

Landscape ecological urbanism: Origins and trajectories

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ABSTRACT

Landscape offers a complex way of seeing, understanding, and shaping environments. In its Dutch origin, *landschap* meant to adapt cultural and natural processes to create new territory. As the word moved into English and other languages, it took on visual meaning as well. In several ways, landscape ecology helped return the word to its root meaning. Developments in urban ecology and landscape urbanism open new possibilities to restructure ecosystem understanding and city design. This essay will explore the concepts and evolution of landscape urbanism and urban ecology, as well as a possible synthesis—landscape ecological urbanism. Such a synthesis is important, given global trends in urbanization, population growth, climate change, energy use, and water availability.

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1. Introduction

City design and planning are especially important in what has been called the “first urban century,” with a majority of people on the planet living in city-regions for the first time in history. Since the mid-1990s, two ideas emerged with implications for how we design and plan cities in the twenty-first century: landscape urbanism and urban ecology. Landscape urbanism evolved from design theory within both architecture and landscape architecture. It melds high-style design and ecology. More traditional ecological design is perceived as messier (some detractors call ecological design practitioners ‘weedies’) and, as a result, less appealing to international design elites. Thus far, landscape urbanism is largely theoretical, with a few, highly visible actual projects.

Urban ecology evolved from science-based research. Scholars apply ecological methods, largely developed in non-urban places, to metropolitan regions. To date, urban ecology exists primarily within the world of academic journals and books. Policy and design implications have been suggested but not yet implemented.

Landscape ecological urbanism offers a potential strategy to bring ideas from landscape urbanism and urban ecology together to create new territories that reflect cultural and natural processes. This synthesis also suggests some possible research directions.

2. Landscape urbanism

The basic premise of landscape urbanism holds that landscape should be the fundamental building block for city design. In traditional urbanism, some structure—a wall, roads, or buildings—led

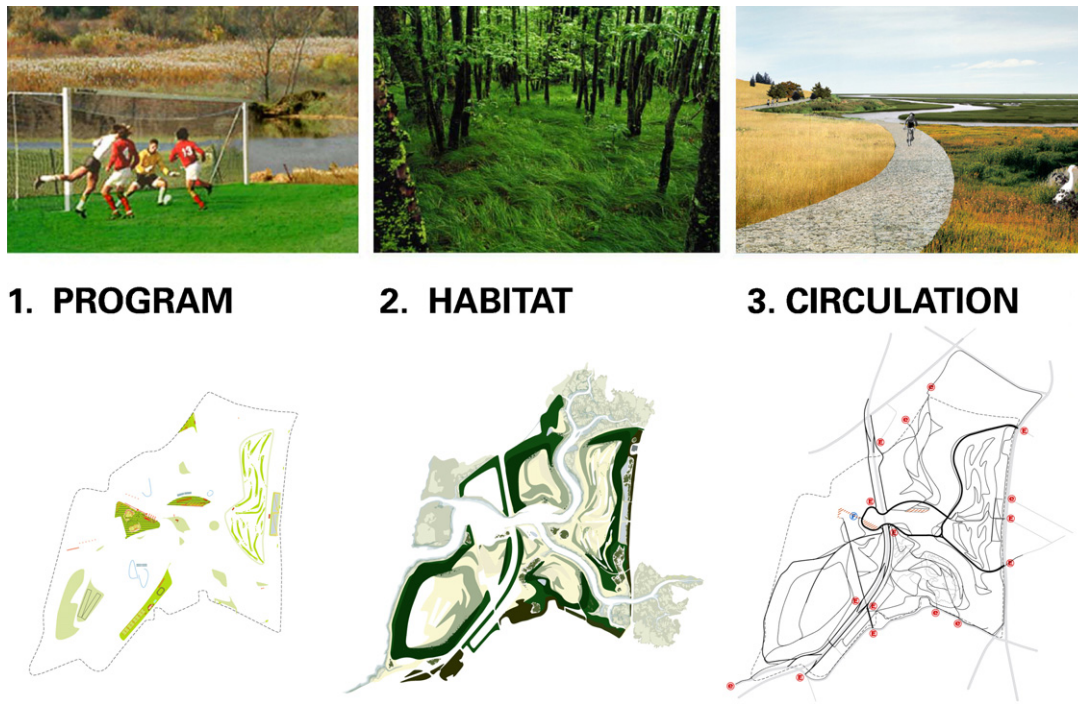
development. Green spaces were relegated to left-over areas, unsuited for building, or were used for ornament. Through landscape urbanism, cultural and natural processes help the designer to organize urban form.

Landscape urbanism is largely the invention of Charles Waldheim, who coined the term (Waldheim, 2006, see also Almy, 2007). As a student of architecture at the University of Pennsylvania in the 1980s, Waldheim was influenced by both James Corner and Ian McHarg, who were at the time engaged in a vigorous debate about the future of landscape architecture. Waldheim identified common ground, integrating McHarg’s ecological advocacy with Corner’s urban design vision.

Landscape urbanism remains a relatively new concept with few realized works. The plan for New York City’s Fresh Kills provides an example of a project moving toward realization (Fig. 1). A key innovation is that James Corner and his Field Operations colleagues embraced long-term change in their design, eschewing a set end state for a more dynamic, flexible framework of possibilities grounded in an initial “seeding.” Located in Staten Island, Fresh Kills covers some 2200 acres (890 ha) and was formerly the largest landfill in the world. Much of the debris resulting from the 11 September 2001 terrorist attacks on the World Trade Center was deposited there. The Field Operations plan suggests how the landfill can be converted into a park three times larger than Central Park. The 30-year plan involves the restoration of a large landscape and includes reclaiming much of the toxic wetlands that surround and penetrate the former landfill.

Another recent landscape urbanist example is the High Line Project in Manhattan (Figs. 2 and 3). The Regional Plan Association and the Friends of the High Line advocated that an abandoned rail line weaving through 22 blocks in New York City be converted into a 6.7-acre (2.7-ha) park. They promote the 1.45-mile (2.33-km) long corridor as a recreational amenity, a tourist attraction,

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1. PROGRAM

2. HABITAT

3. CIRCULATION

Fig. 1. Fresh Kills Competition, New York City. Three coordinated systems organize a vast landscape: program, habitat, and circulation. ©James Corner Field Operations, Courtesy of the City of New York.

and a generator of economic development. In 2004, the Friends of the High Line and the City of New York selected Field Operations and Diller Scofidio + Renfro to design the project. The designers proposed a linear walkway that blurred the boundaries between paved and planted surfaces while suggesting evolutions in human use plus plant and bird life. The first phase of the High Line opened to much acclaim in June 2009. Its success suggests a model for how

abandoned urban territories can be transformed into community assets.

As Field Operations advances landscape urbanism on the ground, others continue to refine the concept theoretically through competitions and proposals. For instance, Chris Reed and his StossLU colleagues presented many fresh ideas in their proposal for the 2007 Lower Don Lands invited design competition orga-



Fig. 2. High Line Project, New York City. The High Line's dramatic curve westward along 30th Street is augmented by an access point, with the stairs intersecting the structure and rising up through it. ©James Corner Field Operations and Diller Scofidio + Renfro. Courtesy of the City of New York.



Fig. 3. The High Line, New York City. Photograph by Frederick Steiner.



Fig. 4. Lower Don Lands proposal, Toronto, Canada: a hybridized river and river marsh—carefully structured with a full range of armored to porous surfaces—give rise to a new habitat for fish and wildlife and to a new type of green city. ©StossLU.

nized by the Toronto Waterfront Revitalization Corporation (Fig. 4). The site covers 300 acres (121.4 ha) of mostly vacated, former port lands, just east of downtown Toronto. StossLU's approach considered flood protection, habitat restoration, and the naturalization of the Don River mouth. They also proposed new development areas and an integrated transportation system. The Canadian ecologist Nina-Marie Lister joined the StossLU team, and her contribution is evident in proposals for restoring the fish ecology. The approach suggested restoration and renewal strategies for both the Don River and Lake Ontario, with the river marsh envisioned as a breeding ground for fish.

The broader regional planning lessons of Ian McHarg (1969) are at the base of landscape urbanism. The approach involves understanding large-scale systems first and allowing them to inform and even structure proposals in order to develop schemes that engage and inaugurate ecological and social dynamics. However, landscape

urbanism departs from McHarg in the ways its proponents allow multiple functions to be hybridized or to occupy the same territory simultaneously. McHarg's approaches brought people closer to nature. For example, McHarg's plan for The Woodlands in Texas successfully used storm drainage systems to structure the master plan, making water an organizing principle. Protected hydrologic corridors form green ribbons weaving through the urban fabric of The Woodlands. In contrast, landscape urbanists are interested in having people and nature occupy the same space—and to construct new urban ecologies that tap into social, cultural, and environmental dynamics playing off one another. This is E. O. Wilson's concept of 'consilience', insofar as urban natural systems and human systems interact and alter one another, producing an energetic synthesis in the process. Landscape urbanism adds to this the often unfathomable flows of cultural and economic data, updating, if not negating, McHarg's original vision.

3. Urban ecology

Ecology is an evolving discipline with an increasing focus on landscapes and urban regions. Forman and Godron (1981, 1986) are responsible for defining the field of landscape ecology and illustrating its potential for planning. They explain: "Landscapes as ecological units with structure and function are composed primarily of patches in a matrix. Patches differ fundamentally in origin and dynamics, while size, shape, and spatial configuration are also important. Line corridors, strip corridors, stream corridors, networks, and habitations are major integrative structural characteristics of landscapes" (Forman and Godron, 1981, 733). Forman expanded the field to address regions and planning. His particular interest addresses the ecology of landscapes and regions "beyond the city." Meanwhile, ecologists have also begun to refocus their science inside the city.

The U.S. National Science Foundation (NSF) supports a network of 26 Long Term Ecological Research (LTER) projects. The NSF initiated the LTER program in 1980 to support research on long-term ecological phenomena. The LTER mission is to document, analyze, and understand ecological processes and patterns that change over long temporal and large spatial scales. Until 1997, these LTERs were located outside urban regions. After an intense competition, the NSF selected the contrasting American cities of Phoenix (<http://caplter.asu.edu>) and Baltimore (<http://www.beslter.org>) for its first urban LTERs. Baltimore has a longer European settlement history and is located in a humid, coastal region. Although there were ancient native settlements, the Phoenix region has grown rapidly since World War II and is located in a desert.

The Baltimore LTER aims to understand the metropolitan region as an ecological system. The Baltimore Ecosystem Study team of cross-disciplinary researchers explores complex interactions between the built and the natural environments with ecological, social, economic, and hydrological processes (Pickett et al., 2007). The Baltimore LTER attempts to advance both ecological research and environmental policy. For example, "Our finding that urban riparian zones experiencing hydrologically-induced drought are not sinks for nitrate, but in fact may be nitrate sources, helped lead policy makers concerned with the water quality of the Chesapeake Bay to reduce their reliance on stream corridor tree planting as a primary mitigation strategy" (Pickett et al., 2007, 51). In addition, the Baltimore LTER team has suggested how science might be used in urban landscape design.

The Central Arizona-Phoenix LTER also includes an interdisciplinary team of researchers at Arizona State University (ASU). They study the interactions of ecological and socio-economic systems in a rapidly growing urban environment. They have especially advanced our understanding of land-use change on ecological patterns and processes (Grimm et al., 2000, 2008). Such understanding is important as cities in the Southwest United States continue to grow rapidly in an environmentally sensitive context.

In addition to the formal NSF-backed urban LTERs, other U.S. scholars are advancing urban ecology research across disciplines, most notably in the Puget Sound region of the Pacific Northwest (Alberti and Marzluff, 2004). The Puget Sound group from the University of Washington has contributed to our understanding of ecological resilience in urban ecosystems. Resilience, from the Latin *resilire* meaning to spring back or rebound, is a concept and a theory with growing appeal in the disciplines of ecology and planning. When rising from traditional concepts in ecology, resilience emphasizes equilibrium and stability. The United Nations defines resilience as the ability to absorb disturbances while retaining the same basic structure and ways of functioning, the capacity for self-organization, and the capacity to adapt to stress and change.

As a result of urban-based ecological studies, urban ecology is emerging as a field that emphasizes an interdisciplinary approach

to understanding the drivers, patterns, processes, and outcomes associated with urban and urbanizing landscapes. Alberti (2008) conceives of urban ecosystems as complex coupled human-natural systems where people are the dominant modifiers of ecosystems, thus producing hybrid social-ecological landscape patterns and processes. Some urban ecology research focuses on the impact of habitat fragmentation on suburban and urban housing development patterns for avian species productivity; other research focuses on the integration of scientific analyses into growth-management strategies. Such diverse research agendas are united in their recognition that urban ecosystems are characterized by complexity, heterogeneity, and hybridity, and are therefore best analyzed within an interdisciplinary approach.

4. Landscape ecological urbanism

Recently, Mohsen Mostafavi promoted the concept of "ecological urbanism" to imagine an approach "that has the capacity to incorporate the inherent conflictual conditions between ecology and urbanism" Mostafavi and Doherty (2010, 17). Mostafavi and his colleagues draw strongly on landscape urbanism, but pay scant attention to the advances made in urban ecology. If those ecological advances were incorporated, then one might imagine a truly new synthesis: landscape ecological urbanism.

New ideas about city design and planning are necessary because urbanization poses significant social and environmental challenges. As the number of people in the world increases in this first urban century, the percentage of those dwelling in large city-regions is also expected to increase. The consequences of continuing to develop as we have in the past are clear: energy use and greenhouse gas production for buildings and transportation systems increase; water and air pollution spreads; valuable habitat and prime farmland are lost; social issues, such as crime and poverty, are exacerbated.

Urban ecology research indicates what should be obvious: people interact with other humans and with other species as well as their built and natural environments. The city is a human-dominated ecosystem. Landscape urbanism projects, such as the High Line and the Toronto waterfront, illustrate how designing with nature can improve the quality of cities for people, plants, and animals.

In doing so, ecosystem services can be enhanced. Ecosystem services can be defined as the benefits we receive from nature: resource services, such as food, water, and energy; regulatory services, such as purification of water, carbon sequestration and climate regulation, waste decomposition and detoxification, crop pollination, and pest and disease control; support services, such as nutrient dispersal and cycling, and seed dispersal; and cultural services, including cultural, intellectual, and spiritual inspiration, recreational experiences, ecotourism, and scientific discovery. The concept has evolved in the United States to provide a basis for measuring landscape design efficiency. For instance, the Sustainable Sites Initiative (SITES) has developed a measurement system for evaluating landscape performance. SITES is led by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center of the University of Texas, and the U.S. Botanic Garden (www.sustainablesites.org). Its goal is to be the equivalent of the U.S. Green Building Council's LEED system for the outdoors. The SITES pilot projects currently underway suggest that ecosystem services can actually be enhanced and created through landscape design.

A goal of landscape ecological urbanism might be to design and plan cities to increase, rather than to decrease, ecosystem services. This suggests exciting new areas of research in landscape and urban planning, from ways to measure landscape

performance to case studies of successful and not-so-successful projects.

5. Conclusions and research directions

Landscape ecological urbanism suggests three possible research directions: an evolution of aesthetic understanding, a deeper understanding of human agency in ecology, and reflective learning through practice. Humanities-based design theory can be a powerful force in how places are created. Traditional ecological design fell short in creating an alternative aesthetic to modernism (or its romantic offspring, postmodernism). Landscape urbanism, if nothing else, has succeeded in exciting architects, landscape architects, and urban designers about how city futures can be viewed.

Meanwhile, as ecological research has moved into cities, the role of people in urban ecosystems could not be ignored. Geographers and other social scientists have played a leadership role in urban ecology research, underscoring the dual cultural and natural foundations of human settlement. Concepts such as sustainability, regeneration, resilience, and ecosystem services hold the potential for advancing human ecology.

Projects such as Fresh Kills, the High Line, and the Lower Don Lands provide helpful lessons about what works and what does not through actual experience. Reflective practice and case studies have a strong heritage within city planning, landscape architecture, and urban design. Case studies can build on reflective practice by incorporating ecological research and design theory. In the process, new ways to design and plan city-regions with nature and culture can result.

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