Amendment*. Piscataway, NJ: Transaction Publications, 2001.

Sillers, Walter, Jr. "Flood Control in Bolivar County, 1838-1924." *Journal of Mississippi History* 9 (January 1947): 3-20.

Simpson, Peter K. *The Community of Cattlemen: A Social History of the Cattle Industry in Southeastern Oregon, 1869-1912*. Moscow: University of Idaho Press, 1987.

Skocpol, Theda. "Bringing the State Back In: Strategies of Analysis in Current Research." In *Bringing the State Back In*, eds. Peter B. Evans, Dietrich Rueschemeyer, and Theda Skocpol, 3-37. Cambridge: Cambridge University Press, 1985.

_____. *Protecting Soldiers and Mothers: The Political Origins of Social Policy in the United States*. Cambridge, Mass.: The Belknap Press of Harvard University Press, 1992.

Skowronek, Stephen. *Building a New American State: The Expansion of National Administrative Capacities, 1877-1920*. New York: Cambridge University Press, 1982.

Spence, Mark David. *Dispossessing the Wilderness: Indian Removal and the Making of the National Parks*. Oxford: Oxford University Press, 1999.

Starkey, Armstrong. *European and Native American Warfare, 1675-1815*. Norman: University of Oklahoma Press, 1998.

Stegner, Wallace. *Beyond the Hundredth Meridian: John Wesley Powell and the Second Opening of the West*. Boston: Houghton Mifflin Company, 1954.

Steinberg, Theodore L. "Dam-Breaking in the 19th-Century Merrimack Valley: Water, Social Conflict, and the Waltham-Lowell Mills." *Journal of Social History* 24 (Autumn 1990): 25-45.

_____. *Down to Earth: Nature's Role in American History*. 2nd ed. New York: Oxford University Press, 2009.

_____. *Nature Incorporated: Industrialization and the Waters of New England*. Cambridge: Cambridge University Press, 1991.

Stephenson, George M. *The Political History of the Public Lands from 1840 to 1862: From Pre-emption to Homestead.* New York: Russell and Russell, 1917.

Stine, Jeffrey K. *America's Forested Wetlands: From Wasteland to Valued Resource*. Durham, N. C.: Forest History Society, 2008.

Stoll, Steven. *Larding the Lean Earth: Soil and Society in Nineteenth-Century America*. New York: Hill and Wang, 2002.

Strausberg, Stephen F. "Indiana and the Swamp Lands Act: A Study in State Administration." *Indiana Magazine of History* (September 1977): 191-203.

Strom, Claire. *Profiting from the Plains: The Great Northern Railway and Corporate Development of the American West*. Seattle: University of Washington Press, 2003.

Stromquist, Shelton. *Reinventing "The People": The Progressive Movement, the Class Problem, and the Origins of Modern Liberalism*. Urbana: University of Illinois Press, 2006.

Swain, Donald C. *Federal Conservation Policy, 1921-1933*. Berkeley: University of California Press, 1963.

Swierenga, Robert P. *Pioneers and Profits: Land Speculation on the Iowa Frontier*. Ames: Iowa State University Press, 1968.

Szczygiel, Bonj, and Robert Hewitt. "Nineteenth-Century Medical Landscapes: John H. Rauch, Frederick Law Olmsted, and the Search for Salubrity." *Bulletin of the History of Medicine* 74 (Winter 2000): 708-34.

Taylor, Alan. "Unnatural Inequalities: Social and Environmental Histories." *Environmental History* 1 (1996): 6-19.

Tester, John R. *Minnesota's Natural Heritage: An Ecological Perspective*. Minneapolis: University of Minnesota Press, 1995.

Thornton, Russell. *American Indian Holocaust and Survival: A Population History Since 1492*. Norman: University of Oklahoma Press, 1987.

Tilly, Charles, ed. *The Formation of National States in Western Europe*. Princeton: Princeton University Press, 1975.

Trachtenberg, Alan. *The Incorporation of America: Culture and Society in the Gilded Age*. New York: Hill and Wang, 1982.

Treat, Payson Jackson. *The National Land System, 1785-1820*. New York: E. B. Treat and Company, 1910.

Tyrrell, Ian. "American Exceptionalism in an Age of International History." *American Historical Review* 96 (October 1991): 1031-55.

Urban, Michael A. "An Uninhabited Waste: Transforming the Grand Prairie in Nineteenth Century Illinois, USA." *Journal of Historical Geography* 31 (October 2005): 647-65.

Valenčius, Conevery Bolton. *The Health of the Country: How American Settlers Understood Themselves and the Their Land.* New York: Basic Books, 2002.

Van Hise, Charles Richard. *The Conservation of Natural Resources in the United States*. New York: The Macmillan Company, 1921.

Veenendaal, Augustus J., Jr. *The Saint Paul and Pacific Railroad: An Empire in the Making, 1862-1879*. DeKalb, Ill.: Northern Illinois University Press, 1999.

Vileisis, Ann. *Discovering the Unknown Landscape: A History of America's Wetlands*. Washington: Island Press, 1997.

Ward, James A. *Railroads and the Character of America, 1820-1887*. Knoxville: University of Tennessee Press, 1986.

Warren, Louis S. *The Hunter's Game: Poachers and Conservationists in Twentieth-Century America*. New Haven: Yale University Press, 1997.

"Water and Watercourses—Obstructions of Diffused Surface Water by Lower Owner." *Columbia Law Review* 20 (March 1920): 356-57.

Webb, Sidney, and Beatrice Webb. *English Local Government: Statutory Authorities for Special Purposes*. London: Longmans, Green and Co., 1922.

Webb, Walter Prescott. *The Great Plains*. Boston: Ginn, 1931.

Weiner, Douglas R. "A Death-Defying Attempt to Articulate a Coherent Definition of Environmental History." *Environmental History* 10 (July 2005): 404-20.

Wellington, Raynor G. *The Political and Sectional Influence of the Public Lands from 1828-1842*. Cambridge, Mass.: Riverside Press, 1914.

Wellock, Thomas R. *Preserving the Nation: The Conservation and Environmental Movements: 1870-2000*. Wheeling, IL: Harlan Davidson, 2007.

White, Richard. "The Nationalization of Nature." *Journal of American History* 86 (December 1999): 976-86.

_____. "Poor Men on Poor Lands: The Back-to-the-Land Movement of the Early Twentieth Century: A Case Study." *Pacific Historical Review* 49 (February 1980): 105-31.

_____. *"It's Your Misfortune and None of My Own": A New History of the American West*. Norman: University of Oklahoma Press, 1991.

White, W. Thomas. "A Gilded Age Businessman in Politics: James J. Hill, the Northwest, and the American Presidency, 1884-1912." *Pacific Historical Review* 57 (November 1988): 439-56.

Wiel, Samuel C. *Water Rights in the Western States*. 2 vols. San Francisco: Bancroft-Whitney Company, 1911.

Wilbur, Ray Lyman, and William Atherton Du Puy. *Conservation in the Department of the Interior*. Washington: Government Printing Office, 1931.

Wilhelm, Peter W. "Draining the Black Swamp: Henry and Wood Counties, Ohio, 1870-1920." *Northwest Ohio Quarterly* 56 (Summer 1984): 79-95.

Williams, Michael. "Agricultural Impacts in Temperate Wetlands." In *Wetlands: A Threatened Landscape*, ed. Michael Williams, 181-216. Oxford: Basil Blackwell, 1990.

_____. *Americans and Their Forests: A Historical Geography*. Cambridge: Cambridge University Press, 1989.

Willan, Thomas S. *River Navigation in England, 1600-1750*. London: Routledge, 1964.

Wilson, Anthony. *Shadow and Shelter: The Swamp in Southern Culture*. Jackson: University Press of Mississippi, 2006.

Winks, Robin W. *Frederick Billings: A Life.* New York: Oxford University Press, 1991.

Wood, Gordon S. *The Creation of the American Republic, 1776-1787*. Chapel Hill: University of North Carolina Press, 1969.

_____. "Environmental Hazards, Eighteenth-Century Style." In *Old World, New World: America and Europe in the Age of Jefferson*, eds. Leonard J. Sadosky, Peter Nicolaisen, Peter S. Onuf, and Andrew O'Shaughnessy, 15-31. Charlottesville: University of Virginia Press, 2010.

_____. *The Radicalism of the American Revolution*. New York: Vintage Books, 1991.

_____. *The Rising Glory of America, 1760-1820*. Revised ed. Boston: Northeastern University Press, 1990.

Worster, Donald. "The Ecology of Order and Chaos." In *Out of the Woods: Essays in Environmental History*, eds. Char Miller and Hal Rothman, 3-17. Pittsburg: University of Pittsburgh Press, 1997.

_____. *A River Running West: The Life of John Wesley Powell*. Oxford: Oxford University Press, 2001.

_____. *Rivers of Empire: Water, Aridity, and the Growth of the American West*. New York: Pantheon Books, 1985.

_____. *An Unsettled Country: Changing Landscapes of the American West*. Albuquerque: University of New Mexico Press, 1994.

_____. "World without Borders: The Internationalizing of Environmental History." *Environmental Review* 6 (Fall 1982): 8-13.

Yochelson, Ellis L. *Charles Doolittle Walcott, Paleontologist*. Kent, Ohio: Kent University Press, 1998.

Zeidel, Robert F. "Peopling the Empire: The Great Northern Railroad and the Recruitment of Immigrant Settlers to North Dakota." *North Dakota History* 60 (Spring 1993): 14-23.

Zuidervaart, Huib J. "An Eighteenth-Century Medical-Meteorological Society in the Netherlands, Instrumentation and Quantification. Part 2." *British Journal for the History of Science* 39 (March 2006): 49-66.

Unpublished Theses and Dissertations

Ahrens, Marjorie Henkel. "A Contribution to the History of Land Administration in Minnesota: The Origins of the Red Lake Game Preserve." M. A. thesis, University of Minnesota, 1987.

Almquist, Alton Wilhelm. "Farm Drainage in the Red River Valley of Minnesota." M. S. thesis, University of Minnesota, 1955.

Clynch, Daniel F. "An Introduction to Swamp Land Disposal in Iowa: 1850-1880." M A. thesis, State University of Iowa, 1957.

Eisenstadt, Peter R. "The Weather and Weather Forecasting in Colonial America." PhD diss., New York University, 1990.

Gunderson, Dora Josephine. "The Settlement of Clay County, Minnesota: 1870-1900." M. A. thesis, University of Minnesota, 1929.

Poe, Cynthia R. "Reconstructing the Levees: The Politics of Flooding in Nineteenth-Century Louisiana." PhD diss., University of Wisconsin, 2006.