


Frederick Law Olmsted, Green Infrastructure, and the Evolving City

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Abstract

Over the past decade, green infrastructure has emerged as a subject of significant interest in city and regional planning; yet, this discussion is not entirely new. Significant elements can be traced to the work of Frederick Law Olmsted, Sr., in the nineteenth century, and the roots of the urban planning and landscape architecture professions. As evidence, this article frames three aspects of Olmsted's work within contemporary green infrastructure theory and practice: ecosystem services and human well-being; environmental restoration; and comprehensive planning. The article then addresses Olmsted's philosophy regarding the civilizing influence of urbanism and concludes that green infrastructure may be integral to the evolution of the twenty-first century city.

Keywords

Olmsted, green infrastructure, ecosystem services, parks, cities, urbanism

We have reason to believe, then, that towns which of late have been increasing rapidly on account of their commercial advantages, are likely to be still more attractive to population in the future; that there will in consequence soon be larger towns than any the world has yet known, and that the further progress of civilization is to depend mainly upon the influences by which men's minds and characters will be affected while living in large towns.¹

Olmsted, 1870; Figure 1.

Introduction

Over the past decade, green infrastructure has emerged as a topic of significant interest in urban and regional planning.² Identified by the President's Council on Sustainable Development as one of the five strategic areas providing a comprehensive approach to sustainable community development, green infrastructure encompasses both natural and engineered green space across spatial scales,³ resulting in "an interconnected network of natural areas and other open spaces that conserves natural

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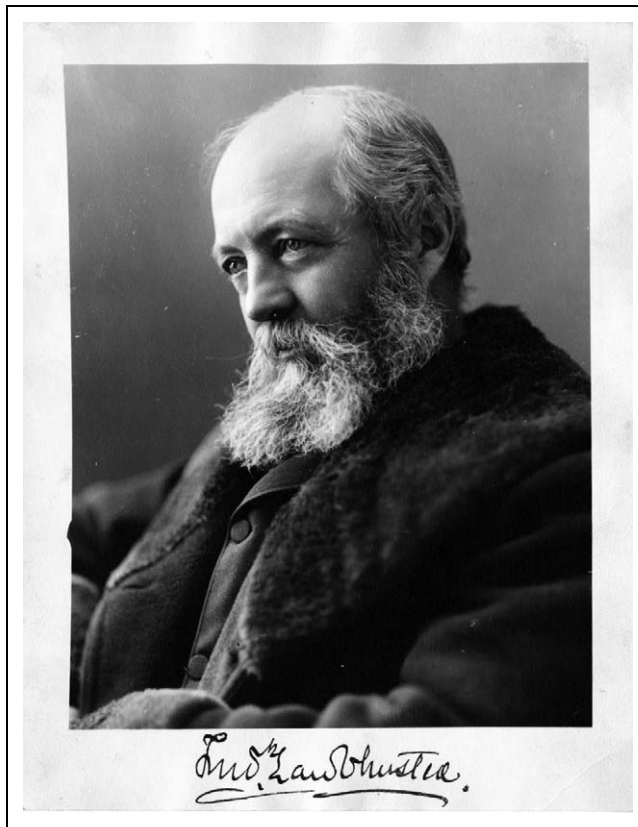


Figure 1. Frederick Law Olmsted, Sr. (c.1895). Photographer: Bartlett F. Henney. Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site.

ecosystem values and functions, sustains clean air and water, and provides a wide array of benefits to people and wildlife ... in short, our natural life-support system."⁴ The foundation of green infrastructure networks are natural elements that work together to ensure the availability of ecosystem services,⁵ which refers to the supporting, provisioning, regulating, and cultural benefits people derive from ecosystems.⁶

Unlike conventional open space conservation that often occurs after the implementation of gray infrastructure such as transportation networks, and water, sewer, and electrical utilities, green infrastructure planning serves as an organizing framework for urban form and growth,⁷ according natural lands the same status as other physical urban elements,⁸ to be protected, managed, and restored in concert with or before land development.⁹ This has important implications for city and regional planning; yet, this discussion is not entirely new. In fact, significant elements can be traced to the work of Frederick Law Olmsted, Sr., in the nineteenth century and the professional emergence of landscape architecture and urban planning.

To illustrate the point, this article frames three aspects of Olmsted's written and built work within contemporary green infrastructure theory and practice: ecosystem services and human well-being; environmental restoration; and comprehensive planning. This is followed by a discussion of Olmsted's belief in the civilizing agency of cities and the relevance of his farsighted, systemic, and public-spirited thinking upon contemporary urbanism. Indeed, in much the same way that Olmsted and the nineteenth-century parks movement responded to the ills of industrial urbanization, green

infrastructure planning and design may play an essential role in the evolution of the twenty-first century city.

Ecosystem Services and Human Well-being

Born in 1822, Frederick Law Olmsted lived and worked in the United States during the height of the Industrial Revolution. In the late eighteenth century, Great Britain initiated an economic transition from manual labor and draft animals toward machine-based manufacturing, expressed through the mechanization of the textile industry, new iron-making techniques, and the use of refined coal for energy. This fuel spurred the development of steam power that greatly augmented production capacity and the transportation of goods and people via railways and ships. These early innovations heralded a period of tremendous technological development in the nineteenth century including the elevator, the bridge, the radiator, electric light bulb, the telephone, sewerage, central power, and new steel construction methods.

An outcome of this technological progress was the prodigious growth of cities. Combined with increasing immigration, the United States experienced a particular surge in urban development during this period. From a 1790 population of four million, the United States expanded to 106 million people in 1920. Reflecting the concurrent expansion of industrialization and urbanization during this period, only 5 percent of the 1790 population lived in cities whereas the majority of people lived in cities by 1920.¹⁰ The industrial era yielded significant advancements in human prosperity. However, the physical and institutional infrastructure of cities was not prepared for this unprecedented urban growth, resulting in lamentable living conditions: horrible air quality from coal-fired factories; contaminated drinking water; pestilence and disease from deficient sewerage and solid waste management; dangerous, traffic-choked streets littered with animal corpses and manure; inefficient movement of goods and services; tenement housing with little fresh air or light; hazardous and unethical working conditions; and extreme income disparities.

These conditions inspired Progressive Era social reforms at the turn of the twentieth century. Noteworthy bookmarks in this important chapter of American history include the 1908 Pittsburgh Survey, the first comprehensive analysis of social welfare addressing issues such as public health, labor conditions, gender, and housing; 1909 Plan of Chicago, arguably the first comprehensive plan and vision for a city, presenting a clean, hospitable antidote to industrial squalor, and a quadrupling of the lakefront that remains public today; and the 1916 New York City Zoning Resolution that ensured light and air circulation through building setbacks.

A unifying thread in many of the social reforms during this period is the amelioration of health and well-being through improvements in the physical fabric of the city, and one of the most prominent expressions of this type of intervention was the nineteenth-century parks movement. In both Europe and America, the ideology of the public park was predicated on the importance of open, public green space to the health and vitality of urban populations. Reflecting the prevailing miasma theory of disease,¹¹ England established a Select Committee on Public Walks following a major outbreak of cholera, urging Parliament in 1833 to promulgate a law requiring every town to build a park.¹² This would lead to the 1847 creation of England's (and perhaps the world's) first public park in the town of Birkenhead near Liverpool.¹³

While traveling through England as a journalist in 1850, Olmsted visited 125-acre Birkenhead Park and was quite impressed. "And all this magnificent pleasure-ground is entirely; unreservedly, and for ever the people's own. The poorest British peasant is as free to enjoy it in all its parts as the British queen."¹⁴ During this period, prominent opinion makers advocated for the establishment of a large park in New York City. Referencing the pleasure grounds of London, Vienna, and Paris, Andrew Jackson Downing—landscape designer and editor of the influential journal *The Horticulturist*—argued in a series of essays that the city needed a large park commensurate with its

aspirations. Likewise, both candidates for Mayor of New York in 1850, and William Cullen Bryant, editor of the *New York Post*, called for the creation of a large urban park.¹⁵ Echoing the “lungs of the city” rationale for urban green space during this period,¹⁶ sanitary and public health reformers, including the American Medical Association’s Committee on Public Hygiene (1849), also advocated for the creation of parks.¹⁷

It is in this context that Olmsted and partner Calvert Vaux won a public design competition to build a new Central Park for fast-growing New York City. Unlike many of the other submissions that featured formal elements such as statues and fountains, and associational references to subjects including US history and world geography, Olmsted and Vaux’s plan—entitled *Greensward*, an English term for a large, unbroken swath of land—was decidedly naturalistic. Where fellow contestants offered minimal annotations, the Olmsted and Vaux plan included a rich descriptive text. “Two classes of improvements were to be planned for this purpose; one directed to secure pure and wholesome air, to act through the lungs; the other to secure an antithesis of objects of vision to those of the streets and houses which should act remedially, by impressions on the mind and suggestions to the imagination.”¹⁸

Here, Olmsted illuminates a theme to which he would return throughout his career, namely, that in addition to physical health risks associated with industrial urbanization, city living can compromise mental health and social bonds. Overexposure to the artificial sights of the urban environment led to “excessive nervous tension, over-anxiety, hasteful disposition, impatience, [and] irritability.”¹⁹ Likewise, the “restraining and confining” condition of city streets compels people to “walk circumspectly, watchfully, jealously . . . [and] to look closely upon others without sympathy.”²⁰ To remedy these detrimental effects of urban living, Olmsted advocated for proactively incorporating natural scenery in cities, “to give the mind a suggestion of rest from the devouring eagerness and intellectual strife of town life.”²¹ Furthermore, public parks would promote democratic values and social life, where people come together, “with a common purpose . . . competitive with none, disposing to jealousy and spiritual or intellectual pride to none, each individual adding by his mere presence to the pleasure of all others.”²²

It is upon this rationale that Olmsted became one of the nineteenth century’s leading park builders and advocates, predicated on an intuitive understanding of the link between nature and human well-being that is the underpinning of what we today know as ecosystem services. The 2005 Millennium Ecosystem Assessment (MA), a United Nations initiative including contributions from more than 2,000 authors and reviewers, frames four ecosystem services as essential to human well-being: *supporting services* such as soil formation, photosynthesis, and nutrient cycling; *provisioning services* such as food, water, timber, and fuel; *regulating services* that affect climate, floods, disease, and water quality; and *cultural services* that provide recreational, aesthetic, and spiritual benefits. The MA also identifies several constituents of well-being derived from ecosystem services, including *health, good social relations, security, and freedom of choice and action* (Figure 2).

Contemporary understanding of the heat island mitigation and stormwater management function of urban vegetation reflects the regulating services inherent in Olmsted’s work.²³ Moreover, a growing body of research now largely substantiates the designer’s early intuitions regarding cultural ecosystem services and the salutary effect of nature contact upon mental health and social cohesion. In a seminal 1984 study, hospital patients with a window view of trees had statistically significant shorter recovery times than those placed in rooms with a view of a brick wall.²⁴ A raft of scientific literature has since emerged that expands upon these findings. Stress has been the subject of much research, “and while not every measure of stress or anxiety shows a nature effect in every study, the overall pattern of findings is crystal clear. Although green environments don’t always reduce stress, they certainly can, and generally do.”²⁵ Benefits include improved physiological indicators of stress²⁶; increased job satisfaction and reduced work-related stress²⁷; less self-reported experience of stress²⁸; and a moderating influence on common childhood stressors such as family strife, divorce, and being picked on in school.²⁹ Even simulacra such as landscape murals, and video and audio recordings of nature, reduce stress.³⁰

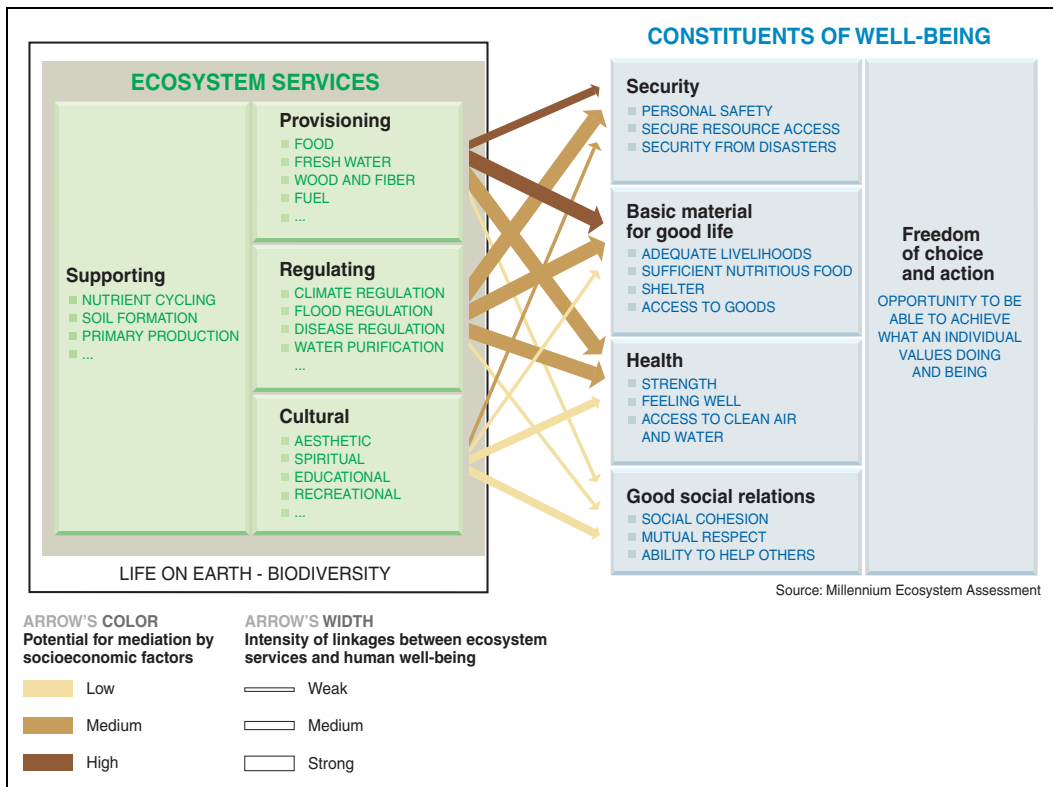


Figure 2. Linkages between ecosystem services and human well-being. Courtesy of World Resources Institute.

Nature contact improves self-esteem and mood among people exercising in green environments.³¹ This holds especially true for the mentally ill³² as well as for people diagnosed with major depressive disorder.³³ Mental health benefits also extend to cognition, where studies show increased memory and attention³⁴; improved concentration among the elderly³⁵; and increased attentional functioning among various demographic groups including women newly diagnosed with breast cancer,³⁶ as well as children with attention deficit/hyperactivity disorder and attention deficit disorder.³⁷ Given that maximum attentional functioning is necessary for optimal academic performance, these findings suggest a potentially important role for green schoolyard settings and children's academic development. Indeed, after controlling for confounding variables, one study found that classroom and cafeteria views with greater quantities of trees and shrubs were positively associated with standardized test scores, graduation rates, percentages of students planning to attend a four-year college, and fewer occurrences of criminal behavior.³⁸ Other studies point to increased math and reading scores, and more creative play.³⁹

Various theories seek to explain the etiology underlying the associations described above.⁴⁰ In addition, a growing corpus points to generally positive links between nearby nature and social cohesion. Also known as social capital or social connectivity, this refers to, "social networks and the norms of reciprocity and trustworthiness that arise from them."⁴¹ A common measure of social cohesion is crime and aggression. While previous research has suggested that low, dense vegetation is associated with actual or perceived crime risk because it affords criminals a place to hide,⁴² more recent studies show an inverse relationship, including: reductions in gun assaults and improved perceptions of safety linked to vacant lot cleaning and greening⁴³; lower crime rates among

single-family homes facing large trees in the public right-of-way⁴⁴; and a 12 percent decrease in crime associated with a 10 percent increase in tree canopy across an urban–rural metropolitan gradient.⁴⁵ These recent studies support pioneering work in Chicago public housing projects, where green views and common areas were associated with reduced psychological violence and aggressive behavior, and decreased violent crime and property crime.⁴⁶

Studies indicate that nature contact in cities may also promote pro-social behavior including: greater use of outdoor spaces by all people, young and old, as well as groupings of youth and adults⁴⁷; more social activities and increased sense of belonging and support between neighbors⁴⁸; greater neighborhood social ties and sense of community⁴⁹; increased amount of social activity in outdoor public spaces⁵⁰; and higher levels of children’s play and access to adults.⁵¹ Likewise, research at larger scales and across socioeconomic groups shows a positive correlation, including higher levels of mutual trust and willingness to help one another,⁵² and reduced feelings of loneliness and perceived shortage of social support.⁵³ The social cohesion benefits described above may, in turn, have health effects for individuals. Based on decades of research addressing physical and psychological health, political scientist Robert Putnam concludes: “Beyond a reasonable doubt . . . social connectedness is one of the most powerful determinants of our well-being.”⁵⁴

In sum, contemporary research on the psychosocial benefits of nature contact in urban settings largely substantiates the intuition of Olmsted over a century ago. While terms such as ecosystem services and green infrastructure were not part of the nineteenth-century lexicon, his writing and built work attest to an early understanding of these concepts. As historian Charles Beveridge points out, underlying all of Olmsted’s public designs was a “desire to use landscape art to meet deep human needs.”⁵⁵ Perhaps, the greatest testament to this point is the popularity of Olmsted’s parks. A recent study found that Central Park has never been more visited and its landscapes never more heavily used than they are today. The Park receives approximately 38 million annual visitors, making it one of the most visited public spaces in the world.⁵⁶

Environmental Restoration

Even though Olmsted adhered to a naturalistic aesthetic, his designs were anything but natural. Having spent a brief teenage period as an apprentice to a civil engineer, Olmsted had a rudimentary understanding of this profession. Decades later, he would draw upon these skills to push the frontier of urban landscape design and create some of the most enduring places in American cities.⁵⁷ Iconic urban elements such as Central Park and Boston’s Emerald Necklace are revered today for their natural beauty. Yet, few people appreciate the degree to which these places have been formed through human manipulation. Even in “wild” places such as Niagara Falls and Yosemite, also touched by Olmsted’s influence, the experience has been shaped to a degree that many do not perceive. In the case of Central Park, where he served initially as superintendent of construction, Olmsted faced immense physical problems. “The park site was swampy, brush-filled, littered with the debris of evicted squatters, crossed by dirt rights of way, and infested with goats . . . Draining, road-making, planting, brush-cutting, and digging artificial ponds were all necessary operations. During the course of his work, Olmsted rearranged almost five million cubic yards of earth and rock to create pastoral vistas; 114 miles of drainage pipe were used before the deceptively natural ponds and fields took their final shape.”⁵⁸

While scenic experience inspired much of Olmsted’s design approach, necessity sometimes required purely functional solutions. Such was the case in the Back Bay Fens and Muddy River, important sections in the Emerald Necklace system of interconnected parks, created over the course of roughly two decades (1880s–1890s). As a collector of sewage and swamp water, Back Bay created a distinct health problem and olfactory nuisance for surrounding neighborhoods. Draining several thousand acres in Roxbury, Dorchester, and adjacent Brookline, Muddy River, and Stony Brook

emptied into the tidal basin of the Charles River through Back Bay. Both streams received raw sewage, which was carried downstream and deposited in the basin of the bay. When the tide fell, some of this sewage was carried out to sea, but a residue remained in the mud flats, “baking odoriferously in the sun.”⁵⁹ Over time, this sewage sludge became incorporated into the mud, eventually killing what remained of the estuary’s original salt marsh ecology. When the Boston Park Commission surveyed the area in 1877, animal life could no longer survive in the waters of the Back Bay.

Equally important was the issue of flooding. Roughly every ten years following heavy rains when stormwater runoff coincided with high tides, this tidal system would back up and flood the lowlands of Roxbury. To address these sanitary and flooding problems, municipal leaders created a three-man commission in 1875. In 1878, Olmsted was asked to review a proposal that had been submitted to this group. Rejecting the efforts of previous designers, Olmsted proposed to simultaneously solve the drainage problems and transform Back Bay into a public park by constructing a tidal marsh instead of a concrete basin. In so doing, he pursued early expressions of contemporary environmental restoration, the “process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed.”⁶⁰

Olmsted succeeded in his argument and convinced municipal leaders to adopt a significant expansion of the project’s original scope and intent. Drawing upon the botanical expertise of Charles Sprague Sargent, Director of the Arnold Arboretum, Olmsted planted two and a half acres with 100,000 marsh grasses, shrubs, flowers, and vines that could tolerate salt and occasional immersion in seawater during storms and high tides. Securing the plants and finding a contractor for such a novel design proved difficult, and most of the vegetation died in the first year. However, the Fens were replanted and within a decade the marsh looked like it was part of the preexisting landscape.⁶¹

According to the landscape historian and Olmsted scholar, Anne Whiston Spirn, the Back Bay project was “the first attempt anywhere, so far as I know, to *construct* a wetland.”⁶² Another Olmsted scholar and expert on the Emerald Necklace, Cynthia Zaitzevsky, underscores the novel approach of this project. “The rationale behind the plan was very far from what was commonly understood as a park. The design was primarily a sanitary improvement, the main feature of which was a storage basin for the storm waters of the Stony Brook. A second aim was to restore the salt marsh to its original condition.”⁶³

Upstream from this site, at the Muddy River, Olmsted also implemented a design that reflects contemporary environmental restoration. Similar to Back Bay, sanitary conditions were the most pressing concern. The increasingly stagnant and brackish condition of the river and swamp had to be ameliorated to protect the health of nearby residents. But the original park system proposed by the Boston Park Commission did not include the Muddy River valley. Olmsted made a strong appeal for, and succeeded, in its inclusion. He warned, however, that the conventional hard engineering solution to the problem for such a waterbody—channeling the river through an underground pipe—would be costly and time-consuming. In the meantime, the valley would become increasingly noxious and deter residential development. Instead, he proposed and ultimately built, a naturalistic riverine landscape (Figure 3).

Similar to his work on the Back Bay Fens, the Muddy River valley project reflects Olmsted’s understanding of the functional, performance-related characteristics of natural systems that are a conceptual underpinning of ecosystem services. Moreover, these environmental enhancement and restoration interventions reflect important tenets of contemporary green infrastructure planning and design. Ahern describes environmental restoration as an “offensive” and “opportunistic” green infrastructure strategy that seeks to rebuild landscape elements and provide ecosystem services in previously disturbed or fragmented urban areas.⁶⁴ Likewise, Benedict and McMahon suggest that “some components of green infrastructure networks might be heavily degraded . . . Restoration needs should be analyzed during the network design phase and prioritized according to the anticipated ecological benefits, reclamation ease, and institutional priorities.”⁶⁵

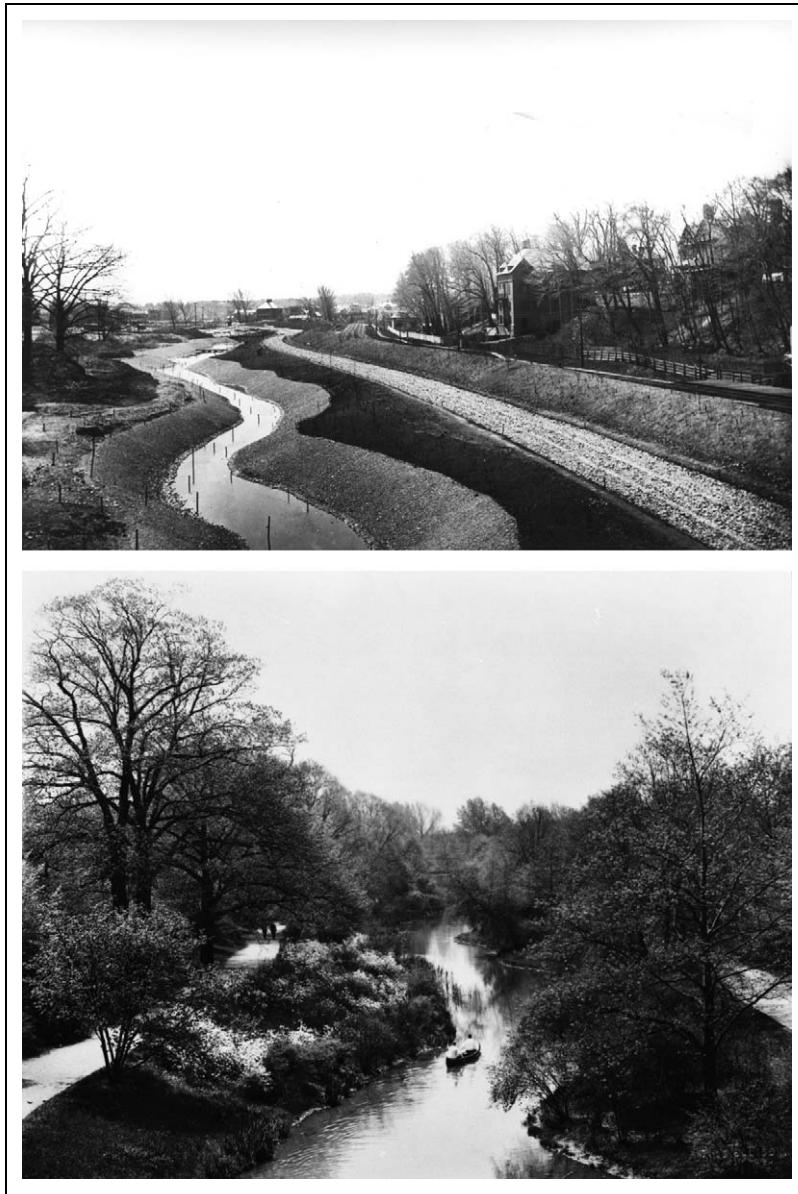


Figure 3. Muddy River during (c. 1892; top) and after (c. 1920; bottom) construction. Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site.

According to biographer Lee Hall, environmentalism and ecology do not appear in Olmsted's writing,⁶⁶ suggesting an anthropocentric orientation. Yet, by replicating the morphology, hydrology, and plant composition of a tidal marsh and riverine landscape in the late nineteenth century, Olmsted's work on the Back Bay Fens and Muddy River established early environmental restoration and green infrastructure precedents. Due to damming of the Charles River in 1910, which shifted the Back Bay system to a freshwater hydrologic and ecologic regime, little remains today of Olmsted's original marsh design. The system still provides important stormwater management and flood

regulating services. However, these functions have been compromised by a range of factors restricting water flow: mid-twentieth-century filling and introduction of culverts; sedimentation; and invasion of *Phragmites* (common reed). The Emerald Necklace Conservancy is now coordinating a multiparty restoration effort including: dredging to restore the original depth and width of the river; a combination of “daylighting” and the installation of larger culverts in areas where the river has been filled; removal of invasive vegetation; and restoration of the historic shoreline.⁶⁷

As part of the roughly seven-mile Emerald Necklace park system connecting to downtown Boston, the green spaces also provide important cultural services including recreation, education, and natural scenery, as well as the potential mental health and social cohesion benefits described above. Moreover, the park serves as urban wildlife habitat: today, eastern red fox, white-tailed deer, muskrats, snapping turtles, an occasional coyote, and some 250 birds make their home in the Emerald Necklace system of parks⁶⁸ (Figure 4).

Comprehensive Planning

An aspect of Olmsted’s work that gets perhaps less attention than his prominent parks is his thinking about the expansion of cities and the need to plan ahead for such growth. As early as 1870, in a speech to the American Social Science Association, he advocated for a “comprehensive and impartial study” of cities. Hinting at the professionalization of landscape architecture and urban planning several decades thereon, he also argued that these questions be, “put into the hands of somebody who is able to take hold of them comprehensively as a matter of direct, grave, business responsibility.”⁶⁹

Indeed, Olmsted’s early advocacy foreshadowed the expert analysis and visioning of long-term future land use, circulation, and open space that were an essential component of over 100 municipal comprehensive plans developed in the first three decades of the twentieth century.⁷⁰ In an 1880 letter to Boston’s Parks Commission advocating for improvements to the Muddy River section of the Emerald Necklace, Olmsted framed his argument in terms that went beyond the site itself, reflecting the temporal and spatial scope of urban planning. “Streets have been laid out upon the uplands upon no continuous system; those of each side independently, and regardless of what may be eventually required in the low lands; the leading motive to make small bodies of land immediately available, at little cost, for suburban residences. The city is rapidly advancing in compact blocks towards the region, and public convenience will, before many years, require a more comprehensive treatment of it.”⁷¹

Operating several decades before the advent of the automobile and associated highways—which would become a primary driver of twentieth-century urban form—Olmsted believed that “a park exercises a very different and much greater influence upon the progress of a city in its general structure than any other ordinary public work, and that after the design for a park has been fully digested, a long series of years must elapse before the ends of the design will begin to be fully realized.”⁷² This strategic, far-sighted stance reflects a core tenet of green infrastructure planning, namely, to work in concert with land development and gray infrastructure planning to manage future growth.⁷³ In practical terms, the Fens project was an operation to rid the city of a festering nuisance. Through the more comprehensive vision advanced by Olmsted and other Boston park advocates, it also became a way of joining new and old sections of the city based on a system of natural lands. A tie to the downtown Commons already existed but Olmsted’s design used the Muddy River drainage area as a critical link enabling the future extension of the Emerald Necklace around the circumference of the city to Franklin Park in Dorchester (Figure 5). In so doing, the Emerald Necklace became the nation’s first comprehensive metropolitan park system,⁷⁴ one whose “skeleton of woods and wetland, road, sewer, and public transit structured the growing city and its suburbs.”⁷⁵

While the Emerald Necklace is one of the most celebrated metropolitan park systems, the conceptual precedent for an interconnected network of green spaces integrated into the city fabric

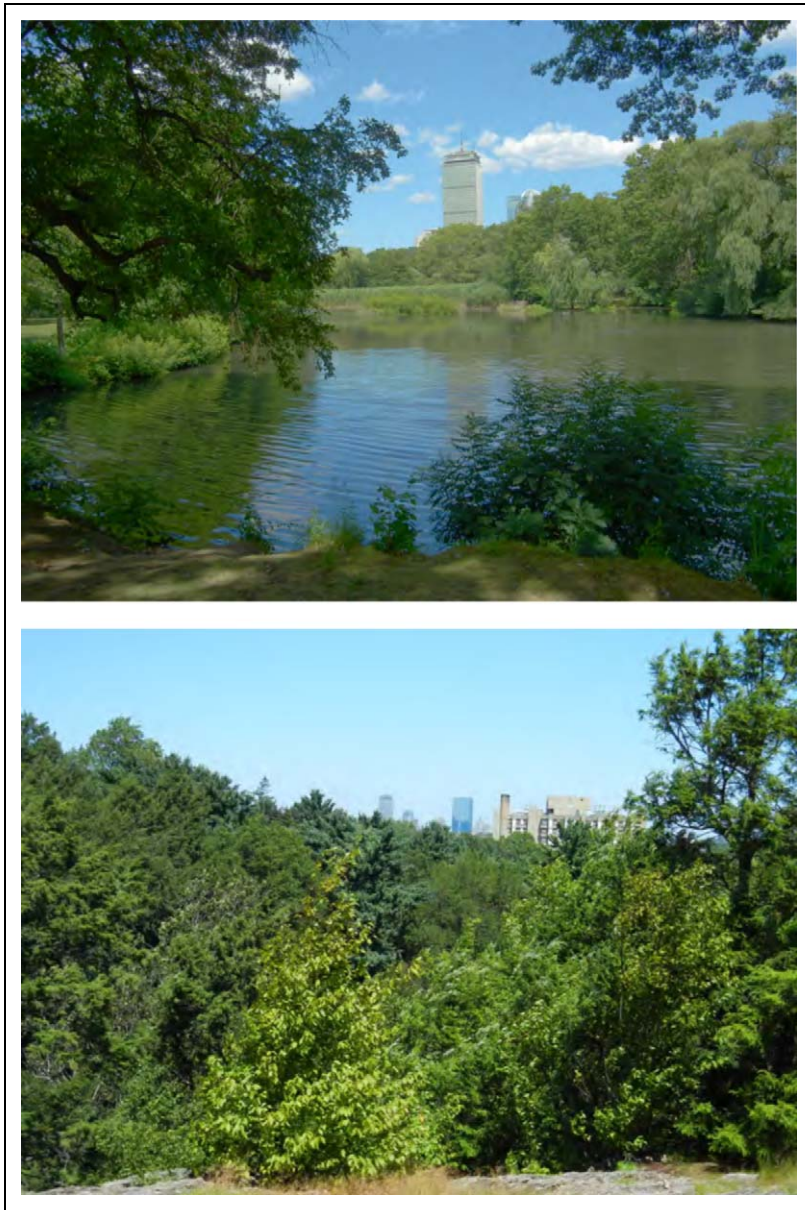


Figure 4. Back Bay Fens (top) and the Arnold Arboretum (bottom) in Boston's Emerald Necklace, 2011. Source: Theodore S. Eisenman.

emerged roughly a decade prior. Inspired by Central Park, Manhattan's neighbor, Brooklyn, employed the services of Olmsted, Vaux and Company in 1865 for a similar undertaking. Anticipating the imminent growth of metropolitan New York and having learned from their work on Central Park, the twosome recognized the limitations of a single park and they sought to extend its benefits beyond the boundaries of an isolated green space by considering its place in both the current and the future metropolis. Responding to this self-generated challenge, the designers urged the creation of a *parkway system*, "a general scheme of routes of approach to and extensions from the Park, through

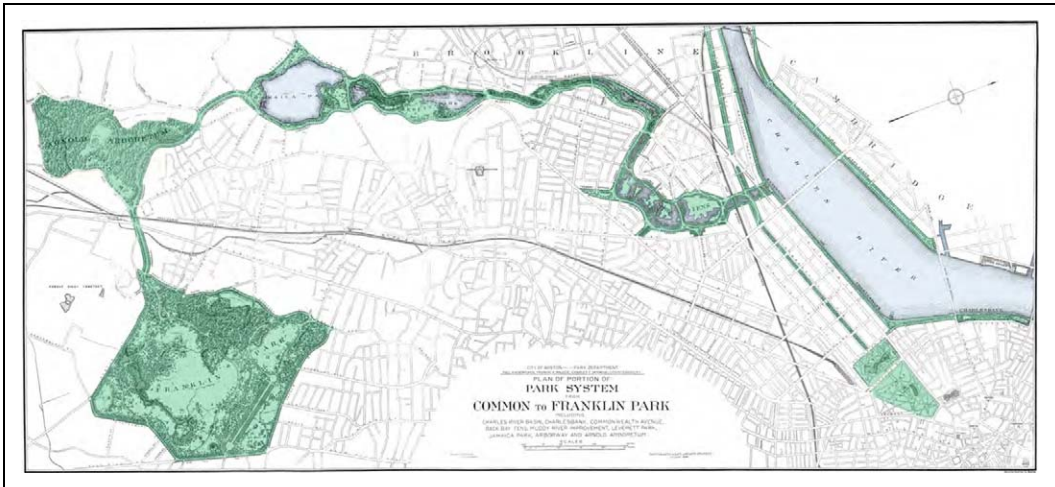


Figure 5. “Plan of portion of Park System from Common to Franklin Park.” Olmsted, Olmsted, and Eliot, Landscape Architects. January 1894. Green areas shaded by author to enhance publication. Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site.

the suburbs, in which the sanitary[,] recreative[,] and domestic requirements of that portion of the city living at the greatest distance from the Park should be especially provided for.”⁷⁶

Schuyler describes this alternative to the orthogonal gridiron as, “radical . . . prescriptions for a new urban form” that ushered in “a new stage in the history of street development.”⁷⁷ Due to financial constraints including the economic panic of 1873, Olmsted and Vaux were unable to realize their citywide green space plan for Brooklyn; however, Prospect Park and two major parkways, Ocean and Eastern, stand today as a partial example of their broader vision. It was in Buffalo, New York, that the partners implemented what biographer Justin Martin describes as “nothing if not revolutionary,” namely, a comprehensive citywide *system of parks connected by parkways*.⁷⁸ Once an inconsequential frontier town abutting the Great Lakes, Buffalo grew steadily from the 1825 opening of the Erie Canal into the eighth largest city in the nation by 1900. In recognition of this expansion, one of Buffalo’s forward-looking leaders, William Dorsheimer, then US District Attorney for Northern New York and later a US Congressman, invited Olmsted to design a park for the city.

“We think it necessary, first of all, to urge that your scheme should be comprehensively conceived,” stated Olmsted and Vaux in a preliminary report. “A large park should not be the sole object in view, but should be regarded simply as the more important member of a general, largely provident, forehanded, comprehensive arrangement for securing refreshment, recreation and health to the people.”⁷⁹ Olmsted convinced Dorsheimer and his colleagues that the city would be best served not by one large park, but rather, an interconnected system of green spaces. Anticipating the city’s expansion, the firm of Olmsted, Vaux and Company proposed and succeeded in building three parks in the northern, largely unbuilt part of Buffalo: the Front, a 32-acre site overlooking the Niagara River and Lake Erie; the Parade, a 56-acre tract along the eastern edge of the city; and The Park (presently Delaware Park), 350 acres of land to the north in an area that was hardly inhabited. Connecting these parks were parkways—200-foot wide “sylvan tributaries”—that acted as extensions of the park experience, allowing one to travel six miles from the Front to The Parade under a canopy of green⁸⁰ (Figure 6).

The first to be constructed in any American city, these parkways were broader than normal city streets and provided separate lanes for different types of traffic. Rows of elms and turf

created a park-like environment for both adjacent residents as well as recreational and utilitarian circulation, resulting in “a complex and refined network of parks, parkways, avenues, and public spaces that represented a degree of sophistication in city planning previously unknown in the United States.”⁸¹ Today, the parkways are largely intact and used for the purpose they were intended, functioning as both verdant conduits to the city’s parks and recreational destinations in and of themselves, for walking, biking, jogging, and a range of passive uses and social gathering⁸² (Figure 7).

In Buffalo and Boston, Olmsted also expressed urban precedents for the “hubs” and “links” composition to which green infrastructure networks aspire (Figure 8). Hubs come in various shapes and sizes and may include large parks, preserves, and working lands. Links are the vegetated corridors that connect the hubs and can serve as biological conduits for wildlife, ecosystem processes such as flood management in riparian areas, and opportunities for outdoor recreation.⁸³ In a historical survey for the European Commission on the birth of urban green infrastructure, Jørgensen describes Olmsted’s work as a nineteenth-century “program for green structure planning.”⁸⁴

Yet, contemporary interpretations of Olmsted’s legacy and his influence on park design and urban planning is fodder for debate. Writer James Howard Kunstler criticizes the degree to which twentieth century American parks have been excessively influenced by Olmstedian adherence to naturalism. He believes that the pastoral aesthetic informing grand projects like Central Park and Prospect Park is not appropriate for the smaller scale public spaces that predominate in most urban settings.⁸⁵ Urban historian Jon Teaford, in turn, suggests that Olmsted’s vision has not stood the test of time. As evidence, he posits that popular preferences for active recreation have usurped the picturesque park, and he further argues that Olmsted’s, “suburban schemes for upper-middle-class enclaves . . . purposely laid the foundations for the class-segregated city of the twentieth century.”⁸⁶

Olmsted biographer and city planning professor, Witold Rybcinski, offers a different take, arguing that twentieth-century planners conceived suburbs as a means of escaping the city, whereas Olmsted perceived the “metropolitan condition” as including cities and suburbs.⁸⁷ Reinforcing the degree to which Olmsted’s conception of the suburb differed from the automobile-centric orientation of contemporary subdivisions, Rybcinski references Olmsted’s position: “But the essential qualification of a suburb is domesticity, and to the emphasizing of the idea of habitation, all that favors movement should be subordinated.”⁸⁸ The biographer also reinforces Olmsted’s understanding that a potential drawback to suburban living was isolation. Thus, at Riverside, an early suburb near Chicago, Olmsted, Vaux and Company set aside roughly a third of the 1,560 acres as public greens and commons, including a 160-acre park on both sides of the adjacent Des Plaines River.⁸⁹

Another Olmsted biographer, Melvin Kalfus, argues that the nineteenth-century urban designer’s principles regarding regional planning are as relevant today as when they were first articulated over a century ago. “Olmstedian ideas are today part of an even larger struggle than simply that of preserving our nineteenth century heritage as embodied in a given park or parkway. This larger struggle has to do with the need to combat modern urban sprawl through regional planning.”⁹⁰ Referencing contemporary efforts to conserve open space in the New York, New Jersey, and Connecticut region by acquiring parks and linking together scenic areas with corridors of undeveloped land, Kalfus adopts the observation of Schuyler that this approach to comprehensive metropolitan planning, “was in fact pioneered by Olmsted and Vaux in the decade following the Civil War, and it was central to the design work Olmsted and his associates later performed in cities such as Buffalo and Boston.”⁹¹

Zaitzevsky reinforces the primacy Olmsted placed on open space networks as critical scaffolding in urban plans. “Olmsted consistently viewed every park design as part of a comprehensive city plan. For him a park was never an ornamental addition to a city but an integral part of its fabric and a force for

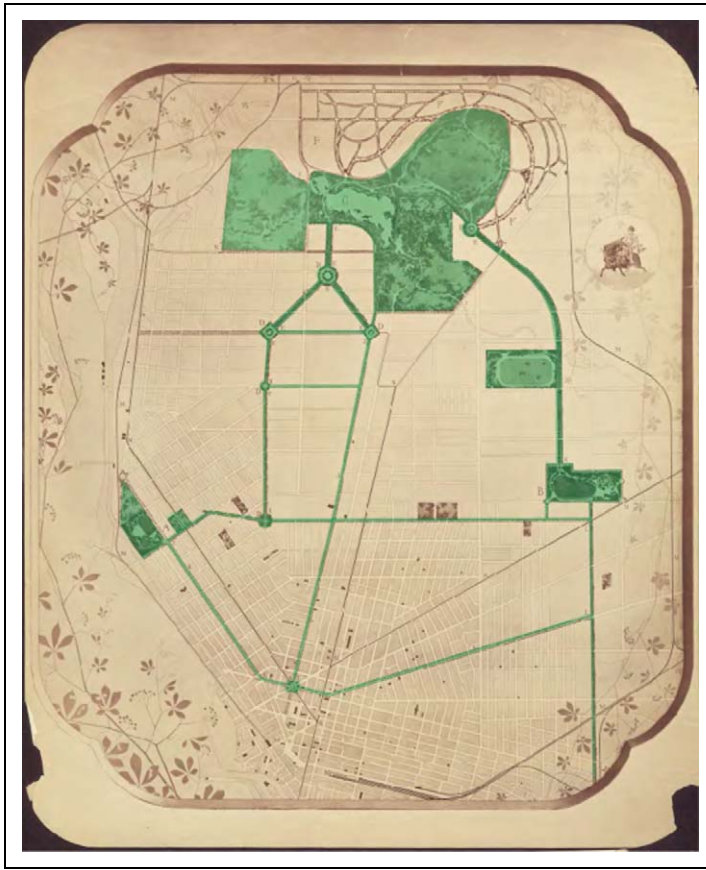


Figure 6. Frederick Law Olmsted, Sr. 1876 map of north Buffalo, showing Olmsted and Vaux’s original park and parkway system. Proposed green spaces shaded by the author to enhance publication. Courtesy of the National Park Service, Frederick Law Olmsted National Historic Site.

future growth on several levels: geographic, economic, social, and cultural.”⁹² This speaks, perhaps, to one of Olmsted’s greatest contributions, namely, his clear recognition of the continued expansion of cities and the need to strategically plan for such growth. “The rapid enlargement of great towns which has hitherto occurred, must then be regarded as merely a premonition of the vastly greater enlargement that is to come.”⁹³ Apprehending this growth, Olmsted viewed a physically linked system of vegetated spaces and corridors—green infrastructure—as essential in shaping urban expansion across time and space. Importantly, the “farsightedness” and “systematic” scope of the nineteenth-century parks movement that he led were essential qualities of the comprehensive purview that served as an antecedent to the birth of urban planning in the early twentieth century.⁹⁴

A telling illustration of Olmsted’s influence came at an 1893 gala dinner to honor the leadership of Daniel Burnham, the driving force behind the Chicago World’s Fair Columbian Exposition, regarded as a seminal moment in the birth of professional urban planning. When Burnham took the stage, he deflected credit away from himself: “Each of you knows the name and genius of him who stands first in the heart of and confidence of American artists, the creator of your own parks and many other city parks. He it is who has been our best advisor and our constant mentor. In the highest sense, he is the planner of the Exposition—Frederick Law Olmsted.”⁹⁵

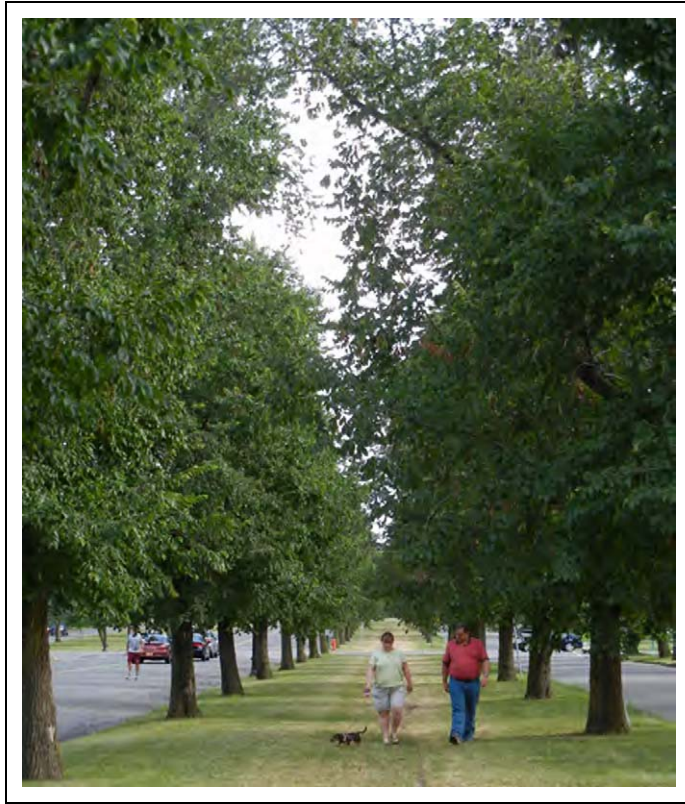


Figure 7. Lincoln Parkway, Buffalo, 2011. Source: Theodore S. Eisenman

Urban Evolution

Like many nineteenth-century progressive thinkers, Olmsted perceived the unhealthy conditions of the industrial city as drivers of reform. He did not, however, advocate a romantic return to an agrarian past, nor did he incriminate modernity, industrialism, or urbanity. To the contrary, Olmsted was a great champion of the city, and he defended the economic, educational, and cultural opportunities it provides. Yet, he believed that these urban advantages are often accompanied by disadvantages such as sickness, poverty, and a “psychosocial environment inimical to the mental health of the inhabitants.”⁹⁶ Importantly, he perceived no necessary relationship between the benefits and dysfunctions of urban living.

Echoing political economist John Stuart Mill’s assertion that the progress of humanity is related to the concentration of populations in cities,⁹⁷ Olmsted believed that civilization—expressed through the city—evolves through a process of stage-by-stage emergence to higher forms.⁹⁸ So essential was this developmental philosophy of urbanism, that S. B. Sutton entitled her 1971 edited collection of Olmsted’s writings, *Civilizing American Cities*, a perspective with roots dating to classical Greece, where the term *polis* means city and *politismenos* connotes a person who is cultured by virtue of living in the city.⁹⁹

Reflecting this etymology, Olmsted states, “There can be no doubt then, that, in all our modern civilization, as in that of the ancients, there is a strong drift townward. But some seem to regard the class of symptoms I have referred to as those of a sort of moral epidemic, the crisis, and reaction of which they constantly expect to see. They even detect already a growing disgust with the town and signs of a back-

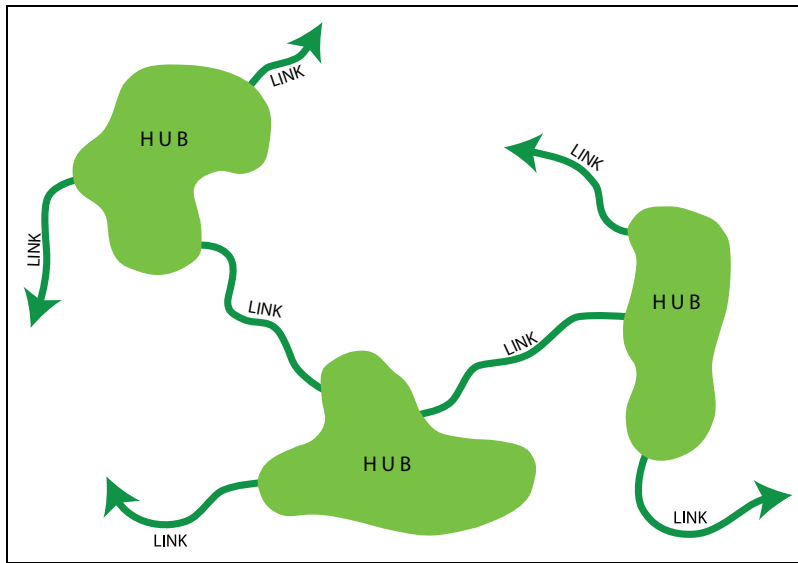


Figure 8. Conceptual Green Infrastructure System. Courtesy of Heritage Conservancy.

set towards rural simplicity. To avoid prolonged discussion of the question thus suggested I will refer but briefly to the intimate connection which is evident between the growth of towns and the dying out of slavery and feudal customs, of priestcraft and government by divine right, the multiplication of books, newspapers, schools, and other means of popular education and the adoption of improved methods of communication, transportation, and various labor-saving inventions.”¹⁰⁰

It is noteworthy that this belief in the developmental, civilizing influence of urbanism departs from an antipathy and ambivalence toward American cities expressed by many of the nation’s leading intellectuals, including Thomas Jefferson’s notions on agrarian moral superiority, and progressive nineteenth-century contemporaries such as the New England Transcendentalists.¹⁰¹ Historian Andrew Menard describes Olmsted’s perception of the city as one of the most positive and liberating forces in human history,¹⁰² and the landscape architect would express humanistic, democratic values through the creation of the country’s first public parks. These communal spaces oriented toward the middle class were essential drivers of “the new urban landscape” that emerged in nineteenth-century American cities.¹⁰³

Within these public places, he consciously sought to provide for a range of uses to meet the needs of an increasingly diverse society. Moreover, Olmsted believed that in addition to health and well-being benefits, nature had the power to touch and rearrange the minds and hearts of all human beings, and thus, the capacity to remind all citizens of their equality.¹⁰⁴ Arguing for the preservation of Yosemite Valley and Mariposa Big Pines in 1865, an important chapter in the formative years of the American conservation movement, Olmsted stated, “It is the main duty of government, if it is not the sole duty, to provide the means of protection for all its citizens in the pursuit of happiness against the obstacles, otherwise insurmountable, which the selfishness of individuals or combinations of individuals is liable to interpose to that pursuit.”¹⁰⁵

This articulation of environmental protection as a fundamental responsibility of democratic governance reflects contemporary ideas relating to social equity and sustainability, both of which are especially relevant in the urban greening discourse. As mentioned earlier, the President’s Council on Sustainable Development has identified green infrastructure as the first of five strategies in a comprehensive approach to sustainable community development. Likewise, a review of advances in

the history of American infrastructure identifies sustainability as a driving force in the contemporary emergence of green infrastructure.¹⁰⁶

The Brundtland Commission's definition of sustainable development that "meets the needs of the present without compromising the ability of future generations to meet their own needs," emphasizes the idea of intergenerational equity.¹⁰⁷ Interestingly, this concept of justice within and between generations aligns with Olmsted's outlook in the nineteenth century, as evidenced in a preliminary report describing the rationale for the first citywide systems of parks and parkways in Buffalo: "Even in the initiatory discussions of a plan for such a work, therefore, it would be unwise to have in view merely the satisfaction of the probable demand of those who will be expected to use it in the immediate future. If a park should prove not adapted to the requirements of those who are to come after us, and even of those who are to come after our immediate successors, the outlay which will be needed for it would be an extravagant one."¹⁰⁸

This focus on intergenerational equity was consistent and clear. "I by no means wish to suggest that nothing should be done for the present generation; but only, that whatever happens to the present generation, it should not be allowed to go on heaping up difficulties and expenses for its successors, for want of a little comprehensive and business-like foresight and study."¹⁰⁹ Viewed within this ethical and temporal context, Olmsted's greatest contribution to posterity may not be the specific compositional, functional, or aesthetic qualities of his designs for parks, parkways, and park systems, as successful and influential as they have proven to be. Rather, it is Olmsted's public spirited, future-oriented, and systemic thinking about urbanism, and his underlying belief in the developmental, uplifting capacity of cities that may be one of his most notable legacies. Most important of all, perhaps, was his intention to be an agent for urban evolution.

As the world enters the "century of the city," characterized by a second historic wave of urbanization in Asia, Africa, and Latin America, as well as aging infrastructure and sprawling, unsustainable development patterns in the United States,¹¹⁰ an essential attribute of twenty-first-century urbanism may be the capacity to consciously and strategically evolve. This becomes all the more pressing when one considers the realities of peak oil,¹¹¹ climate change induced sea level rise, storm events, and extreme heat,¹¹² and the unprecedented influx of people into urban areas. Moreover, studies show that contemporary city dwellers have an increased risk for anxiety and mood disorders,¹¹³ and the risk of schizophrenia is greater in people born and raised in cities.¹¹⁴ Indeed, the innovative qualities that fueled the parks movement and the birth of urban planning over a century ago may be the same impulse that would benefit cities today.

This is not to suggest that the Olmstedian landscape is necessarily the appropriate response to current challenges. Contemporary proponents of "landscape urbanism," for example, depict efforts to introduce a naturalistic aesthetic into the urban fabric as naïve and irrelevant in the face of global urbanization. Instead, this urban design theory advocates for breaking down the perennial divide between nature and city through the "interweaving," "stitching," and "conflation" of landscape with infrastructural systems.¹¹⁵ This proposition is supported by increasing interest in stormwater management strategies featuring green infrastructure such as sidewalk and street median plantings, rainwater gardens, vegetated swales, green roofs, and pervious paving, which have been shown to be cost-cutting alternatives to upgrading sewers and water treatment facilities¹¹⁶ (Figure 9). Other studies and programmatic initiatives have identified the importance of green infrastructure interventions such as vegetated roofs and walls, in addition to street trees and parks, to mitigate extreme urban heat events from rising temperature associated with climate change.¹¹⁷ Schilling and Logan, in turn, frame green infrastructure as a strategy to revitalize neighborhoods, empower community residents, and stabilize dysfunctional real estate markets in shrinking Rust Belt cities,¹¹⁸ while others illuminate the environmental and human health benefits of urban gardening.¹¹⁹

Reflecting evolving notions of urbanism, Cranz and Boland posit that public parks have entered a fifth developmental stage since their birth a century and a half ago. This stage—the Sustainable

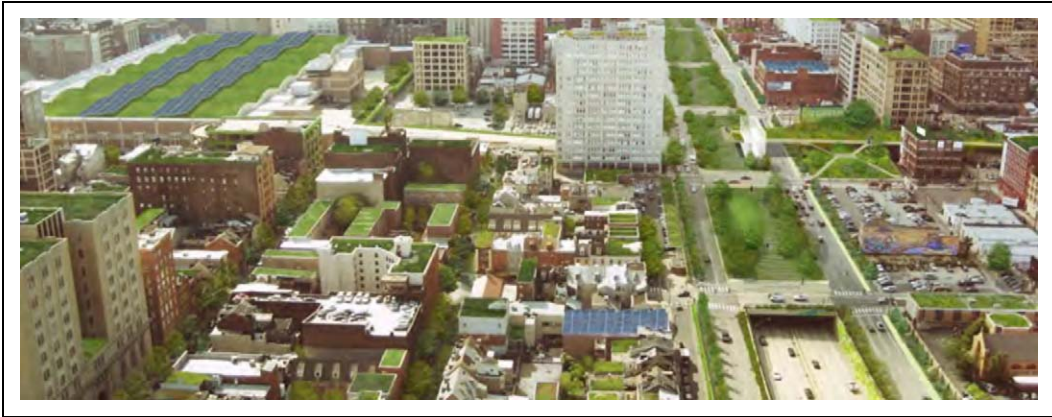


Figure 9. Simulated rendering of city infused with green infrastructure. Courtesy of Philadelphia Water Department.

Park—seeks to address human and ecological health through integration with the larger urban system via green infrastructure.¹²⁰ Pincetl and Gearin reinforce the view that urban parks and public green space are undergoing an historic reevaluation but suggest that this reflects changing attitudes and values about nature, race and class, and equity. Focus group discussions in Los Angeles revealed a strong desire for enhancing quality of life by providing naturalized environments along “necessary journeys” such as walking to the bus or metro stop or school. This argues for a contemporary greening agenda that prioritizes vegetated streetscapes and public rights-of-way instead of traditional, and often inaccessible, parks and nature on the urban periphery.¹²¹

These emerging norms reflect a central thesis—the public realm framework—of urban planner Alexander Garvin’s vision for livable cities: “A community’s public realm comprises its streets and squares, its transportation systems and public buildings, and its parks . . . it is the skeleton around which everything else grows.”¹²² Coupled with mounting evidence for the health and well-being benefits of nature contact, and the substantial investments that municipal governments make in public infrastructure,¹²³ this orientation suggests a strong rationale for elevating green infrastructure as a prominent ordering principle in city and regional planning.¹²⁴ Indeed, in much the same way that Olmsted and the nineteenth-century parks movement responded to the ills of industrial urbanization, green infrastructure may be integral to the evolution of the twenty-first century city.

Author’s Note

During final formatting of this article, the American Planning Association released a new publication, *Green Infrastructure: A Landscape Approach*, stating that “the impetus to reintegrate nature into patterns of human settlement has acquired greater urgency today” (Chicago: 2013, 9). Likewise, the Urban Land Institute and Centre for Liveable Cities released *10 Principles for Liveable High-Density Cities*, wherein a priority is to “draw nature closer to people.” As a precedent, the report references Singapore’s strategy of providing, “pervasive greenery . . . to cloak spaces with green wherever the eye could see” (Hong Kong: 2013, 25-26).

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77. Schuyler, *The New Urban Landscape*, 126, 128.
78. Martin, *Genius of Place*, 292.
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82. Humboldt Parkway connecting Delaware Park in the north to the Parade in the east was converted to a six-lane state highway in the mid-twentieth century to accommodate increased vehicular traffic. More recently, Porter Avenue, connecting the parkway system to Front Park in the west, has been upgraded to include new sidewalks, ornamental lighting, replacement trees where needed, and a bike lane. Brian Dold (associate landscape architect, Buffalo Olmsted Parks Conservancy), in communication with the author, September 2012.
83. Randolph, *Environmental Land Use Planning and Management*; Benedict and McMahon, *Green Infrastructure*.
84. Karsten Jorgensen, "The Origins of Urban Green Structures," in *COST Action C11. Green Structure and Urban Planning: Final Report*, ed. Ann Carol Werquin et al. (Luxembourg: Office for the Official Publications of the European Communities, 2005), 227.
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86. Jon C. Teaford, "Landscaping America," *Reviews in American History* 15, no. 4 (1987): 661.
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94. Jon A. Peterson, *The Birth of City Planning in the United States, 1840-1917* (Baltimore, MD: The Johns Hopkins University Press, 2003), 22.
95. Burnham 1893, in Martin, *Genius of Place*, 1.
96. Irving D. Fisher, *Frederick Law Olmsted and the City Planning Movement in the United States*, 2nd ed. (Ann Arbor, MI: UMI Research Press, 1986), 96.
97. John Stuart Mill, “Principles of Political Economy with Some of Their Applications to Social Philosophy,” in *Collected Works of John Stuart Mill*, vol. 2:120, 3:708, ed. J. M. Robson, (London: University of Toronto Press, 1965). Olmsted dedicated his three-volume documentation of the antebellum south to Mill. Frederick Law Olmsted, *The Cotton Kingdom: A Traveller’s Observations on Cotton and Slavery in the American Slave States, vol. 1, 2* (London: Sampson Low, Son & Co., 1862).
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99. *Politismenos* is a contemporary Greek word not found in Attic (Classical) Greek. The basic meaning is cultured or civilized. Greek uses the term *polis* (city-state) as the root for words connoting cultured, in a similar manner that “urbane” (sophisticated; cosmopolitan) was derived in English from the Latin word for city (*urbs*); Jeremy McInerney (Professor of Classical Studies, University of Pennsylvania), in communication with the author, October 2011.
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104. Hall, *Olmsted’s America*, 242.
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124. See page 39 in note 115 above, describing landscape urbanism as the use of infrastructural systems and the public landscapes they engender as “the very ordering mechanisms of the urban field itself.”

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