

**Seeing the City for the Forest: The Transformation and Preservation of New York
City's Old Growth Urban Forest**

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Abstract

New York City's "emerald empire" is much more than its street trees. The city contains over 10,000 acres of forests within the five boroughs, including several examples of old growth forests. These natural areas are at risk—from their vulnerability to climate impacts, to development pressures, to a lack of support for and information about managing urban forests. Urban forests will only become more crucial to quality of life in cities into the future, as their ecological, health, and psychological benefits become increasingly critical to mitigating the impacts of climate change on cities and their residents. In New York City, half of residents full experience of "nature" happens within the five boroughs. Without access to urban forests and other natural areas, millions of New Yorkers would not have any opportunity to access the well-documented physical and mental health benefits of contact with nature, nor have the experience of learning about and appreciating the important ecosystems that exist in and support the life of the city.

Old growth forests are particularly significant and exceedingly rare, especially in dense urban environments. Old growth forests have been documented to support more biodiversity, can store more carbon, and have more positive impacts on improving water and air quality than younger natural areas. There are multiple old growth forests within the five boroughs of New York City, which have somehow managed to persist over hundreds of years, if not more in the case of some areas. Learning from these rare and increasingly important spaces—how and why they survived, what unique benefits they provide and challenges they face, and what roles they have played in surrounding communities historically and into the future—will be important to ensuring both their long-term sustainability and can provide lessons for managing other urban forests. This thesis explores the historical, contemporary, and future importance of healthy, old growth forest ecosystems in cities and how they can provide more benefits than individual trees, and a greater variety of them.

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Introduction

Trees have always been a crucial part of New York City's landscape identity, from the thriving and biodiverse forests that formed the precolonial home of the Lenape to the tree-lined streets of the dense urban megacity of today. According to the New York City Parks Department, there are 694,249 street trees in New York City, and to the surprise of many, 10,542 acres of forest in parks and privately owned spaces. The conception of New York's trees as an "urban forest," which includes street trees, trees in parks, and trees on private property, has grown increasingly important in recent years with growing awareness of the role of trees in mitigating the impacts of climate change in urban areas. Trees absorb carbon dioxide, cool ambient temperatures, and absorb storm water, all of which are incredibly important given New York's emissions reductions goals and projections for more frequent and extreme heat and precipitation events over the next century. In the global climate mitigation context, tree planting is often described as a panacea for addressing climate change that will absorb the world's carbon emissions and provide health, recreational and beautification benefits at the same time. However, not all tree planting is created equal in this context. This thesis will explore the historical, contemporary, and future importance of healthy, old growth forest ecosystems in cities and how they can provide more benefits than individual trees, and a greater variety of them.

Given the history of the development of New York City, old growth forests are rare, but they exist, and need to be protected. In addition to supporting healthy ecosystems and mitigating climate change impacts, they provide a crucial resource to residents: in a recent survey of New York City park users, 50% of respondents reported experiencing nature only within the borders of the city.¹ New York is one of a few large cities in the United States that are recognizing the importance of their forest ecosystems, and are working to develop new approaches to forest management that take their urban context, changing climate conditions, and

¹ Natural Areas Conservancy, *New York City Nature Goals 2050*

equitable access to nature into account. New York has many policies focused on increasing access to green space, programs to invest in parks in high poverty, high density neighborhoods,² and policies and programs to focus tree planting in neighborhoods most vulnerable to extreme heat,³ but there is no clear home for equity-focused city policies related to management of its forested natural areas and making them more accessible. The City of New York has historically responded to threats to natural areas with new programs and resources, including the Natural Resources Group⁴ founded within the NYC Parks Department in the 1980s to study and support natural areas managed by the department, and the Forever Wild⁵ parks program established in the 1990s to preserve natural areas and unique ecosystems at risk for development, but needs more and new resources at a much larger scale to address increasing risks and impacts from climate change and other factors.

Understanding the importance and rarity of old growth forests, and their role in addressing historic lack of access to nature and mitigating climate impacts, I will explore the history of how and why old growth forests were preserved. The history of these spaces, including decision points over their initial conservation, their management over time, and their current condition, reflects the priorities of the political leadership of the time at which they were formally preserved, but also tells a crucial story of how forested natural areas in cities have shaped—and have been shaped—by environmental policy, housing policy, real estate development, health policy, and increasingly climate change policy over time. The burgeoning interest among many cities in the benefits of the urban forest is a positive development, but understanding the historic lens through which these spaces are treated, and how that has impacted them and the communities they serve, will be important to

² See NYC Parks' Community Parks Initiative: <https://www.nycgovparks.org/about/framework-for-an-equitable-future/community-parks-initiative>.

³ See New York City Cool Neighborhoods Program: https://www1.nyc.gov/assets/orr/pdf/Cool_Neighborhoods_NYC_Report.pdf.

⁴ See NYC Parks Natural Resources Group: <https://www.nycgovparks.org/greening/natural-resources-group>.

⁵ See NYC Parks Forever Wild: Nature in New York City <https://www.nycgovparks.org/greening/nature-preserves>.

ensuring their viability and longevity into the future. New York may have some few and far between remnants of old growth forests, but they are far from untouched, and it is crucial to understand how they have been both helped and harmed by forward-thinking planning as well as acquiescing to the whims of the priorities of the day in terms of design and maintenance.

I will explore this history through three case studies of forested areas in New York City that were chosen based on 1. their status as old growth forests, 2. geographic diversity, and 3. representing different time periods and historical contexts at their founding. I will also provide context via an overview of the “natural history” of New York City and its history of park development and other development patterns as they relate to forests, and the roles that trees and forests play in New York and other cities, including their role in climate mitigation and adaptation.

Urban forested areas are a crucial part of cities’ infrastructure, and provide many ecological services, including mitigating extreme heat and lowering ambient temperatures, absorbing and filtering storm water, absorbing air pollution, releasing oxygen, storing carbon in trees and soil, supporting biodiversity, as well as providing city residents “respite from the frenzy of urban living,”⁶ the physical and mental health benefits of which are well-documented.⁷ What is also well-documented is that degraded forests have diminished capacity to provide these functions,⁸ and that climate change has and will continue to degrade these spaces which provide the services cities need to weather its impacts as well as provide the only access to nature that many city residents have. The loss of these functions cannot simply be mitigated by planting more individual trees, since many of these benefits are tied to healthy forest ecosystems. Questions of maintaining or retrofitting existing infrastructure are not typically at the forefront of many cities’ climate plans, and seeing forests as infrastructure through that lens is even less so.

⁶ New York City Department of Parks and Recreation, *Guidelines for Urban Forest Restoration*

⁷ South, et al.; Williams

⁸ New York City Department of Parks and Recreation, *Guidelines for Urban Forest Restoration*

Old growth urban forests are a critical but threatened resource that still exist in New York and other cities, and can be protected, restored, and expanded through thoughtful and adaptive management and policies.

The Natural History of New York

In *Gotham Unbound: The Ecological History of Greater New York*, Ted Steinberg opens with the contention that this history “can be summed up very simply: an estuary with a high natural density was replaced by an astonishingly high unnatural (for lack of a better word) density.”⁹ The few remnants that are considered to be “old growth” or “native” forests within the five boroughs provide an important connection to this past and give clues about the pre-developed landscape of New York, but the work of projects like Manahatta demonstrate how diverse, dynamic, and productive this ecosystem was: “Mannahatta was blessed with so many ponds, streams, and springs because of a fortunate confluence of factors: a generously aquatic climate, an extensive green mantle that clothed it and slowed the floods, and a glacial history that left thick beds of sand and silt in its subsurface—a reservoir to hold the rain in aquifers for another day.”¹⁰ *Manahatta: A Natural History of New York City* mainly focuses on the Manhattan landscape of 1609, just before Henry Hudson arrived with the Dutch West India Company and set off a process of rapid deforestation and transformation of this landscape, but provides a sense of the scale of what was lost across the land that now comprises the five boroughs of New York, along with the often surprising links between the city’s precolonial landscape and the nature that exists in the dense megacity that we know as New York today.

Sanderson’s natural history is framed around a “gradient of human influence,”¹¹ and rejects the binary conception of nature as either untouched and pristine or impacted and degraded by people. He notes that there is evidence that the forests that Hudson encountered in 1609 were shaped by the Lenape, the indigenous people that first occupied the land that became Manhattan, through intermittent burning that would open up land for hunting and create grasslands for deer to graze on, which would then become shrublands before eventually returning to a forested state.¹² He

⁹ Steinberg, xix

¹⁰ Sanderson, 94

¹¹ *ibid*, 32

¹² *ibid*, 126

estimates that as much as 80-90% of Manhattan burned from the fifteenth to the seventeenth century. In *Old Growth Urban Forests*, Robert Loeb points to “forest resetting events” as the main indicator of whether a forest can be considered to be “old growth,” and describes events that are so catastrophic that a new landscape regenerates or is developed in its place. In the case of the Northeastern United States, and particularly in New York City, the major forest resetting event was the Revolutionary War.¹³ However, in “Notes on the Deforestation of Manhattan,” Richard Howe shows that the conditions that led to the war becoming a forest resetting event were already in place. When the Dutch East India Company established New Amsterdam in the 1620s, the island of Manhattan was 80%-85% forested, and demand for wood as a fuel source soon surged at the same time as forests were being cleared for agriculture to feed the growing town. Demand for wood became so intense that within just a few years of its founding, New Amsterdam started importing wood from elsewhere in the region, and soon after that the Common Council started regulating the production and trading of wood in the 1650s.¹⁴ The winter of 1779-80 was also exceptionally cold, which put additional pressure on the woodlands of the city,¹⁵ so much so that a visit during the following winter by George Washington prompted him to write that he had found “the Island is totally stripped of Trees, & wood of every kind; but low bushes (apparently as high as a Mans waste) appear in places which were covered with Wood in the year 1776.”¹⁶ By 1782, nearly three quarters of Manhattan consisted of “degraded forest and shrub,” pushing the island’s old growth forest toward extinction.¹⁷

In line with the adage “never let a good crisis go to waste,” the newly cleared land was quickly built on, and a number of developments set the stage for the nail in the

¹³ Howe; Loeb; Steinberg; Sanderson

¹⁴ Howe

¹⁵ Steinberg, 36

¹⁶ *ibid*

¹⁷ *ibid*



Left: Detail from a 1778 map of King's Bridge in Northern Manhattan, shows the destruction of Manhattan's forests during the Revolutionary War.¹⁸ **Right:** View of Wall Street in 1789. In the years after the war, New York City rebuilt and grew rapidly.¹⁹

coffin for Manhattan's forest, the 1811 grid plan. By the late eighteenth century, deforestation coupled with landfill to make new land along the waterfront led to erosion and storm water issues, leaving New York in "major drainage trouble" with flooded streets and cellars.²⁰ The marshy landscape of wetlands and ponds that characterized the area north of the increasingly dense main settlement in Lower Manhattan was seen as an impediment to growth and was blamed for threats to public health after a yellow fever outbreak in 1732, but efforts to control and develop it were mainly haphazard. By the end of the eighteenth century, the Collect Pond, which had been the main drinking water source for the town, was polluted by tanneries that had set up shop and had been nearly decimated by an attempt to drain the surrounding wetlands in an effort to "clear the whole and drain the same, which when perfected, it is believed will greatly contribute to the health of this City."²¹ Steinberg describes two main factors that ushered in the idea of the grid: the "conquest of the waterlogged frontier north of southern Manhattan's dense settlement," and "urban expansion encountering the local island geography."²²

The idea for the Manhattan grid arose among a debate over how to plan for the future growth of the city for the first time, instead of "stumbling on with the laissez-

¹⁸ Sanderson, 63

¹⁹ *ibid*, 63

²⁰ Steinberg, 37

²¹ *ibid*, 46

²² *ibid*, 42

faire approach”²³ that favored landed property owners over visionary, large-scale urban development.²⁴ Steinberg describes the three commissioners who were tasked with undertaking the surveying and mapping process for the grid plan as sharing a Romantic vision of nature as untamed and wild, with one, Gouverneur Morris, even claiming that “those awful forests” could lead to errors of judgment. The official commissioner’s plan was published in 1811, and proposed a complete transformation of the topography of the island: leveling the terrain, burying streams and marshes, and what they admitted might be a “matter of surprise to some,” a layout with almost no open space.²⁵ Peter Marcuse notes that the Commissioners’ rationale for restricting the amount of open space was that the land was too valuable to be dedicated to anything other than growing the city:

“the water bounding the city provided all the fresh air and recreational opportunity the citizens could desire. In the Commissioners’ words: ‘when, therefore,...the price of land is so uncommonly great, it seemed proper to admit the principles of economy to greater influence than might, under circumstances of a different kind, have consisted with the dictates of prudence and the sense of duty’.”²⁶

The main purpose of the grid was to move New York from “the rank of cities of the second order”²⁷ and grow the population as much as possible.

By the mid nineteenth century, New York was facing a crisis of both drainage and open space, with the few public areas that had been outlined in the grid plan converted into private property.²⁸ The hilly landscape of Manhattan had been “subordinated” to the “speculative real estate logic of the grid,”²⁹ and it had been a massive success: the population had increased by over 50% every decade since the grid plan had been implemented.³⁰ To address the lack of public space, a large public park was proposed and Egbert Viele, the city’s chief engineer at the time, started to work on a design for it. Comparing a map from the mid-eighteenth century to one of

²³ *ibid*, 57

²⁴ Marcuse

²⁵ Steinberg, 62

²⁶ Marcuse, 298

²⁷ Steinberg, 62

²⁸ *ibid*, 86.

²⁹ Howe

³⁰ Steinberg, 108

the present day, he observed how the massive destruction of forests and filling in of the shoreline had disrupted natural drainage:

“‘The dense forests that covered the area drained by these rivers,’ he reflected, ‘served to retard the melting of the snows, the rapid dissolution of which, has since proved so injurious by the annual freshets, not only in immediate damage but in future consequences.’ [...] Viele’s main concern arose from his view that ‘nature, ever true to her laws, maintained an equilibrium.’ To interfere with that steady state, he argued, would have consequences. As he put it, ‘with regard to rivers, nature acts by certain fixed laws... Man cannot change them; all his efforts to do so, have but produced modifications; the evil he attempts to remove, reappears with greater force at another point.’”³¹

Viele took these lessons to heart when he went to work on planning for the new park, and proposed a plan that would keep the natural topography of the space in place and therefore maintain that equilibrium:

“The hills, the valleys and the streams are nature’s penciling on the surface of the earth, rivaling, in their pictured grace, the most beautiful conceptions of the finite mind; to alter them, would be desecration; to erase them folly! Upon a proper understanding of these features, and a proper appreciation of their beauty, depends the unity of the design.”³²

The City ended up holding a competition for a design for what would become Central Park, and instead chose Frederick Law Olmsted and Calvert Vaux’s plan that involved leveling large hills and adding artificial features that worked within the bounds of the grid.

The drainage crisis connected to the mid-nineteenth century population boom put major strains on the harbor, compounded by the massive rise of sewer construction and an associated construction boom of buildings with indoor plumbing. This sewage crisis occurred at the peak of deforestation in the Hudson watershed, which led to increased erosion and more nutrient flow from upstate into the harbor. Acknowledgment of the role of forests outside of the city in protecting the watershed was growing, with a report from the 1840s decrying, “a considerable portion of the forest which once covered the water shed of the Hudson River has already disappeared and the effect of such destruction is already apparent.”³³ The merchant elite at the time, fearing the demand for lumber that was deforesting the

³¹ Steinberg, 86

³² Sanderson, 82

³³ Steinberg, 123

watershed would reduce flow in the Hudson River, began to advocate for making hundreds of thousands of acres of land in the Adirondacks into a preserve.³⁴

After the construction of Central Park, the next several decades were mainly focused on acquiring land to create small parks in crowded neighborhoods of the city, enabled by the Small Parks Act passed by the New York State Legislature in 1887.³⁵ A push by advocates to create more large parks like Central Park and to protect undeveloped areas further from the center of the city from real estate development led to the State Legislature appointing a New Park Commission, which recommended the city take title to several thousands of acres of agricultural and forested land in the Bronx. After Staten Island, Brooklyn, and Queens were incorporated into the City of New York in 1898, park commissioners were appointed for each area, and formed the board for what officially became the Department of Parks of the City of New York.³⁶ The next phase of intense residential real estate development followed World War I, with the population of Queens doubling between 1910 and 1920. Anticipating further residential development, several large parcels of natural areas in Queens and Staten Island were acquired to become parks.³⁷

As chairman of the New York Park Association's Metropolitan Conference on Parks, Robert Moses was instrumental in the 1930 report that recommended the immediate acquisition of thousands of acres of the last natural areas of the city. The report also recommended a system of parkways that would be developed in concert with the new parks. In 1934, Mayor Fiorello La Guardia discontinued the borough-based independent board of Parks Departments, and appointed Moses the sole commissioner of a unified Department of Parks for New York City. As Parks Commissioner, Moses grounded much of his work throughout the 1930s in the

³⁴ *New York Times*, 1882

³⁵ New York City Department of Parks and Recreation, *Park Planning for Greater New York (1870-1898)*

³⁶ *ibid*

³⁷ New York City Department of Parks and Recreation *Playgrounds and Public Recreation (1898-1929)*

recommendations in the Metropolitan Conference report, and took advantage of federally sponsored public works opportunities through the New Deal.³⁸ Tens of thousands of relief workers were hired by the Parks Department, all paid by the federal government, to implement this expansion of parks and parkways. While Moses oversaw the purchase of many natural areas to be preserved as parks, his concurrent leadership positions on several public works authorities combined with his vision for parks as primarily recreational facilities allowed for the development of roads and other infrastructure in many sensitive natural areas, including wetlands. This dynamic is outlined in *The Power Broker*:

“In 1930, Moses, as head of the Metropolitan Park Conference, had led the fight to persuade the city to preserve parts of its fast-disappearing woodland in Queens and Staten Island by purchasing huge tracts for park land. Reformers had cheered him for that accomplishment, it had preserved open space —beautiful, wooded open space—for the city forever. But now Moses was filling that space with baseball diamonds and football fields and tennis courts—and the land for them could be cleared only by cutting down trees. And Moses was filling other parks with playgrounds and stadia and parking fields and handball courts. Throughout the city’s park system, the reformers suddenly realized, grass was giving way to concrete.

The reformers knew that grass had to be supplanted by recreational facilities and parking lots in many of the city’s parks. But not, they were sure, in *all* the city’s parks.

But **Moses’ plans for parks did not include keeping them—any of them—in their natural state.** His plans were not limited to repairing the ravages made in them by Tammany park commissioners so as to restore them to their natural state. His plans were to cram them—cram *all* of them—with bathhouses and tennis houses, baseball diamonds and tennis courts, restaurants and bicycle paths, zoos and asphalted playgrounds with ugly black iron fences around them, as well as with that essence of the city, concrete—the concrete of access roads, through roads and parking lots—concrete instead of precious grass.

It took a while for the reformers to realize what Moses was doing—first, because he kept his plans so secret that it was difficult for them to discern the overall pattern beneath them until they had begun unfolding; second, because they had been so thoroughly convinced that he was a fighter for parks that they did not easily accept the realization that his definition of parks was much narrower than theirs, and perhaps not at all compatible with it, that where they saw in a towering stand of oak and elms and white pine a priceless bounty to a beauty-starved city, Moses saw a baseball diamond. Many of them, in fact, never came during the 1930’s to realize this because they never took the time to study his overall park plans and while they were distressed by what he was doing to a particular park in which they were interested, they accepted his assurances that he was preserving nature in the rest of the park system.

But some of the reformers did come to realize the implications of Moses’ park philosophy rather quickly, and were anxious to discuss it with him. They were anxious that room be found in the park system—which, after all, was a huge one and included thousands of acres

³⁸ New York City Department of Parks and Recreation, *Robert Moses and the Modern Park System (1929-1965)*

of still undeveloped woods and fields and streams—for their values as well as his. They were sure that in a discussion they would have no difficulty explaining to him—for, they all agreed, he was brilliant; the most brilliant public servant, many of them said, that they had ever met—the crucial difference, which apparently he had not yet grasped, between the implications of his philosophy when applied to Long Island parks and parks within the city. On no point, in fact, were they more anxious for discussion. **For the destruction of the natural values of a park was not a remediable mistake; it was one that could never be rectified.** Destroy the delicate natural balance of a marshland to make a concrete-lined lagoon and it did not lie with the power of man to restore that balance (emphasis added)³⁹

Following Moses' retirement in 1960, mayoral candidate John Lindsay campaigned on several new initiatives for parks, including making community involvement in Parks Department policy decisions a priority. Once elected, he appointed Thomas Hoving as Parks Commissioner, a former curator at the Metropolitan Museum of Art. His administration was not known for its interest in natural areas, but Hoving sought to address concerns around the safety of large parks like Central Park through organizing nontraditional large-scale cultural and artistic events in parks that he called "happenings," including banning cars in Central Park on Sundays.⁴⁰ These events brought new crowds back to parks, and initiated a new role for large parks in communities.

In 1984, Parks Commissioner Henry Stern established the Natural Resources Group within the Parks Department to focus on developing management strategies to preserve and protect New York City's natural areas, including forests and wetlands. The Natural Resources Group undertook a series of inventories of park natural areas to better understand the types and condition of categories of vegetation present in parks, and develop strategies to conserve and manage these areas.⁴¹ In the late 1990s, after the Natural Resources Group had restored hundreds of acres of natural areas, they started the Forever Wild program to focus on preserving areas most at risk for development.⁴²

³⁹ Caro, 495

⁴⁰ Hoving; New York City Department of Parks and Recreation, *Rediscovery and Restoration (1965–1987)*

⁴¹ Forgione et al.

⁴² Nowak et al.

The next resurgence in interest in the urban forest came in 2007 with Mayor Michael Bloomberg's Million Trees NYC initiative, a plan to plant one million new street trees throughout the city over ten years. The millionth tree was planted as part of this program in Fall 2016, with an estimated 220,000 trees planted on streets, 480,000 in parks, and 300,000 on private property.⁴³ During the implementation of this program, the Natural Resources Group identified a need to go beyond the qualitative, park-specific inventories that they had traditionally done, and work towards citywide assessments with more quantitative information that would allow them to compare the condition between and across the city's forests and develop and prioritize strategies and goals for long-term management and restoration of these areas.⁴⁴ To help address this need, the Natural Areas Conservancy was founded in 2012 as a citywide Parks Conservancy to work in direct partnership with the Parks Department.⁴⁵

⁴³ milliontreesnyc.org

⁴⁴ Forgione et al.

⁴⁵ *ibid.*

The Roles of Forests in Cities

New York City’s “emerald empire” is much more than its street trees. The city contains over 10,000 acres of forests within the five boroughs,⁴⁶ including several examples of old growth forests.⁴⁷ These natural areas are at risk—from their vulnerability to climate impacts, to development pressures, to a lack of support for and information about managing urban forests. While public parkland is protected by the public trust doctrine under the New York state constitution, there are limited legal protections for urban nature that is not managed by the New York City Parks Department. Urban forests will only become more crucial to quality of life in cities into the future, as their ecological, health, and psychological benefits become increasingly critical to mitigating the impacts of climate change on cities and their residents. In New York City, half of residents’ full experience of “nature” happens within the five boroughs.⁴⁸ Without access to urban forests and other natural areas, millions of New Yorkers would not have any opportunity to access the well-documented physical and mental health benefits of contact with nature,⁴⁹ nor have the experience of learning about and appreciating the important ecosystems that exist in and support the life of the city.

Old growth forests are particularly significant and exceedingly rare, especially in dense urban environments. Only 1% of forests in the Northeastern U.S. are considered to be “old growth.”⁵⁰ Old growth forests have been documented to support more biodiversity, can store more carbon, and have more positive impacts on improving water and air quality than younger natural areas.⁵¹ There are multiple old growth forests within the five boroughs of New York City, which have somehow managed to persist over hundreds of years, if not more in the case of some areas. Other large cities have these areas also, including “ancient woods” in London, the

⁴⁶ Pregitzer, et al. 2018

⁴⁷ New York City Department of Recreation; New York Botanical Garden

⁴⁸ Natural Areas Conservancy, *New York City Nature Goals 2050* (2016)

⁴⁹ South, et al.; Williams

⁵⁰ Old-growth Forest Network

⁵¹ Luyssaert

Oak Woodlands in Golden Gate Park in San Francisco, and more. Learning from these rare and increasingly important spaces—how and why they survived, what unique benefits they provide and challenges they face, and what roles they have played in surrounding communities historically and into the future—will be important to ensuring both their long-term sustainability and can provide lessons for managing other urban forests.

Most studies of the ecosystem services provided by New York City’s trees look at the entire urban forest, which includes the nearly 650,000 trees on city streets as well as trees on private property. Beginning in the 1990s, the City of New York has supported citywide inventories to quantify the benefits of the urban forest. Based on this inventory, the U.S. Forest Service’s 2018 report on the Urban Forest of New York City estimates that New York City’s trees:

- **store about 1.2 million tons of carbon** valued at \$153 million
- **remove about 51,000 tons of carbon per year** valued at \$6.8 million per year
- **remove about 1,100 tons of air pollution** per year valued at \$78 million per year
- **reduce annual residential energy costs** by \$17.1 million per year
- **reduce runoff** by 69 million cubic feet per year valued at \$4.6 million per year

Trees also reduce ambient air temperatures, which provide key health benefits and reduce energy needs in summer and consequent emissions from power plants. The report notes that forested parkland provides a disproportionate amount of ecosystem service benefits relative to its geographic size because of its greater tree density. Forested natural areas make up 5.5% of city land area, but contain approximately 70% of the city’s total number of trees.⁵² Additionally, while the urban forest as a whole contributes to supporting biodiversity, trees in forested

⁵² Pregitzer, et al., 2019.

areas provide crucial habitat and corridors that enable wildlife movement.⁵³ The United Nations Food and Agriculture Organization also recognizes cultural ecosystem services, the non-material benefits obtained from ecosystems including aesthetic inspiration, cultural identity, sense of home, and spiritual experience related to the natural environment.⁵⁴ Nature-based opportunities for recreation and its contribution to mental and physical health also fall under cultural ecosystem services. Given that half of New York City residents have only experienced nature within the city limits, these non-material benefits are crucial to consider to better support equitable access to nature and green spaces in urban areas.

Out of the more than 10,000 acres of forests in New York City, about 3,000 are actively managed by New York City Parks Department employees, contractors and volunteers.⁵⁵ The Parks Department's Division of Forestry, Horticulture and Natural Resources oversees this work and manages these contracts, and additional support is given by many community organizations through the Natural Area Conservancy's Conservancy Engagement Program.⁵⁶ NAC's urban forest assessment found that nearly 2,500 acres of forest are "degraded," needing significant and costly restoration and management to become healthy, and estimates that \$400 million is needed to invest in New York City's natural areas overall to ensure their longevity into the future. According to the New York City Panel on Climate Change, the number of days over 90 degrees in New York could triple by the 2050s, and heat waves will become longer and more frequent.⁵⁷ Extreme heat is also the deadliest natural hazard in New York City, as well as nationally.⁵⁸ Supporting healthy urban forests is one of the most effective ways of reducing the Urban Heat Island effect and moderating extreme temperatures.⁵⁹ However, the issues facing urban forests will change as the climate changes, and new maintenance and management practices

⁵³ New York City Department of Parks and Recreation, *Guidelines for Urban Forest Restoration*

⁵⁴ Food and Agriculture Organization of the United Nations, *Ecosystem Services & Biodiversity - Cultural Services*

⁵⁵ Natural Areas Conservancy, *NYC Nature Map*

⁵⁶ Forgione

⁵⁷ Eds., Rosenzweig and Solecki

⁵⁸ *ibid.*

⁵⁹ Natural Areas Conservancy, *Promoting Forests in Cities Across the United States*

will be needed. This will present challenges both in terms of gathering data and developing new methods, and a shift will be required in how the Parks Department and other entities that manage urban forests function.

Luckily, New York has a significant history of studying and investing in programs to improve urban forest management. Under the leadership of Parks Commissioner Henry Stern, in the early 1980s the Natural Resources Group (NRG) was tasked with evaluating the conditions of the half of the department's portfolio at that time—nearly 8,000 acres of land—that lacked clearly defined uses.⁶⁰ They found a variety of diverse landscapes and habitats, but as they progressed through these inventories, “it became clear that NRG was an eyewitness to the steady and, in some cases, rapid unraveling of New York City’s ecosystems.”⁶¹ Over the past century, wetlands had been filled in, invasive species had overwhelmed native ecosystems, and development had crowded out forests. The work of the NRG over the last several decades has shed light on the underlying problems facing these spaces and has documented how further fragmentation and degradation of forests will exacerbate the pressures of climate change and future urban development and growth, but has also drawn important lessons from examples within the city and from their exchanges with partners to study and implement best practices to restore and sustain the city’s urban forest.

This initial foray into formalizing New York’s urban forest management has led to a range of new programs and publications to share and implement knowledge and best practices that the Parks Department and others have developed since the establishment of the Natural Resources Group. The NRG published *Guidelines for Urban Forest Restoration* in 2014 to bring together decades of research and experience restoring and managing New York City’s forests and other natural areas, and the Natural Areas Conservancy also published the *Forest Management Framework for New York City* in 2018, a plan to guide restoration and management

⁶⁰ New York City Department of Parks and Recreation, *Guidelines for Urban Forest Restoration*

⁶¹ *ibid.*

of the city's forests. Both publications focus on what NRG refers to as "maximizing ecological value in the city,"⁶² recognizing that forests are essential infrastructure that provide important benefits, and that while native forests need to be protected, restored, and expanded, they will never return to a "primeval state." The most frequently cited challenge in these publications and from other groups who work on forest management in New York is invasive and non-native species that crowd out existing or native vegetation.⁶³ Protection from encroachment, development, and further fragmentation is also frequently cited as being a top challenge. New York's forest managers have adopted a "functional" or "ahistorical" perspective on ecological restoration, looking to "enabl[e] the return of a forest ecosystem's fundamental components" rather than attempt to mimic biological, physical, and aesthetic characteristics to return a forest to a prior, original state, since the historical contexts in which these forests grew no longer exist. The forests of New York City were once part of a relatively continuous forest that reached the prairies of the Midwestern United States, and were predominated by the American Chestnut, a species that has been nearly extinct since the 1930s. "Establishing a natural trajectory towards self-sufficiency"⁶⁴ is therefore considered to be a more rational goal than mimicking the historical forest.

This approach underscores why the few remnants of old growth forests that still exist are so important: their relative lack of disturbances over time allow them to serve as references for historical ecosystems that can provide guidance for restoring other forests in the city, and provide 21st century New Yorkers with a window into the ecological past and historic landscape of their city.

⁶² New York City Department of Parks and Recreation, *Guidelines for Urban Forest Restoration*

⁶³ *ibid.*

⁶⁴ *ibid.*

Case: Thain Forest, New York Botanical Garden, Bronx Park

The 50-acre Thain Forest in the Bronx is the largest expanse of New York City's original woodland in the city, and has been managed by the New York Botanical Garden (NYBG) since 1895 when the garden was established. It is a mixed hardwood forest, originally dominated by hemlock trees. It has never been cleared for agriculture, and there is archeological evidence that it was used by the Lenape as a hunting ground.⁶⁵ The land that became Bronx Park, which includes the NYBG, was first purchased by Jonas Bronck, a 17th century Swedish sea captain who purchased 500 acres of land from the Dutch West India company in 1639, and traded with the Weckquaesgeek for additional property.⁶⁶ After Bronck, the forest became part of two actively farmed large estates, the Delancey and Lorillard estates. The Thain forest was never turned into fields or pasture, possibly due to its rocky soil, early land disputes, or "the sylvan beauty of its stands of mature trees".⁶⁷

The City of New York hired Frederick Law Olmsted in 1876 to survey the Bronx and map out streets based on local geography, a different approach than had been taken with the Commissioners' Plan of 1811, which had bulldozed over natural features in order to lay out a rigid grid in Manhattan. He proposed a greenbelt across the Bronx that would consist of a system of parks and parkways aligning with existing features of the landscape rather than a grid. He also recommended the city purchase the Van Cortlandt family's estate, noting the natural beauty of its forests.⁶⁸ This diverged from his design of Central Park, which relied on landscaped features and aligned with the grid. The City never implemented his proposal.

Soon after the City's hiring of Olmsted, John Mulally, the editor of the New York Herald, started advocating in his newspaper for the city to purchase the Van Cortlandt and other estates in the Bronx to develop into parks. His argument

⁶⁵ Schuler and Forrest

⁶⁶ New York City Department of Parks and Recreation, *Bronx Park Highlights*

⁶⁷ Schuler and Forrest

⁶⁸ Olmsted, et al

focused on anticipated population growth in the area, and the need for the city to secure these rural landscapes as protected parks before the land became too expensive with increased development. He was also very concerned with New York's image as being competitive with other similar cities when it came to the amount of parkland in proportion to its population. A New York Times article covering the first meeting of the New York Park Association, which he founded, opens with his statement "giving the statistics in regard to the park acreage of New York as compared with that of other great cities, showing that this Metropolis had been completely outstripped in providing such places of recreation for her citizens."⁶⁹ Mulally also used lessons learned from Central Park's impacts on surrounding real estate values as well as the cost of its construction to advance his case:

"After a careful study of the whole subject the writer was convinced that an enlargement of our park area would be attended by results no less satisfactory and conclusive; in a word, that the city's experience in the case of Central Park would be repeated on a larger scale; that the extension of our park domain NEED NOT COST THE CITY A SINGLE DOLLAR, but that on the contrary it would be a source of profit; that it would add greatly to its embellishment and attractiveness; promote the health and physical development of the rising and succeeding generations; improve our sanitary condition, and contribute to the recreation and social enjoyment of the hundreds of thousands of our toiling masses (emphasis in original)."⁷⁰

The New York Park Association came under criticism from landowners surrounding Central Park, who claimed that assessments levied on them to build the park were unfair and that the city should focus on funding existing parks and building needed (and promised) infrastructure:

"L. Friedman followed Mr. Marsh, and argued against the establishment of a park at the present time. He knew of people who had been ruined by Central Park lots. There were 50,000 lots surrounding parks in this City, all heavily assessed, and yet the upper part of Central Park was still unfinished, while the Morningside Park was in no condition for use. It would be better, he thought, to improve the present parks before spending for new ones above the Harlem. Prof. Arthur H. Dunden said he, too, was opposed to the proposed park. He had lived in the annexed district seven years and paid \$2100 in taxes, but he had never got a gallon of water, a yard of pavement, a foot of gas-pipe, nor a bit of sewer. Parks were luxuries. Sewers were necessities, and it would be better to get the necessities before expending millions for luxuries."⁷¹

⁶⁹ New York Times, 1881

⁷⁰ Mulally, 108

⁷¹ New York Times, 1882

The city decided against creating a new commission to plan these new proposed parks, so the New York Park Association appealed to the New York State Legislature, which passed a law in 1883 authorizing a commission that would be responsible for studying sites for future parks in the Bronx west of the Bronx River. Mulally was named the secretary of the commission, and by 1884 drafted a bill proposing six parks connected by three parkways, including the Pelham Estate, which would be annexed from Westchester County. New York City's mayor at the time, Franklin Edson, argued that the system was too far from Manhattan, and that the land would be too expensive to acquire and too large to manage, but Mulally's newspaper connections and appeals to powerful New Yorkers were enough to get the bill passed. The New Parks Act was signed by Governor Grover Cleveland in June 1884, authorizing the creation of the new park system in the Bronx. The City purchased the forest in 1888 as part of a purchase of nearly 4,000 acres of new parkland for "the sanitary welfare of our metropolis...an increase of its park area, commensurate not only with its present wants but with its future and rapidly increasing necessity."⁷²

What we see as preservation today was also an economic argument: creating "rural parks" from existing natural areas was seen as a way of saving money on landscaping. The analysis that went into selecting the Bronx parks that were established by the New Parks Act of 1884 was driven in part by the experience of Central Park, which was referred to as "mere waste ground" that required a large investment to be transformed into a useful park (although it was not a "waste ground:" a thriving community of mostly black landowners, Seneca Village, was displaced by eminent domain to create Central Park):

"The question of economy was, of course, an all important one, and it was, therefore, constantly kept in view in the determination of the various sites. It was desirable that the tracts should be natural parks, *requiring the least expenditure possible to adapt them for public use*, not like the Central, mere waste ground, the improvement of every acre of which cost thrice the original price of the land."⁷³

⁷² State of New York, 1888

⁷³ Mulally , 131

The beauty and size of the Thain forest was the main reason that Bronx Park, one of the six parks established by the New Parks Act, was chosen as the location for the NYBG. In 1895, a co-founder of the Botanical Garden, Nathaniel Lord Britton, picked the northern part of Bronx Park to establish the garden, specifically targeting an area with dense woodland. He called it “the most precious natural possession of the city of New York,”⁷⁴ appreciating how rare and unique it was. Although buildings and greenhouses were later constructed as part of the facilities of the Botanical Garden, this decision to include the Thain forest in the boundaries of the Garden and largely leave it alone has preserved a rare large example of New York’s original landscape.

The Forest, originally known as the “Hemlock Grove,” has undergone major changes since 1895. The hemlocks that once dominated the canopy began to decline early in the 20th century and have been nearly decimated in the last 30 years by invasive insects. Today, the NYBG describes the forest as: “A canopy of centuries-old oaks, tulip trees, sweetgums, maples, and other native hardwoods [that] rises over dramatic terrain that includes the Bronx River floodplain and gorge, intermittent streams, ephemeral pools, and rocky ridges.”⁷⁵

For many decades after its founding, the NYBG preferred a “let alone” policy of limited intervention in the forest in an attempt to be respectful of natural processes, and their belief that “rural parks” were ecosystems that would manage themselves. This belief was part of the original argument for establishing the park:

“‘These grounds’ it was added, ‘should be rural parks, not artificial constructions requiring the expenditure of millions of dollars without corresponding benefit to the people. Extensive and well-shaded groves, running waters, widened here and there in their course into miniature lakes, broad tracts of meadow land for healthful exercise in athletic sports, camping, parade and rifle grounds; quiet little dells and nooks for picnic parties; in a word, great health-giving resorts for the whole people.’”⁷⁶

⁷⁴ Britton, 1906

⁷⁵ Schuler and Forrest

⁷⁶ Mullaly, 108

Eventually, it became clear that active management of the Thain forest would be necessary to mitigate the impacts of human activity and the urban environment on the forest: soil compaction, over-collection of native plants, pollution, introduction of invasive species, fragmentation, loss of top predators, and now climate change which threatens the remaining native plant communities and habitats.

The NYBG established the Forest Project in the 1980s, a long-term ecological research program with the goal of documenting the impacts of the urban environment on forest health. To address threats to the forest's health, the Garden's 2008 Strategic Plan proposed the creation of a comprehensive program of research, education, and ecological restoration, which has been updated to address the increasing disturbances to the forest caused by climate change and other anthropogenic challenges. The forest is unique in terms of biodiversity, age, size, and urban location, and provides a critical opportunity for the city to conserve native species and habitats, conduct research that could benefit other urban forests, and serve as a resource for educating residents and others about the importance of urban forests and their ecosystems.

Part of this process was to change the official name of the forest from the "Hemlock Grove," when the NYBG recognized that having "Hemlock" in the name would enforce a narrow traditional definition of the forest and would subsequently influence public perception and prevent the Garden from creating a new management strategy. To address threats to the Forest's health, the Garden's *Strategic Plan, Into the 21st Century 2009–2015* proposed the creation of a comprehensive program of research, education, and ecological restoration. To preserve the Forest for future generations, the NYBG now actively manages invasive species, plants native plants, and performs research.

Case: Alley Pond Park, Queens

Alley Pond Park is the second largest park in Queens at 645 acres, and contains some of the oldest forest in the region with tulip, oak, and beech trees that are also among the largest in the city and Long Island.⁷⁷ The park contains one of the only glacial kettle moraine ecosystems left in New York City, and supports a complex network of freshwater and saltwater wetlands, meadows, tidal flats, and diverse wildlife, in addition to forests.⁷⁸

The Matinecock originally inhabited the area that became Alley Pond Park, attracted by the plentiful shellfish in Little Neck Bay.⁷⁹ The park is named after the colonial name for the area, “the Alley,” the origin of which is subject to some debate, but most think it is named for the well-traveled route that passed through the valley that was used to travel from Long Island through Brooklyn to get to ferries to Manhattan in the seventeenth and eighteenth centuries. A 600-acre land grant was given to Thomas Foster in 1673, who built a cottage near Alley Creek. A few mills were built that harnessed water from the Creek, and some light industry was developed, but the area remained largely rural through the end of the 19th century. World War I brought intensive residential development to the whole city, but particularly Queens, where the population doubled between 1910 and 1920. In 1908, William Vanderbilt constructed a privately run parkway through the area, anticipating development to come.⁸⁰

With a booming population and a landscape that was rapidly shifting away from agriculture (In the 1870s, Queens County was the most productive agricultural county in the nation),⁸¹ Queens residents advocated to preserve a landscape that was already well-loved and utilized for recreation, and the City began with a purchase of 330 acres in 1929. An article about the purchase from the Daily Star

⁷⁷ New York City Parks Natural Resources Group

⁷⁸ *ibid*

⁷⁹ New York City Department of Parks and Recreation, *Alley Pond Park History*

⁸⁰ *ibid*

⁸¹ Sanderson, 215

Queens edition includes photos of the area’s pristine kettle ponds and a boy scout camp set up in the woods, and describes how the park area had been used and seen by residents until that point:



Scenes in Alley Pond Park, showing the pond and a woodland path which skirts it (at top); the automobile road leading to the park, a Boy Scout over-night camp and Boy Scouts using the spillway outlet of the pond as a handy washtub.⁸²

Caption: Scenes in Alley Pond Park, showing the pond and a woodland path which skirts it (at top); the automobile road leading to the park, a Boy Scout over-night camp and Boy Scouts using the spillway outlet of the pond as a handy washtub.⁸²

“The Alley Pond section of Queens, which the Board of Estimate has authorized Controller Berry to acquire for a public park, long has been known as one of the most picturesque undeveloped sections of the city. [...] The park site long has been the haunt of campers and trampers, its unexpected woodland paths and virgin beauty untrammelled by the fact that it lies well within the boundaries of the biggest city in the world.”⁸³

The Mayor at the time agreed: “This is an attractive offer and parks must be anticipated for the good of the increasing populations,” Mayor James J. Walker said

⁸² Daily Star, Jan, 25, 1929

⁸³ *ibid.*

after the approval of the \$1.3 million acquisition. “There is no better site in Queens.”⁸⁴

As the park was being designed, some residents worried that the park would lose the natural areas that made it unique. In a 1933 New York Evening Post article, the author decries the approach that the Parks Department had taken to designing other parks in that era:

“Nature lovers who know the beauty and botanical, geological and zoological interest of the kettlehole ponds in the terminal moraine in Queens Borough, many of which have been included in the new Alley Pond and Hillside Parks, hope that the new administration will bring with it a Park Administration which will have sympathy with the idea of preserving these areas in a natural state. The woods and ponds already have been encroached upon by conventional treatment under the Park Administration of the past few years. Pleas for preserving some of them in a natural state and possible development of nature trail areas and plant sanctuaries have not met with much appreciation or any practical response. [...] Naturalists who love this region, so accessible from the city for science classes and students, earnestly hope that the new Queens Park Commissioner, whoever he may be, will sympathize with their hopes and save some of Alley Pond Park in a natural state before it is too late.”⁸⁵

The park officially opened in 1935, and included the first nature trail in the city’s park system, along with playing fields, a bird sanctuary, bridle paths, and a large parking lot.⁸⁶ The press release for the park’s opening notes the attendance at the opening ceremony by Mayor Fiorello H. LaGuardia and Parks Commissioner Robert Moses, and invites New Yorkers to take “an hour’s ramble over the Nature Trail, reading the pages of Nature’s open book, will leave, among many other impressions, one of greater love and respect for our ever silent and useful friends, the trees.”⁸⁷ In 1937, the title for the Vanderbilt private roadway was transferred to the Parks Department, and was converted into a bicycle path.⁸⁸

Although Parks Commissioner Robert Moses attended the opening ceremony for the park with a message focused on preserving and experiencing nature, the Parks Department under his leadership began filling in much of the marshland in the park in order to convert more of the area for recreational uses and to construct the Long

⁸⁴ New York City Department of Parks and Recreation, *Alley Pond Park History*

⁸⁵ Torrey

⁸⁶ New York City Department of Parks and Recreation, *Alley Pond Park History*

⁸⁷ New York City Department of Parks and Recreation, *1935 Press Release for Alley Pond Park*

⁸⁸ New York City Department of Parks and Recreation, *Alley Pond Park History*

Island Expressway and Cross Island Parkway. Works Progress Administration workers lined the brook that fed Oakland Lake, one of the largest kettle ponds in the park, with cement. In 1941, the Sanitation and Health Departments worked with more WPA workers to fill in additional wetlands in an effort to control the mosquito population. As Queens continued to develop, more construction encroached on the park, and roads were constructed that cut through it. In the 1960s, a group called the Alley Restoration Committee started a campaign to restore the park. In 1969, 2000 people marched in a "Walk in the Alley" led by Dr. John Riedl, a dean at Queensborough Community College and chair of the Alley Restoration Committee. The group met with Parks Commissioner August Heckscher, and secured a commitment to speed up plans to rehabilitate Oakland Lake and the surrounding forest. Community pressure to protect the park remained steady, and a local educator, Gertrude Waldeyer, mapped freshwater wetland sites that supported the New York State Freshwater Act.⁸⁹

In 1974, the Parks Department created a Wetlands Reclamation Project and began rehabilitating the natural wetlands of the park. The Alley Pond Environmental Center opened in 1976 to educate the public on the park's history and ecology, reflecting the pleas of advocates from the 1930s who wanted to maintain the park's accessibility for students and educators.⁹⁰

In 1987, the Parks Department's Natural Resources Group conducted an assessment of the park, and found:

"Along with the rich habitat found in some areas, the assessment revealed many problems including frequent arson, dumping, abandoned vehicles, rampant creation of 'desire lines,' and widespread invasion by non-native plant species, with Oriental bittersweet (*Celastrus orbiculatus*) and multiflora rose (*Rosa multiflora*) predominating. Destabilized slopes around the kettle ponds caused by invasive plant encroachment and off-trail mountain bike and ATV usage had led to sedimentation and increased loading of nutrients into the ponds. Through this assessment, NRG created a management plan which prioritized the planting of native forest communities and the installation of fencing, perimeter protection, and erosion control structures."⁹¹

⁸⁹ New York City Department of Parks and Recreation, *Gertrude Waldeyer Promenade at Oakland Lake*

⁹⁰ Alley Pond Environmental Center, *Alley Pond Environmental Center: Our History*

⁹¹ New York City Department of Parks and Recreation, *Guidelines for Urban Forest Restoration*

After this assessment, the Parks Department spent nearly \$1 million to restore Oakland Lake to its natural state, and in 1988 the New York State Department of Environmental Conservation designated the lake and the surrounding area as freshwater wetlands. In 2011, the Parks Department in partnership with the Department of Environmental Protection completed another restoration of Oakland Lake and incorporated it into the city's Bluebelt system of natural features that provide storm water management.⁹²

⁹² New York City Department of Environmental Protection, *NYC Parks Oakland Lake improvement project*

Case: Inwood Hill Park, Manhattan

Inwood Hill Park is located at the northern tip of Manhattan and contains 123 acres of the only remaining old growth forest on the island. It is one of the few areas where the original topography of the island can be experienced. The park consists of ridges, valleys and caves, surrounded by the Hudson River to the west and Spuyten Duyvil Creek to the north. Archaeological evidence of artifacts and signs that caves were used as shelter demonstrate that the area had been occupied by humans for thousands of years, and was home to the Lenape through the seventeenth century who called the area Shorakapok, meaning “the wading place,” “the edge of the river,” or “the place between the ridges.”⁹³ The colonial name for the area was Cox Hill, possibly a variant on Shorakapok. In the seventeenth century, the 166 acres that comprise Inwood Hill were allotted to the Dyckman and Nagel families, who both undertook extensive agriculture in the area, but never constructed homes there.⁹⁴

During the Revolutionary War, the Revolutionary Army constructed a five-sided earthwork fort known as Fort Cox, which fell to British and Hessian troops in November 1776 and was held until the war ended in 1783.⁹⁵ Fort Cox was the only structure in the park until the mid-nineteenth century. A visitor writing about a visit to the pre-park Inwood Hill in the *New Yorker* magazine in 1933 describes walking along the “torturous” Bolton Road, built by Curtis and John Bolton in 1817, who had purchased Inwood Hill in an attempt to develop the area into a residential neighborhood. They laid out building lots, but did not receive much interest and after a few years traded the land for property upstate.⁹⁶ In 1840, Samuel Thompson purchased the large tract of woodland and built an estate that he named “Mount Washington” as a tribute to the area’s Revolutionary War history. The estate was

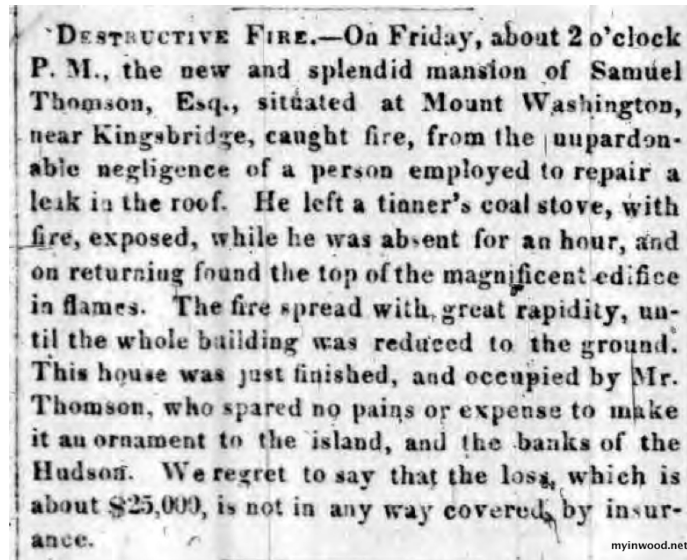
⁹³ New York City Department of Parks and Recreation, *Inwood Hill Park History*

⁹⁴ Markey

⁹⁵ New York City Department of Parks and Recreation, *Inwood Hill Park History*, Horenstein

⁹⁶ Markey

prominent enough to warrant a newspaper article about a fire that burned down their newly built mansion.⁹⁷



From the New York Morning Herald, September 7, 1840.

The estate passed to his merchant son in law James McCreery, who Markey describes as “rich enough, powerful enough socially, to bring neighbors to Inwood.”⁹⁸ Accounts by residents at the time describe a secluded, exclusive area, and the name “Inwood” was meant to capitalize on the woods to brand the area:

“By 1874, the woods and streams of this lovely rus in urbe were as attractive as one could imagine. Calver (1948) recounts in his recollections written in 1932 that in the early 1880s one could still meet farmers who allegedly had not been down to New York for the past 25 years. He relates that the name Inwood was ‘bestowed upon it’ in the 1860s ‘by a venerable clerk of one of our courts—so he told us himself—to encourage its settlement by nature-lovers.’”⁹⁹

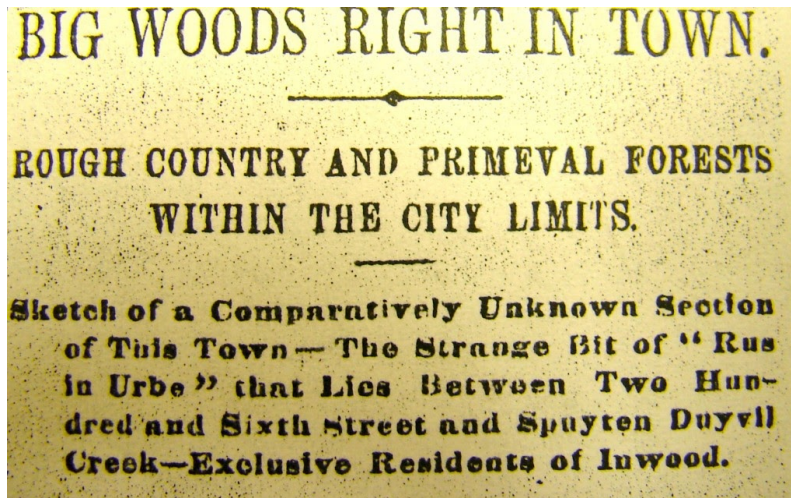
Several estates, described by Markey as “prim Victorian villas” were soon built, but “even with enough people on the hill to make a gay society, even with the laughter and music which grew in mannered drawing-rooms, the curiously sad quality of the place could not be exorcised. The winds from the Hudson screamed through the trees in winter, and in summer the road was often a quagmire, impassable for the horse-drawn carriages which must make the steep ascent.” An 1886 New York World article on Inwood describes the charm of “rough country and primeval

⁹⁷ My Inwood, *The Story of Mount Washington*

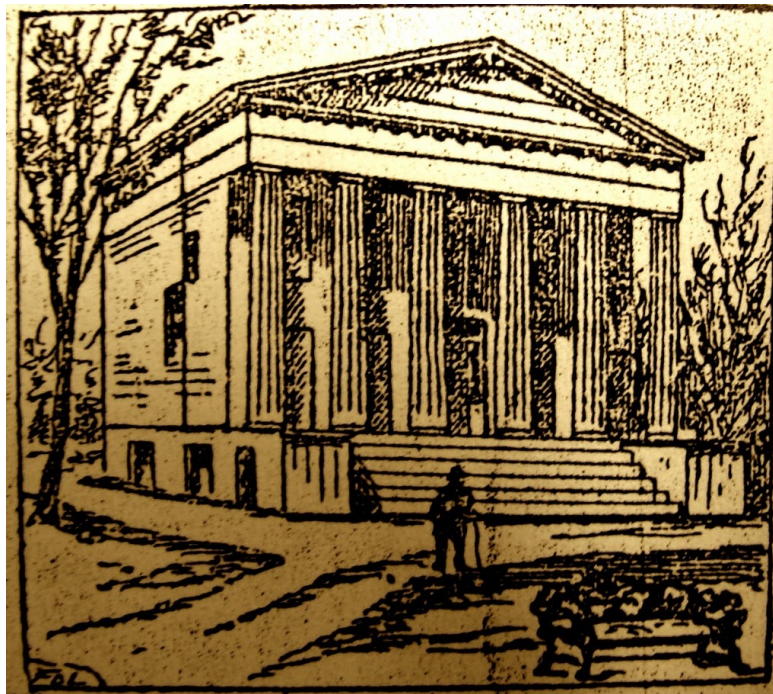
⁹⁸ Markey

⁹⁹ Horenstein

forests within the city limits,” and predicts its impending development: “Inwood is certainly destined, in the course of the city’s growth, to lose its present air of seclusion, but those who have explored its shady dells and enjoyed its rustic solitude must regret the approach of the contractor leveling the woods and blasting the rocks. It is no wonder that the residents of the place are jealous of all innovations looking towards its popularization.”¹⁰⁰



New York World, December 26, 1886



“The Thomson Mansion,” New York World, December 26, 1886.

¹⁰⁰ New York World, “Big Woods Right in Town”

A variety of factors came together that curtailed further development for the time being, most prominent being the “certain establishments of a fixed unhappiness [that] came to perch upon the hill,”¹⁰¹ including a hospital for tuberculosis patients, the House of Mercy, which was “dedicated to the reclamation of wayward girls,” and an asylum.

“As swiftly as Inwood had come into fashion, so now it went out of fashion. The wailing of the girls at the House of Mercy was a disheartening sound. The constant dropping of the flag to half-mast at the House of Rest was a dismal thing to see. People who owned homes at Inwood came to them as rarely as possible, preferring their town establishments. And then Isidor Straus went down on the Titanic. The Grant house caught fire and burned. Soon there was a concerted abandonment of the whole colony by its wealthy residents. The villas were boarded up to gather cobwebs and ghostly legends. Inwood Hill was given over to the institutions for the weak and the dying.”¹⁰²



*“Residents of the upper part of Washington Heights and all of the Inwood section are aroused over the proposition to locate consumptives near them. They assert that the health of their families will be endangered, and a determined fight is to be made to prevent the board of health from issuing a permit for the opening of the establishment.”*¹⁰³

Around the same time, Andrew Haswell Green was assigned responsibility for laying out the streets in the Inwood area. He had been in charge of the Central Park Commission, and was a major proponent of consolidating the five boroughs into one city. He first suggested that a park be created there in 1895, citing his interest

¹⁰¹ Markey

¹⁰² Markey

¹⁰³ New York Herald, “Consumptives Not Wanted At Inwood”

in preserving the unique forest, but also tying into a larger national movement to create local parks as a vehicle for development.¹⁰⁴ The idea did not gain traction quickly, but the discovery of Lenape artifacts, the impending extension of a subway line to the area, and a growing recognition of the need to preserve the few natural areas that were left for open space as development loomed sparked interested in condemning the remaining properties to transfer the land to City ownership.

In 1906, the same year that the IRT transit line opened in Inwood and remaining farms and estates were snapped up to develop six and seven story buildings, the New York Times described Inwood's potential as a park in a spread titled "New York's Historic Landmarks: Shall They Be Allowed to Pass Away?": "Our most comprehensive plan for a public park, however, involves the extreme Northern End of Manhattan Island, Inwood Hill, as it is called. [...] The property which we hope to inclose in this park is about seventy-five virgin acres in extent, covered with an almost virgin growth of trees, and picturesque in the extreme."¹⁰⁵

Part Three
First Magazine Section

The New York Times

SUNDAY, JANUARY 28, 1906.

Part Three
First Magazine Section

NEW YORK'S HISTORIC LANDMARKS

SHALL THEY BE ALLOWED TO PASS AWAY?

What the American Scenic and Historic Preservation Society Is Doing to Save the Antiquities of the Metropolis of the Western World--Secretary Edward Hagaman Hall Calls Attention to Some of the Landmarks Most Worthy of Preservation.

DWY in Nassau Street, surrounded by the great skyscrapers that have sprung up within the last few decades in sight of the bridge and the thronging thousands who daily pour out of the building and down from the elevated road, is a little office whose walls are hung with floor plans of the past--plans of great historical value. The office is the headquarters of the American Scenic and Historic Preservation Society, a national organization, formed and nurtured, through the efforts of its founder, Secretary Edward Hagaman Hall, in a little office whose walls are hung with floor plans of the past--plans of great historical value. The office is the headquarters of the American Scenic and Historic Preservation Society, a national organization, formed and nurtured, through the efforts of its founder, Secretary Edward Hagaman Hall, in a little office whose walls are hung with floor plans of the past--plans of great historical value.



Home of Alexander Hamilton, which the Historic Society hopes to place in a public park.

Where the Oldest House in New York Is to be Found--A Centre of Revolutionary Activity--Should be Included in a Public Park--Interest in Preservation of Hamilton Grange--Survival of an Aboriginal Dwelling in Upper Manhattan.

...of his and other patriotic societies to meet quarterly. According to present plans the grounds about the building will be made into a public park, and with the cooperation of other organizations, we are ready to offer the building as a historical landmark as soon as it can be put in order.

Home of Alexander Hamilton, which the Historic Society hopes to place in a public park.

Washington Headquarters, N.Y. soon to be opened as a historical museum.

Aboriginal cave dwelling, recently discovered in the process of excavation.

Billings Row, Staten Island, oldest house in New York City.

¹⁰⁴ Horenstein

¹⁰⁵ New York Times, *New York's Historic Landmarks*

Perhaps seeing the writing on the wall for large estates in Inwood, or in a philanthropic gesture to preserve open space and the original landscape of the area, Julia Isham Taylor donated land from her family's estate in 1911 to create Isham Park. The donation was widely celebrated and covered in newspapers of the time, and rekindled the campaign to encourage the city to pursue a park on Inwood Hill as well.¹⁰⁶ A 1912 New York Sun article titled "Fight to Preserve Inwood Hill Park" voiced concern that the Borough President was planning to map the area for road construction:

"The American Scenic and Historical Preservation Society is priming for a fight to save Inwood Hill at the upper end of the city, for park purposes. For the last 6 years the city's engineers have been surveying the hill preliminary to laying it out with streets. The survey is now finished and on Tuesday next the plan, which has cost about \$30,000 to complete, will be laid before the Washington Heights board of improvement, comprising the aldermen of that district and borough President McAneny. If this board approves the plan it will be presented to the board of estimate and apportionment.

It is here that the Scenic and Historical Society will make its fight for what it considers the only virgin land left on Manhattan island. If the plan meets with success it means that the strenuous efforts of the American Scenic and Historical Preservation Society, and at least a dozen other societies and civic bodies which have been trying for years to get the city fathers to buy this tract of about 105 acres, have been wasted.

So far they have met with little or no success, and these public spirited citizens are now bending every effort in bringing all the influence they can muster to have the street opening plan, which they consider sacrilegious, voted down for good and all. An officer of the American Scenic and Historical Preservation Society said yesterday that the hill should be preserved and that **the people of New York would see that it was preserved if they only knew what they were losing** (emphasis added).¹⁰⁷

A letter to the editor of the New York Times in 1913 outlined similar concerns:

"Today the greater part of this section is being sold to corporations who will undoubtedly use it to engineer a real estate boom, and I am reliably informed that cutting down the trees will begin within 60 to 90 days. Mr. McAneny knows very well that I have not only given 18 months of my undivided time to this matter, but have done my utmost to prevent detraction from the primitive beauty of this—the last bit of virgin territory on Manhattan—not alone personally, but have induced others to follow my example in averting its commercialization."¹⁰⁸

Encouraged by the Isham Park donation and pushed by the lobbying of several groups concerned about development and advocating for preserving the beauty and

¹⁰⁶ Horenstein

¹⁰⁷ The New York Sun, *Fight to Preserve Inwood Hill Park*

¹⁰⁸ New York Times, Inwood Hill: President McAneny Urged to Make It a City Park

historical significance of the land, the City purchased a small tract of land west of the Isham estate in 1916 to begin the process of securing land for Inwood Hill Park.¹⁰⁹



Cows grazing on current site of Isham Park circa 1900¹¹⁰

With designs on the rest of the land in Inwood Hill by the Parks Department, the status of the remaining institutions in the area were put in limbo, but a 1921 New York Tribune article titled “Neighbors of Inwood’s Ghost” described a thriving new “colony” of houseboats and shacks that had taken advantage of the relative isolation and freedom of the area:

“When, in this year 1921, a group of people can form a colony that is in New York and not yet of it—can beat the high cost of living, twiddle their fingers at landlords, and within fifty minutes of the theater district dwell in perfect simplicity amid surroundings that many a summer resort can’t touch, isn’t it a miracle? That is what I found on the old ghost’s stomping ground.”¹¹¹

On the subject of turning the area into a park, the author condemns the presumed approach that the Parks Department will take to designing the new park, and the “horrible rumor that when the city does this it will fell those magnificent trees and make neat little grassy terraces all the way down the hill to the water on the canal side. But it doesn’t seem as if even a politician could commit a crime like that.”

¹⁰⁹ New York City Department of Parks and Recreation, *Inwood Hill Park History*

¹¹⁰ Museum of the City of New York

¹¹¹ Booth Simmons

In 1924, park advocates found a friend in President of the Board of Alderman Murray Hulbert, who according to the New York Times had “cherished for a long time a dream of adding to Inwood Hill Park a large tract of woodland adjacent to it, in the hope of converting it into a beautiful natural playground.”¹¹² Beyond his interest in a “beautiful natural playground,” he also argued that the 151 acre land purchase would provide the City with valuable right of way for the subway expansion: “If the woodland is taken over, it will not only provide an important extension to Inwood Hill Park, but it will also make available a right of way for the proposed Washington Heights city-owned subway north of the 191st Street terminus without adding to the cost of that project.” It took several years to finalize the amount of damages to be paid to landowners in the desired park area, as well as other land purchases to meet strict terms set by John D. Rockefeller Jr. for development and park preservation in surrounding neighborhoods in exchange for a gift of an estate in Washington Heights.¹¹³ Advocates grew frustrated, summed up by a testy letter to the Editor of the New York Evening Telegram in 1928:

“There are many reasons why the thing should be done now. It is an historic spot and should be preserved in its present condition as much as possible. [...] If the present opportunity is lost it will never come again. The men who planned Central Park and Riverside Drive looked far ahead. Surely it is not asking too much to expect the men of the present generation to see as far as the ends of their noses.”¹¹⁴

By the time the City finalized the acquisition of land and formalized the parcels that would make up the new park, Robert Moses had been named Parks Commissioner of a unified Parks Department for the five boroughs. His approach was similar to developing other new parks with natural areas, capitalizing on opportunities to use the land to tie into designs for growing road and highway networks, and utilizing free WPA labor to execute the plans. The new Inwood Hill Park was ideally located to house an entrance to the new Henry Hudson Bridge, designed to accommodate traffic from the new West Side Highway. As the sole member of the Henry Hudson

¹¹² New York Times, *City Moves to Buy Big Wooded Tract*

¹¹³ The Evening Telegram-New York, *Ask John D., Jr., To Renew Offer*

¹¹⁴ The Evening Telegram-New York, *Get Inwood Hill Park Now.*

Bridge Authority, Moses was able to easily counter the often fierce opposition by open space advocates who had argued to create the park mainly to preserve the forest.¹¹⁵ In a letter to the New York Times in 1936, Moses summed up his lack of interest in preserving the wild, historical nature that advocates wanted to keep intact: “the petrified forest is interesting in Yellowstone Park, but will have no counterpart at Inwood Hill.”¹¹⁶

A 1938 New York Times article decried Moses’ “taming” of Inwood Hill: the “wildest and most picturesque of Manhattan’s parks, it undoubtedly will lose some of its careless, rugged qualities in the process of becoming more useful to the city’s Sunday strollers.”¹¹⁷ The same author painted a stark contrast between the

‘TAMING’ INWOOD HILL

Manhattan’s Wildest Park Will Soon Be Civilized for the Sunday Stroller

From New York Times, April 10, 1938

nearly two decades that passed between the first land being acquired to start the process of creating the park, and Moses’ work to develop it:

“For ten years the park resembled an abandoned farm, though within three blocks of the subway. [...] But in 1934 relief forces were put to work making the park useful to a wider public. Water and lights were put in, macadamized paths built, drains constructed to save the steep hillsides from erosion. The squatters were evicted (although one of them remained until 1937) and the old houses removed. [...] The Department of Parks plans to complete the whole Inwood project sometime in 1939. But younger residents of the vicinity hope that Mr. Moses will leave parts at least of the old hill in the shaggy state they find so delightful now.”¹¹⁸

There are several romantic accounts of life on Inwood Hill before Moses began constructing the park that describe families living in the park’s abandoned mansions

¹¹⁵ New York Times, *Highway Opposed As Park Invasion*

¹¹⁶ New York Times: *Inwood Hill Park Plans: Commissioner Moses Corrects some Inaccurate Impressions*

¹¹⁷ Graff

¹¹⁸ *ibid*

where “nice fellows had built little shacks where visitors were always welcome” and “there was air and sunshine and Indian caves, almost limitless space in which to play,”¹¹⁹ as well as small farm operations, a houseboat colony where “people were merry and lived in little floating homes,”¹²⁰ a renowned pottery studio and school, and a woman who was known as a “Cherokee Princess” who ran a museum about the area’s Native American heritage out of her home and hosted large gatherings for people of indigenous descent who lived in New York City.¹²¹ Facing opposition to evicting these groups, Moses pushed back the eviction date, but did not express much sympathy for either conservation advocates or the people who would be evicted from the park: “The hullabaloo about disturbing the princess, the kiln, the old tulip tree, and other flora and fauna was terrific. Among the protestants were parlor conservationists who manifestly had never climbed Inwood Hill Park who regarded stopping the parkway and bridge as a holy cause and a romantic escape from boredom.”¹²²

Moses took a similar approach to the design of Inwood Hill Park as he did with other parks with large natural areas, filling in wetlands, landscaping flat areas with ball fields, and taking advantage of gaining public right of way for road and bridge construction, but left 123 acres of forest intact.¹²³ Today, only 30 of those forested acres are considered “healthy” according to Parks Department assessments.¹²⁴ In 1995, the Inwood Hill Nature Center opened to educate the public on the ecology of the natural areas and history of the park and surrounding area, and the forest continues to be a popular site for Parks Department educational and volunteering programming.¹²⁵

¹¹⁹ Markey

¹²⁰ *ibid*

¹²¹ Markey, Horenstein, Flint

¹²² Horenstein, quoting Robert Moses in 1970

¹²³ Fitzgerald

¹²⁴ Natural Areas Conservancy *NYC Nature Map*

¹²⁵ New York City Department of Parks and Recreation *Inwood Hill Park Nature Center*

Conclusion and Future Challenges

When the New York City Parks Department's Natural Resources Group undertook its first inventory of the natural areas under the department's management in 1984, they were surprised by what they found:

"The quality, integrity, and diversity of some of the City's natural areas startled even the NRG team. Seeing the tall tulip trees (*Liriodendron tulipifera*) ascending above spicebush (*Lindera benzoin*) and flowering dogwood (*Cornus florida*) in The Clove in Manhattan's Inwood Hill Park, Yale professor of silviculture Dr. David Smith commented that the park '... has stands of trees that rival the famous old growth in the Smokey Mountain National Park.'"¹²⁶

Despite shifting priorities over the centuries, the need to preserve and maintain the forests of New York has played a persistent role in the history of the development of the city. The forces driving that need have changed over time, from intermittent burning by the Lenape, to ordinances to protect the supply of lumber in the 17th century by the Dutch colonial government, the 18th century catastrophic "forest resetting event" of the Revolutionary War that opened up space for and facilitated rapid development, the formation of the Manhattan grid in the 19th century while acknowledging the role of forests as infrastructure and observing the negative impacts of the loss of the ecosystem services they provide, the drive to preserve the last natural areas in the city from development in the 20th century while also using them as a vehicle for development, and the creation of the first programs to formally document and manage the city's natural areas in the late 20th century, to 21st century concerns about climate change and debates over how to leverage forests' role in urban climate mitigation and adaptation.

Questions around forests' role in both protecting land from development and facilitating it have been debated throughout the history of the city, and the future of the approximately ten thousand acres of forest that remain in the city today continue to be subject to those same debates. The current conversation is dominated by tree-planting as a panacea for addressing climate change that will absorb the world's carbon emissions and provide health, recreational and

¹²⁶ New York City Department of Parks and Recreation, *Guidelines for Urban Forest Restoration*

beautification benefits at the same time. At a surface level, these solutions seem like simple wins, but individual trees do not provide the same level and variety of benefits as healthy, old growth forest ecosystems. Urban tree-planting efforts are important, but have to go hand-in-hand with forest protection and management efforts.

The old-growth forests that remain in New York are few and far between, but as the NRG found in their initial assessment of natural areas of the city, they are surprisingly robust and diverse. They are also threatened. The case studies outlined in this thesis demonstrate that they have unique histories and trajectories that led to their formal preservation, but all show a pattern of anticipating and reacting to development that led to their formal preservation. Today, urban natural areas have little formal protection from development, and growing climate challenges present greater needs for management and protection. Understanding this history is important to ensure the burgeoning interest among many cities in the benefits of the urban forest takes into account the forces that have impacted these spaces in the past, and how they have been both helped and harmed by attempts at forward-thinking planning.

Lessons Learned

A combination of geography and luck facilitated the initial survival of these old growth forests in all three cases.

"The most precious natural possession of the city of New York."¹²⁷

It is difficult to pinpoint why all of these old growth forests were able to escape agricultural and then residential and commercial development over the years, as well as the catastrophic impact of the Revolutionary War on the city's forests, but thanks to a combination of geography and luck—they were challenging to develop

¹²⁷ Britton, 1906

and integrate into the grid, in the case of the rocky hills of Inwood Hill Park, or far from the city center like Alley Pond Park, or subject to old land disputes as is rumored about the Thain Forest—they managed to survive into periods of the city’s history when acquiring land for parks was a priority.

They were all formally preserved by transferring them to City ownership as parkland.

“If the present opportunity is lost it will never come again. The men who planned Central Park and Riverside Drive looked far ahead. Surely it is not asking too much to expect the men of the present generation to see as far as the ends of their noses.”¹²⁸

By the time Inwood Hill Park and Alley Pond Park were created, acquiring the land to become parks was the only real legal route available to preserve them. However, acquiring land to create large parks was still without much precedent in New York City when Bronx Park was created. The lack of open space in the Manhattan grid design and a desire to be competitive with the grand open spaces of European cities led to the push to create Central Park, the first large urban park of its kind in the United States, and it was followed by the creation of several small parks around the city. The purchase of large rural estates that were going out of fashion for Bronx Park was a bold investment at the time.

They were preserved as a reaction to rapid development, but arguments that their preservation would facilitate positive development (health, real estate values, public ownership of land facilitating other uses) were a strong factor in their preservation.

“If the woodland is taken over, it will not only provide an important extension to Inwood Hill Park, but it will also make available a right of way for the proposed Washington Heights city-owned subway north of the 191st Street terminus without adding to the cost of that project.”¹²⁹

¹²⁸ The Evening Telegram-New York, *Get Inwood Hill Park Now*

¹²⁹ New York Times, *City Moves to Buy Big Wooded Tract*

The purchase of land to create Bronx Park and other large parks in the Bronx in the 1880s was radical at the time partially because it was out of character with the approach to park development that the City had taken previously, but also because it envisioned a much larger, denser city that most people at the time could not fathom. One of the criticisms at the time was that no one would want to visit parks that were so far away from the main residential area of the city. However, John Mulally and the New York Parks Association that he founded sensed that real estate development was moving quickly, and the example of Central Park was a lesson in how park development could both provide valuable recreational space and immensely drive up land values in the surrounding area. Much of his argument centered on the competitiveness of New York City, citing statistics about parkland per person in other cities and the need for New York to up its game. The purchase also facilitated the annexation of part of Westchester County into the city. As the editor of a newspaper, he also had a powerful platform and as well as connections with which to spread this message, powerful enough to get a state bill passed to

This tension can be observed in the other two cases as well. Advocacy for turning Inwood Hill and the Alley Pond area into parks began shortly after the consolidation of Greater New York in 1898 and the pace of development grew significantly. It is not a coincidence that the “father of Greater New York,” Andrew Haswell Green, was both the first person to publicly propose the idea of turning Inwood Hill into a park and was assigned to lay out streets in the Inwood area shortly after the turn of the century. While the preservation voices were strong and filled the local papers with letters extolling the uniqueness and beauty of Inwood Hill as well as Alley Pond Park, many pro-development arguments were used to justify their purchase as well, including the quote above from the President of the Board of Alderman about gaining right of way to expand the subway system in Inwood. Preservation as development vehicle was part of Robert Moses’ vision as well, who was a major advocate of the quick purchase of the last natural areas of the city in the 1930s, and was also responsible for the implementation of construction of both Alley Pond and

Inwood Hill Parks as Parks Commissioner. His work on both parks went hand in hand with his vision for a parkway system, utilizing public right of way to build roads and bridge entrances in both parks and encroaching on their forest areas.

The public was skeptical that dominant attitudes towards the design of parks would ruin the wild character of these old growth forests.

“There is a horrible rumor that when the city does this it will fell those magnificent trees and make neat little grassy terraces all the way down the hill to the water on the canal side. But it doesn’t seem as if even a politician could commit a crime like that.”¹³⁰

In every case, there are multiple accounts of distrust of the approach that the Parks Department would potentially take in transforming these old growth forests into parks. In the earliest case, Bronx Park, a major part of the argument for selecting the large rural tracts of land in the Bronx that were ultimately purchased was that they could be made into “rural parks” that would be less costly to maintain and design than the overly-manicured and rigid Central Park, and that this approach would also allow for more freedom by park users. There were many rumors swirling around the Parks Department’s approach to Inwood Hill Park over the years that it took to finalize the purchase of land that eventually made up the park, from the terracing referenced in the quote above, to turning it into an open air amphitheater,¹³¹ that in the opinion of advocates would ruin the “last bit of virgin territory on Manhattan.”¹³² In his long-running newspaper column on walking in New York, “The Long Brown Path,” Raymond Torrey expressed similar dismay with the encroachment that had been allowed on Alley Pond Park by the Parks Administration before the park had been fully developed, writing, “naturalists who love this region, so accessible from the city for science classes and students, earnestly hope that the new Queens Park Commissioner, whoever he may be, will

¹³⁰ Booth Simmons

¹³¹ Shurman

¹³² Burns

sympathize with their hopes and gave some of Alley Pond Park in a natural state before it is too late.”¹³³

Future Challenges

One of the bright spots that has come about as a result of increasing awareness among cities of the unique challenges and importance of urban forest management are the collaborative efforts that cities have begun to share knowledge and best practices with each other. Many cities face common challenges, and the Natural Areas Conservancy undertook a survey of urban forest managers to better understand what those challenges are and what steps cities are taking to address them. The majority of cities who responded to the survey cited climate change stressors as a top challenge, but found that less than half of cities consider climate change in their decision making, only 30% use data on climate change projections to inform their work, and only about half of cities have data on how their forests are changing over time.¹³⁴

New York City is fortunate to have extensive data on the ecosystem services provided by its trees, and research by the Natural Areas Conservancy¹³⁵ has shown that forested areas provide more of these benefits because of their greater tree density. Maintenance of urban natural areas has long been a challenge and subject to debate, with Moses’ paving and wetland-filling approach on one end, to natural areas being left to suffer because there was too much emphasis on conserving them in their pristine form, when basic management or other interventions could have saved the ecosystem even if it meant removing trees.¹³⁶ Preserving old growth forests in cities while also maximizing the climate mitigation and adaptation benefits they provide add a new dimension to this conversation. Climate change will—and already is—degrading these ecosystems, and the loss of the functions they

¹³³ Torrey

¹³⁴ Pregitzer, et al. 2018

¹³⁵ Pregitzer, et al. 2019

¹³⁶ Spirn

provide cannot simply be mitigated by planting more individual trees, since many of these benefits are tied to their being old growth forests. This role as a crucial part of the city's infrastructure comes into direct conflict with their role as a link to the historical landscape of the city and an important educational tool.

The Natural Areas Conservancy's most recent forest assessment found that nearly a quarter of the forests in New York need significant and costly restoration and management to become healthy and self-regenerating. The histories outlined in the case studies make clear that their preservation was partially due to geography but mostly hard-won, and that shifts in attitudes and priorities concerning the urban forest over time can and have had significant impacts on their health and survival. While they may be legally protected as parkland, they are still extremely vulnerable, and ensuring their longevity into the future will require challenging conversations about the tradeoffs that may be necessary to address the impacts of climate change. Their importance as spaces that provide access to nature for city residents is also crucial, with half of residents' full experience of nature happening within the five boroughs of the city. Balancing accessibility of these spaces and ensuring more residents have the opportunity to experience the well-documented physical and mental health benefits of contact with nature can come into conflict with the goal of maintaining healthy ecosystems and the wild character of old growth forests. Growing this connection and engagement among New Yorkers with their forests can only help. In 1911, a concerned resident wrote to a local newspaper about preserving Inwood Hill, and said, "the people of New York would see that it was preserved if they only knew what they were losing."¹³⁷ The impending losses connected to climate change are overwhelming, but New York and other cities still have an opportunity to mitigate these impacts by ensuring the sustainability and longevity of these unique spaces into the future, while maintaining an important link to their histories at the same time.

¹³⁷ The New York Sun, *Fight to Preserve Inwood Hill Park*

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