

# *Empire of Water*

An Environmental and Political History  
of the New York City Water Supply



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## INTRODUCTION

# The Evolution of a Water System

Road atlas designers generally divide New York State into two sections. The densely populated southeastern quadrant consumes a page, while the sprawling northern and western sections require two pages. This convention highlights a rather startling reality: with the exception of the Hudson River, the most prominent inland bodies of water in the region that stretches from Long Island to the Catskill Mountains are the reservoirs that serve New York City. North of the city, in Westchester and Putnam Counties, the dozen reservoirs and three controlled lakes of the Croton water system dot the landscape. A hundred miles to the northwest, in the Catskill Mountains, a different picture emerges. In a region laced with rivers, creeks, and streams but bereft of large lakes, six substantial reservoirs dominate their valleys, serene repositories for the snowmelt and water that courses down the hillsides.

The construction and management of New York City's water supply in the twentieth century is the subject of this book. New York City began designing its Catskill Mountains water network in 1905. It completed the Cannonsville Reservoir, the final component of its mountain water system, in the mid-1960s. Damming local streams and two major tributaries of the Delaware River provided New York with an enormous volume of water, enough to meet 90 percent of its needs.<sup>1</sup> *Empire of Water* tells the story of this 90 percent, and the challenge of operating and maintaining one of the world's most extensive water networks.

The regional implications of New York City's waterworks expansion were profound. The flooding of rural communities by enormous reservoirs and the resulting economic dislocation were predictable consequences of waterworks construction. But focusing exclusively on the remaking of the rural landscape obscures the ways in which the desire for water also transformed the suburban and urban recreational and cultural landscape.<sup>2</sup> Exploring developments through this regional prism reveals the diverse and often surprising effects of waterworks expansion

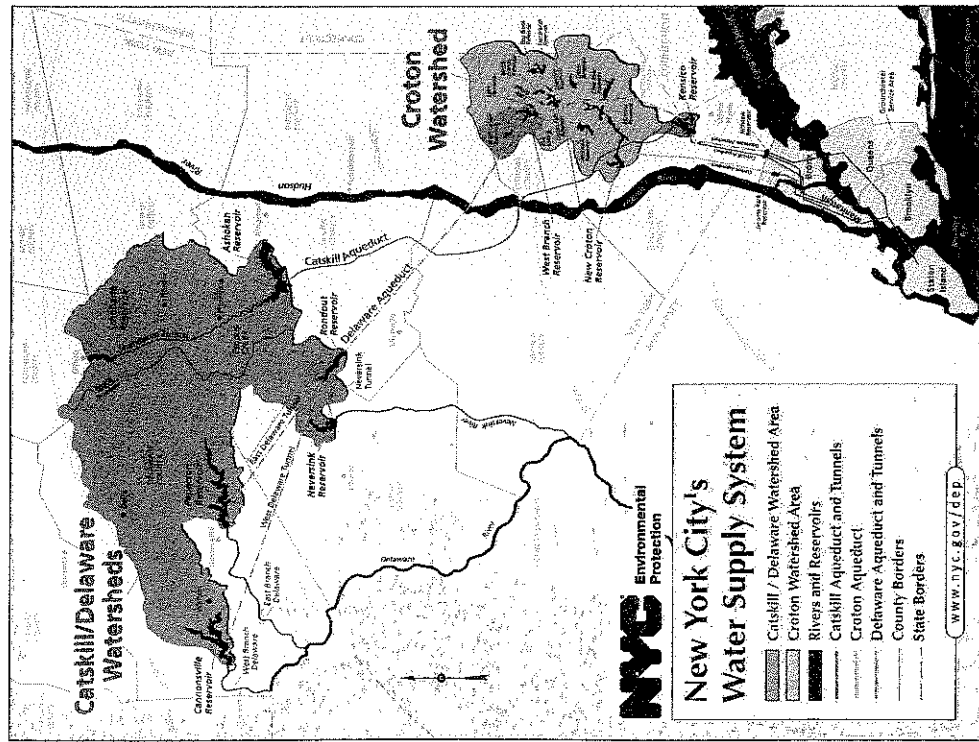


Fig. 1. New York City watershed. New York constructed its water system over the course of 130 years, beginning in Westchester County in 1837 and ultimately ending in the western Catskills in 1967. (Collection, New York City Department of Environmental Protection. Courtesy of the New York City Department of Environmental Protection)

on city, suburb, and countryside. Some communities disappeared; others saw familiar streams altered beyond recognition; others acquired new parks. The construction of the city's water system reconfigured the natural and built environments of southeastern New York State, from Long Island to the headwaters of the Delaware River, 125 miles northwest of the city. New York City's "hydrological

commons," the area affected by its perpetual pursuit of more water, was both much larger and more intricately constructed than historians have recognized.<sup>3</sup>

The eighteenth-century residents of a city notorious for its unsavory water could scarcely have envisioned the elaborate supply and distribution network that the municipal government would construct in the nineteenth and twentieth centuries. Colonial-era New Yorkers relied on hundreds of wells that tapped a network of underground streams. When British troops occupied New York during the Revolutionary War, they destroyed an incipient project to construct a reservoir at the outskirts of the city. (This was the first serious attempt to construct a public water supply.) Independence did not bring an improved water supply. Instead, a combination of rapid population growth and poor sanitation practices led to a steady deterioration of water quality, especially for working-class New Yorkers, who could not afford the high prices charged for more pristine supplies. It was not until the 1830s, in the wake of a ferocious cholera epidemic that killed more than three thousand residents, that New Yorkers voted to build a public water network to convey high-quality supplies from outside the city.<sup>4</sup>

The Croton water system—so named because it drew on the waters of the Croton River and its tributaries—was one of the city's signal accomplishments of the nineteenth century. New York harnessed the labor of Irish immigrants and the capital of America's most prosperous port to build a substantial reservoir and a forty-one-mile aqueduct to carry its waters to hundreds of thousands of citizens.<sup>5</sup> In addition to altering the landscape of northern Westchester County, construction of the Croton system reshaped the city itself. Workers built the elegant High Bridge, which carried the Croton Aqueduct over the Harlem River and into the city. The aqueduct terminated at the Yorkville Receiving Reservoir, which would become a prominent Central Park landmark. From there, water flowed to the distributing reservoir at Murray Hill, a hulking four-story water tank that dominated the surrounding countryside. New Yorkers greeted the arrival of Croton water with unbridled enthusiasm.<sup>6</sup> Municipal officials even commissioned a poem to mark the occasion. George Pope Morris verse clearly conveyed the joy and wonder of urban dwellers who had long abided inadequate and impure supplies: "Water shouts a glad hosanna! / Bubbles up the earth to bless! / Cheers it like the precious manna / In the barren wilderness."<sup>7</sup>

This enthusiasm proved short-lived. Within a decade, the inability of the water system to keep pace with increasing consumption had become apparent, prompting calls for its expansion. By the 1850s, two patterns that would define New York City's approach to water supply for the next century had emerged: the city would seek pure water from well beyond its borders, and it would engage in a perpetual struggle to secure enough water to meet the demands of the metropolis. Although these trends began in the nineteenth century, they became more pronounced in

the twentieth century, when the scale of New York City's waterworks projects and the level of demand for fresh water reached unprecedented heights. By the time it was finally completed in 1911, the Croton system bore little resemblance to its first incarnation; its original reservoir and aqueduct had been supplanted by larger versions, and its reservoirs and lakes extended over two upstate counties.<sup>8</sup> Generations of engineers and workers had toiled to collect virtually every drop of water from the river and its tributaries, but the Croton's modest yield could not meet the seemingly insatiable demand for water.

Increasing demand for water reflected political and demographic changes. The consolidation of Brooklyn, Manhattan, and other communities into Greater New York in 1898 almost doubled the city's population, placing enormous strains on the water network. Manhattan soon discovered the inadequacy of the water systems it had inherited; locating and tapping new water sources to supply the outer boroughs became one of the first tests of the city's commitment to Brooklyn and the other newly annexed communities. Even as they continued to expand the Croton system, municipal officials recognized the need for a much larger source to accommodate the demands of rapid population growth and increasing per capita water consumption. They again eyed the region north of the city, but this time they looked west of the Hudson, to the dense network of streams that laced the Catskill Mountains, roughly one hundred miles from New York. Like their counterparts in Los Angeles, San Francisco, and Boston, New York's political leaders envisioned a long-distance water delivery system that would draw on rural resources to meet the growing demand of urban dwellers.<sup>9</sup>

The near-continuous process of system expansion from the 1830s to the 1960s shaped and reshaped New York City and its suburbs. The original Croton system relied on reservoirs and pumping stations located within the city to deliver water to urban households. Modernization of the Croton system and the widespread introduction of water from the Catskills beginning in 1917 rendered obsolete most of the water infrastructure within city limits. New York City "recycled" these parcels, greatly enriching the cultural and recreational landscape of the city and its suburbs. Two of Manhattan's most prominent landmarks—the New York Public Library and Central Park's Great Lawn—occupy former reservoir sites. On Long Island, property acquired by Brooklyn to protect its water supply became the nucleus of the island's parkway and state park systems. In Westchester County, the state converted the path of the Old Croton Aqueduct into a linear park, which has become one of the most beloved and utilized recreational resources in suburban New York.<sup>10</sup>

The tendency of historical accounts to focus almost exclusively on the technical aspects of reservoir and aqueduct construction has consigned these urban and suburban by-products of rural waterworks expansion to the realm of anecdote and curiosity. This represents a missed opportunity to connect water supply expansion to

larger themes of public space and the churning of the built environment. By taking a regional perspective on New York City's water system, this book illustrates the wide-ranging and enduring significance of these lesser-known products of waterworks expansion.

In addition to widening the geographical scope of inquiry, I explore developments over a long stretch of time—from the twilight of the nineteenth century to the early years of the twenty-first century. The ecological effects of water development did not end with the completion of a dam. On the contrary, it was only when a reservoir went into service that scientists and watershed residents began to fully appreciate the wide-ranging environmental consequences. Similarly, political tensions between watershed residents and city officials did not disappear with the end of active construction. Frustration with New York City's post-construction watershed policies—its poor record of road maintenance, inconsistent releases of water from its reservoirs back into streams and rivers, restrictions on recreational use of its watershed properties, and frequent challenges of local property tax assessments—explains much of the resentment felt by Catskill residents.<sup>11</sup> The city's management of its hydraulic network often proved just as controversial as its decision to tap Catskill waters in the first place.

This broader approach—exploring the life of a water network, rather than simply its birth—highlights the connections between politics and ecology that lie at the heart of this book. As its title suggests, New York City enjoyed immense autonomy in designing, constructing, and managing its water network. This urban dominance began in 1905, when the city received permission from the state to divert Catskill streams, and continued into the 1960s, when New York completed its last mountain reservoir. Upstate communities surrendered farms, homesteads, and hamlets to the needs of the downstate metropolis. Waterworks development also altered the recreational landscape of the Catskills. Large releases of water from the reservoirs changed the flow, character, and even the temperature of mountain streams. Catskill residents were prohibited from hiking and hunting on thousands of acres of reservoir buffer lands. Until the 1970s, watershed residents won only marginal victories in their attempts to resist New York City's incursions. Their appeals to the state to block reservoir construction amounted to pro forma exercises in free speech; the era of the environmental impact statement had not yet arrived. Those who lost their homes to new reservoirs or saw their businesses fade with the disruption of community living patterns generally received some compensation from the special boards the state created to hear their claims. However, some residents entitled to monetary awards received nothing or next to nothing. In theory, watershed expansion took place under the watchful eye of state and federal authorities charged with balancing the interests of country and city. In practice, the scales of power were rigged in favor of New York City.

The increasing influence of ecology and the erosion of urban political clout led to a gradual but tectonic shift in the balance of power between the city and watershed residents. By the 1970s, the empire that had constructed the vast water network was crumbling. New York City teetered on the edge of bankruptcy, and hundreds of thousands of urban dwellers had fled the city in search of a better life. The state government that intervened to save the city's finances also began to take its environmental responsibilities more seriously, no longer reflexively supporting New York's management of its water system. New York City constructed its water network in the pre-ecological era, but it was compelled to change the way it operated this system to reflect evolving ecological priorities and knowledge. This transformation in environmental governance, dramatic as it was, did not lead to imperial withdrawal. New York City continued to tap the region's streams and rivers to provide water for residents in the city and northern suburbs. Ironically, the emphasis on watershed protection that emerged in the 1990s enmeshed New York City more tightly into the fabric of daily life in the Catskills. But the nature of the relationship between watershed residents and the city had changed dramatically since the 1970s.

The Watershed Memorandum of Agreement, generally known as the MOA, was the most significant evidence of change. The MOA, signed in 1997, balanced the city's desire to minimize human activity in the watershed with the recognition that economic development and expanded recreational opportunities were critical to watershed residents' quality of life. New York secured permission to acquire more land in the areas that supplied its reservoirs. In exchange it agreed to invest tens of millions of dollars into local economies, open up more of its watershed holdings to hunting and hiking, and fund a wide variety of projects to help local farmers, residents, and communities improve water quality. Although the MOA did not eliminate disputes between New York City and watershed communities, it signaled the end of the imperial era. It created new institutional mechanisms designed to forestall serious disputes, and firmly bound the fate of the Catskills to New York City's water supply.<sup>12</sup>

The MOA was based on the concept of ecosystem services—the recognition that preserving natural processes such as pollination and water filtration can be a cost-effective means of achieving environmental goals. A participant in the watershed negotiations likened the plight of Catskill residents to that of Amazon natives: “It behooves the rest of the world to provide some sort of economic alternatives to destroying the rain forest. Well, the same is true up here. The city should provide an economic alternative.”<sup>13</sup> The success of the watershed negotiations demonstrated that ecosystem services, a strategy hitherto employed almost exclusively in remote regions, could help protect the economy and ecology of developed areas as well. The New York City watershed agreement is recognized as an international model

of environmental dispute resolution and water management. Experts from around the world have visited the watershed to learn more about its programs, and it has informed the resolution of environmental conflicts in distant regions.<sup>14</sup>

In the American context, the MOA represented an important shift in environmental management. The combination of increasingly sophisticated understanding of ecological processes and more flexible governing regimes gave rise to a more collaborative mode of environmental politics by the late twentieth century. For most of the century, New York City officials maintained a static conception of natural processes; as long as the city continued to draw its water from relatively undeveloped mountain watersheds, its main concern was quantity, not quality. The transition from a command-and-control style of environmental politics to a more cooperative approach that recognized the need to collaborate with watershed residents did not happen overnight. Well into the 1990s, municipal officials clung to the old verities and attempted to unilaterally impose a system of centralized ecological management on its watersheds. Resistance from Catskill residents and the spur of extraordinarily expensive federal water quality statutes were the proximate causes of New York's decision to embrace a new mode of environmental governance. Nonetheless, the arrival of a new breed of environmentally minded city leaders with a more holistic vision of watershed management was critical in forging a collaborative partnership with watershed residents. The ability of these partners to deliver clean water to more than nine million people without sacrificing rural economic vitality ranks as one of the most significant American environmental success stories of the last thirty years.<sup>15</sup>

The evolution of New York City's water supply system reflects significant changes in environmental policy and thought in twentieth-century America. It embodies both the conservationist urge to use nature to meet human needs, and the preservationist impulse to minimize human interference in natural processes. Perhaps most important, it casts the environmental revolution of the final decades of the century in a new light. Most accounts of late twentieth-century American environmental policy emphasize the role of federal statutes and the legal disputes they spawned in establishing the parameters of environmental change and reform.<sup>16</sup> It would be foolhardy to deny the powerful influence of federal regulations. In the case of New York City's water supply, they spurred the negotiations that produced the MOA. But this narrative needs revising. Businesses, environmental organizations, and average citizens did more than fight to restrict or expand the reach of federal regulations in court. As the New York City watershed negotiations reveal, they sometimes worked together to reconcile conflicting social, economic, and environmental goals. Regulations may have established the frame of possible outcomes, but citizens, government officials, and other parties filled in the important details.<sup>17</sup>

Two aspects of the transformation in environmental governance—water conservation and watershed recreation—receive particular attention in this book. They are each important to the environmental history of the water system, and both topics underscore the regional dimensions of water supply expansion. New York bears the dubious distinction of being the last major American city to install water meters in all residences. It did not complete the job until the 1990s, decades after most other cities began using consumption as the basis for water charges. The reluctance to install meters reflected the overall laxity toward water conservation that prevailed until the 1980s. The ability to continually expand the water supply discouraged the development of meaningful conservation policies. Leaking sinks and toilets in Manhattan bore testament to the abundance of Catskill water. The absence of residential metering and low water charges led to some of the highest per capita rates of water consumption in the United States. New Yorkers significantly reduced consumption when droughts threatened to lead to water shortages, but usage shot back up when the rains returned and the reservoirs filled.

The city finally broke this cycle in the 1990s, when it launched the nation's largest toilet replacement program. Despite the first marked increase in New York City's population in decades, overall water usage decreased significantly. Although largely obscured by the MOA, the reduction in water consumption represented a clear break with decades of intransigence and ended all speculation about further expansion of the water system. In 1987, water expert Edwin Clark observed that New York City "has the reputation for the best-engineered and worst-managed water system in the nation."<sup>18</sup> By the late 1990s, this charge no longer rang true. New York was slowly learning how to share regional resources with its neighbors.

One of the most prized resources in the watersheds was recreational space. The development of New York's supply network reshaped recreation on both land and water. Reservoirs provided new fishing opportunities, but water releases from these reservoirs also altered stream conditions, creating challenges for those who sought to swim and fish in the Catskills, the birthplace of American fly-fishing. Conflicts over Catskill waters in the 1970s foreshadowed disputes about recreational access to city-owned lands in the 1990s. To enhance the protection of its water sources, New York City began to purchase land throughout the Catskills, eventually acquiring tens of thousands of acres of mountain holdings. These acquisitions threatened to severely limit access to parcels that had formerly been available for hunting, hiking, and other forms of recreation. Reconciling public health and the desire for recreational access to newly acquired properties loomed as a major challenge.

City and state officials and local residents have worked diligently to expand recreational access to New York's expanding watershed holdings since the signing of the MOA. This collaborative process has revealed areas of common ground

between the needs of the water system and residents' desire to hunt, hike, and explore these lands. The city has expanded hiking and boating opportunities and loosened permit restrictions for using its watershed property. Although conflicts persist over access to particular parcels and policies, New York City has made significant strides in increasing recreational access to its watershed holdings. The change in recreational policy bespeaks a more fundamental shift. Long accustomed to viewing the Catskills as a sparsely populated region immune to larger economic and societal shifts—municipal officials believed that nature would protect water quality as long as people stayed away—New York City gradually adopted a more pragmatic stance that recognized the need to collaborate closely with watershed residents and upgrade technology to ensure the integrity of its water supply.

Water experts describe this more holistic approach as taking the "soft path" to managing water. By partnering with rural residents to protect water supplies and taking aggressive steps to curtail consumption, New York abandoned its long-standing practices of continuous supply expansion and reliance on large-scale technologies to ensure the delivery of high-quality water. The "hard path" to water security that New York City constructed remained in place—it continued to upgrade aqueducts, reservoirs, and treatment systems to meet the needs of its citizens. But protecting water at its source became the centerpiece of the city's approach to managing its sprawling supply network.<sup>19</sup>

The slow transition in environmental governance provides the arc of the narrative and also dictates the form and content of this book. A work of social, political, and environmental history, *Empire of Water* is an exploration of history from the bottom up and the top down. It analyzes developments from the perspective of those building and overseeing the water system and also from the point of view of those who lost their homes and businesses to satisfy New York City's demand for more water. An emphasis on political ecology inevitably highlights the actions of the engineers, lawyers, and politicians who had the power to remake landscapes. As a result, much of the first half of this book centers on the city's own decision-making processes and its legal battles with other states. New York's ability to secure state and federal backing for its waterworks projects was a critical component of its success. The path to Catskill water went through Albany and the United States Supreme Court. The latter chapters focus on management of the system and highlight the efforts of New York City and watershed residents to adjust to the new ecological expectations and financial circumstances that emerged in the 1970s.

Environmental historians are frequently accused of writing declension narratives in which they portray the natural world as idyllic and in balance before human beings came along and cut down trees, built dams, and generally threw nature out of whack. I do not seek to replace one overly simplistic description of

environmental change with another. New York City's water system is a work in progress. The present state of environmental and political equilibrium will not persist forever. Some watershed residents resent New York City's incursions and view the current state of affairs as a violation of their rights. They continue to file lawsuits and closely monitor the city's water operations. Nonetheless, most would acknowledge that they benefit much more from the water system than they did only a few decades before. In an era of intense political friction, the success of the MOA offers hope that a brighter environmental and political future is within reach.

## CHAPTER ONE

### From Croton to Catskill

**O**n the afternoon of July 15, 1890, Mayor Hugh Grant boarded his horse-drawn carriage en route to a ceremony marking the introduction of water from the New Croton Aqueduct into New York City's distribution system. Plans called for Grant "to appear as a fresh water Neptune" and turn a regulator, which would send a torrent of water into gatehouses at the main Central Park reservoir. City employees at an uptown gatehouse—not the mayor, whose planned whirl of the regulator was pure political symbolism—would initiate the flow of water into the reservoir. Faithfully obeying the instructions of Alphonse Fteley, chief engineer of the Aqueduct Commission, workers opened the gates of the new aqueduct just before two o'clock, ensuring that a gush of water would arrive at Central Park on the hour. When the mayor arrived a few minutes after two, he was disappointed to discover that a new era had begun without him.<sup>1</sup>

Grant's frustrating afternoon symbolized the difficulty of providing a pure and abundant supply of water to New Yorkers around the turn of the century. The root of the problem was the rapid growth and transformation of the city. The arrival of hundreds of thousands of eastern and southern European immigrants sharply increased demand for water. Lifestyle changes, particularly the growing popularity of apartment houses among middle- and upper-class residents, also strained the water system. Apartment houses provided residents access to more water-consuming devices, fueling higher per capita consumption. Each unit in the Stuyvesant Apartments, considered New York's first apartment building when it opened in 1870, included two water closets and a separate bathroom. Just a few blocks away, tenement dwellers shared hallway taps with several other families and relied on privies.<sup>2</sup>

The dynamism and energy of the city spilled over into the larger metropolitan area. As late as the 1830s, Brooklyn was a minor city, home to fewer than forty thousand residents. Six decades later, owing to an influx of residents from