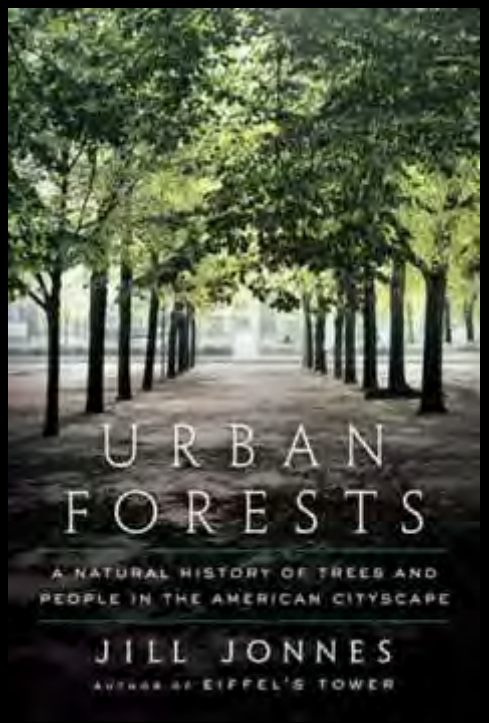
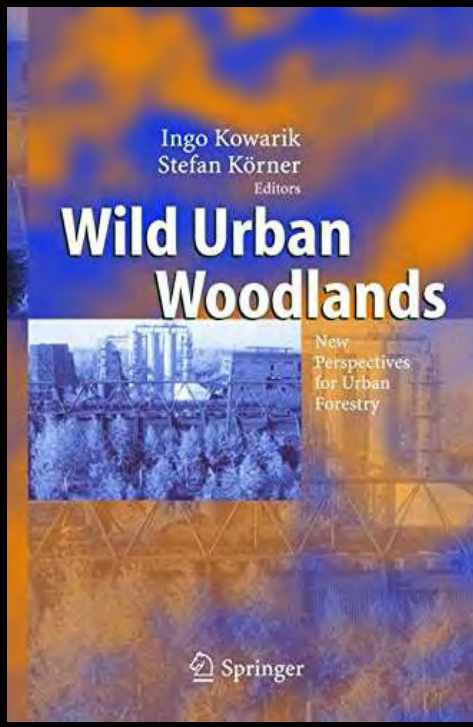
Center for Environmental Research at Hornsby Bend

Austin Water

The Terrestrial City: Greenspace and the Urban Forest

Kevin M. Anderson, Ph.D.
Austin Water – Center for Environmental Research





Urban Nature and "Established Notions of Nature"

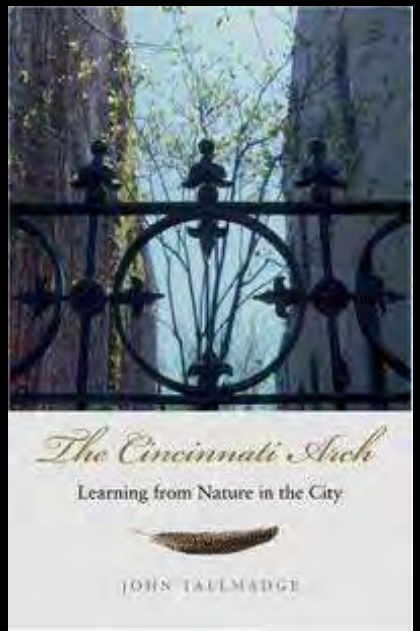
John Tallmadge *The Cincinnati Arch: Learning from Nature in the City* (2004)

Urban nature is not sublime…There's too much sterility in the form of roofs and pavement, and, oddly enough, there's also too much wildness, too many weeds and wooded borders and tangled banks, not to mention vacant lots going to brush.

Of course, "wilderness" won't do to describe such landscapes either. Despite the degree of wildness, there's too much human impact, too many alien species, too few large animals to meet the legal and cultural criteria.

The fact is that urban landscapes are just too mixed up, chaotic, and confused to fit our established notions of beauty and value in nature.

Maybe it's not really nature at all, not a real ecosystem, just a bunch of weeds and exotics mixed up with human junk.



The Terrestrial City
Greenspace and the Urban Forest

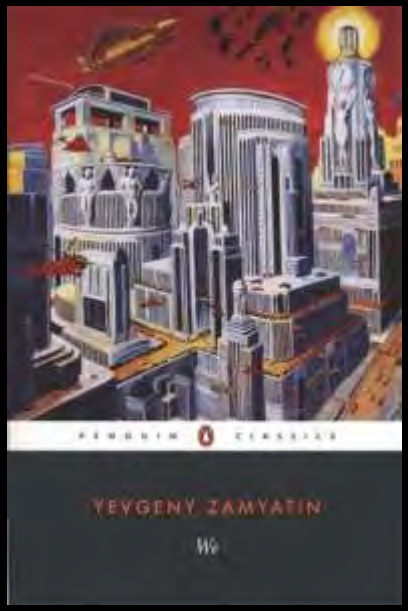
Nature and Culture and Urban Greenspace – 19th Century Urban Pastoral Democracy
Science and the Urban Forest – Retrospective vs. Prospective Ecology
Urban Flora and Fauna – Wildness and The Agency of Nature

Nature and Culture: Wild Nature and The City

Oh, how great and divinely limiting is the wisdom of walls. This Green Wall is, I think, the greatest invention ever conceived.

Man ceased to be a wild animal the day he built the first wall; Man ceased to be a wild man only on the day when the Green Wall was completed, when, by this wall we isolated our machine-like, perfect world from the irrational, ugly world of trees, birds, and beasts.

- Eugene Zamyatin, *We* (1921)



The Iterative Natures - Classical Western Ideas of Nature

1. First nature - wilderness or pristine nature
   Wilderness is the realm of the gods or “the noble savage”

2. Second nature – pastoral arcadia – pastures, farms, towns

3. Third nature – Renaissance formal gardens

Jacopo Bonfadio wrote in 1541 that formal gardens make a “third nature, which I would not know how to name.”

The illustration shows a distant mountain (first nature) giving way to cultivated agricultural land (second nature) and then a formal garden (third nature).

Frontispiece to l'Abbé de Vallemont's *Curiositez de la nature et de l'art* (1705)

“Established Notions of Nature”

The American Myth of Nature

In the United States, the kinds of nature that we celebrate are wilderness and pastoral landscapes.

They are the foundation of the American myth of nature from which we assess the value of nature in America.

“Established Notions of Nature” and Urban Nature

The Problem

Our understanding of what constitutes “official” urban nature in cities is shaped by culturally dominant metaphors of nature.

In American cities, we perceive nature in the urban landscape filtered through a conceptual framework that prejudges its ecological and cultural value.

Wilderness

Pastoral

Urban Nature?

Official Urban Nature - The Wild and The Pastoral

In America, official urban nature is either formally protected as remnants of the "wild" native landscapes obliterated by the creation of the city in preserves, sanctuaries, refuges, and other "wildlands" or deliberately cultivated pastoral "green space" like parks, gardens, landscaping, and urban farms.

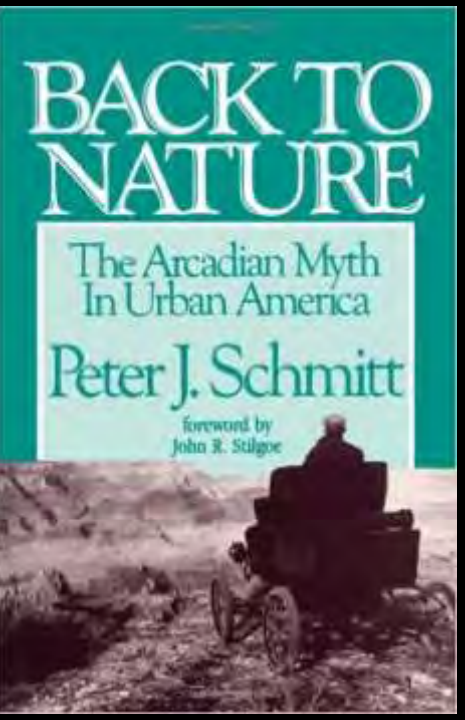
We celebrate official urban nature as a redemptive component of an otherwise artificial landscape.

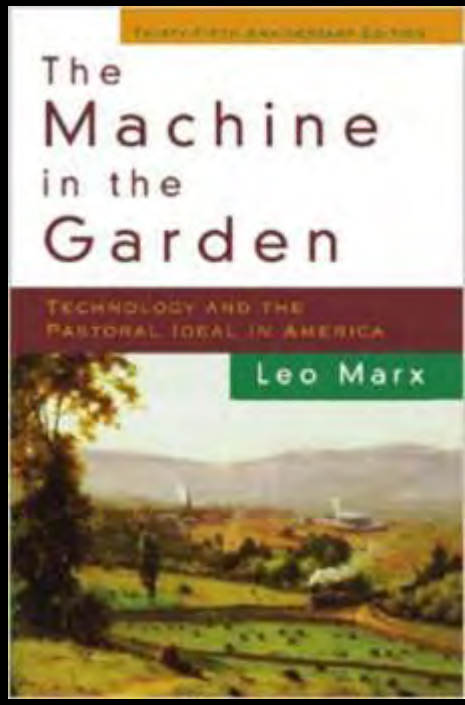
WILDLAND CONSERVATION DIVISION

American Narrative of Redemptive Urban Nature

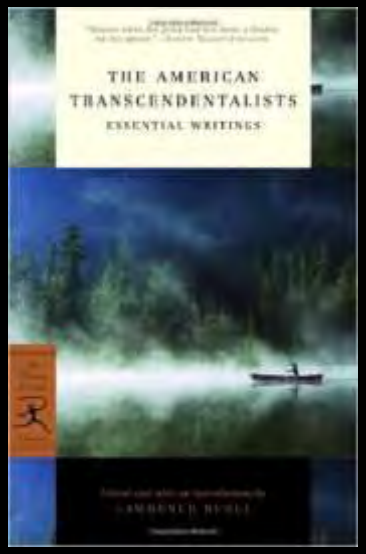
- The American narrative of redemptive urban nature emerged in the 19th century, and it uses the Transcendentalist myth of nature in which nature is a tonic for body and spirit.
- Space for urban nature is created to provide recreation for physical health and to allow contact with officially sanctioned nature for mental health.

Jean-Honoré Fragonard
Pastoral Landscape with a Shepherd and Shepherdess at Rest 1761





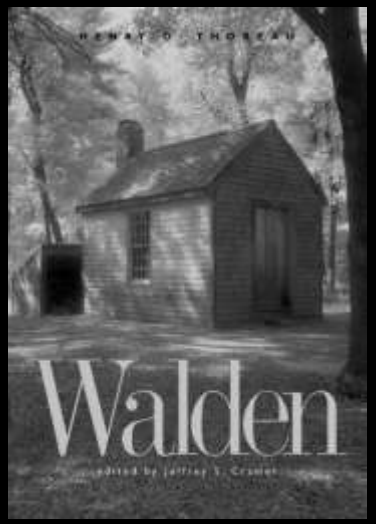
19th Century Literary Re-invention of American Nature



American Transcendentalism

The Romantic idea of Nature transformed into the American Transcendentalist idea of Nature with Ralph Waldo Emerson's essay, "Nature" (1844).

- Nature is a source of sensations--healthy feelings.
- It is therapy for a diseased, over-civilized heart.
- Humans can discover emotional health in nature. Such health leads to moral and spiritual clarity.



Henry David Thoreau

Henry David Thoreau, *Walden* (1854)

- Nature is a refuge from the artificial constructs of civilization i.e. the Town and the City

"A More Refined Kind of Nature" - The American Urban Forest

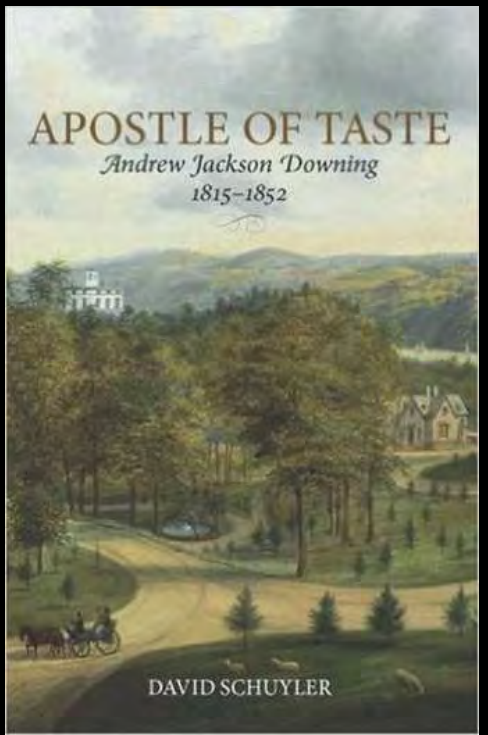
A. J. Downing 1815-1852 – The Apostle of Taste

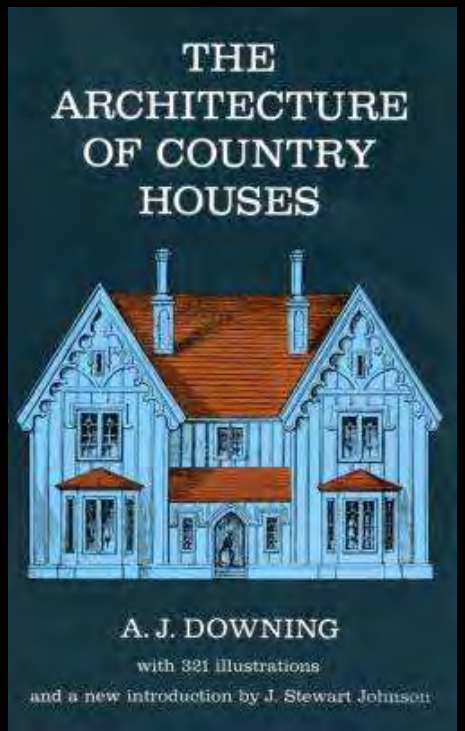
A Treatise on the Theory and Practice of Landscape Gardening, Adapted to North America (1841)

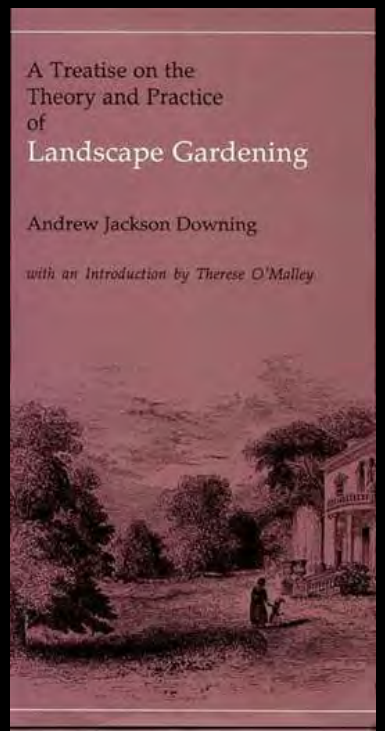
- the first book of its kind published in the United States. Promoted – "the enjoyment of landscape or ornamental gardening – which, when in pure taste, may properly be called a more refined kind of nature, - is every day becoming more and more widely diffused."

Editor of *The Horticulturist* magazine (1846–52)

"If our ancestors found it wise and necessary to cut down vast forests, it is all the more needful that their descendants should plant trees…the first duty of an inhabitant of forlorn neighborhoods…is to use all possible influence to have *the streets planted with trees*." 1847







Narratives of Nature – Native vs. Non-native
Ailanthus the Celestial Tree

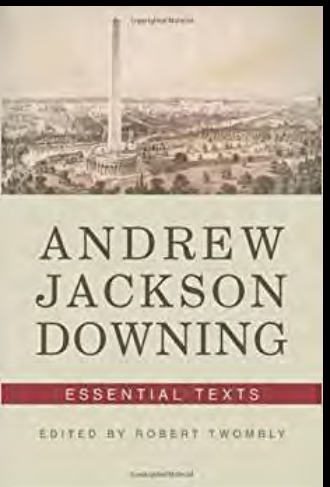
The Admirable Urban Tree - "the Ailanthus is more generally known by the name of Celestial Tree and is much planted in the streets and public squares. For such situations it is admirably adapted, as it will insinuate its strong roots into the most meager and barren soil, where few other trees will grow and soon produce an abundance of foliage and fine shade."

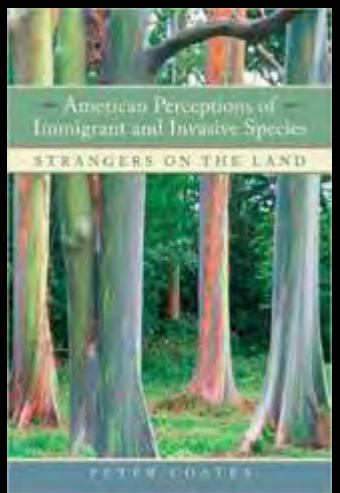
A Treatise on the Theory and Practice of Landscape Gardening (1841)

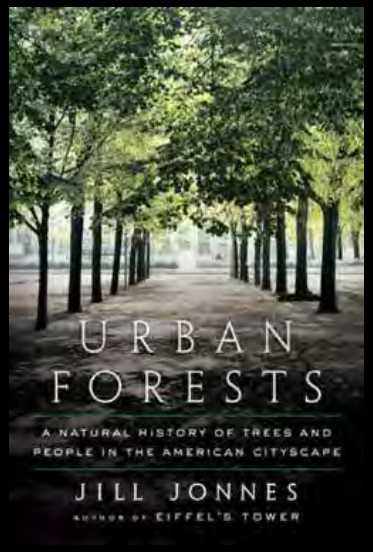
The Invasive Immigrant - "Down with the ailanthus! The vices of the ailanthus…it smells horribly, both in leaf and flower…it suckers abominably, and there by over runs, appropriates and reduces to beggary all the soil of every open piece of ground."

Downing then admitted that his was in part "a patriotic objection…This petted Chinaman or Tartar, who has played us so falsely…has drawn away our attention from our own more noble native American trees, to waste it on this miserable pigtail of an Indiaman."

"Shade Trees in the City" *The Horticulturalist* (1852)

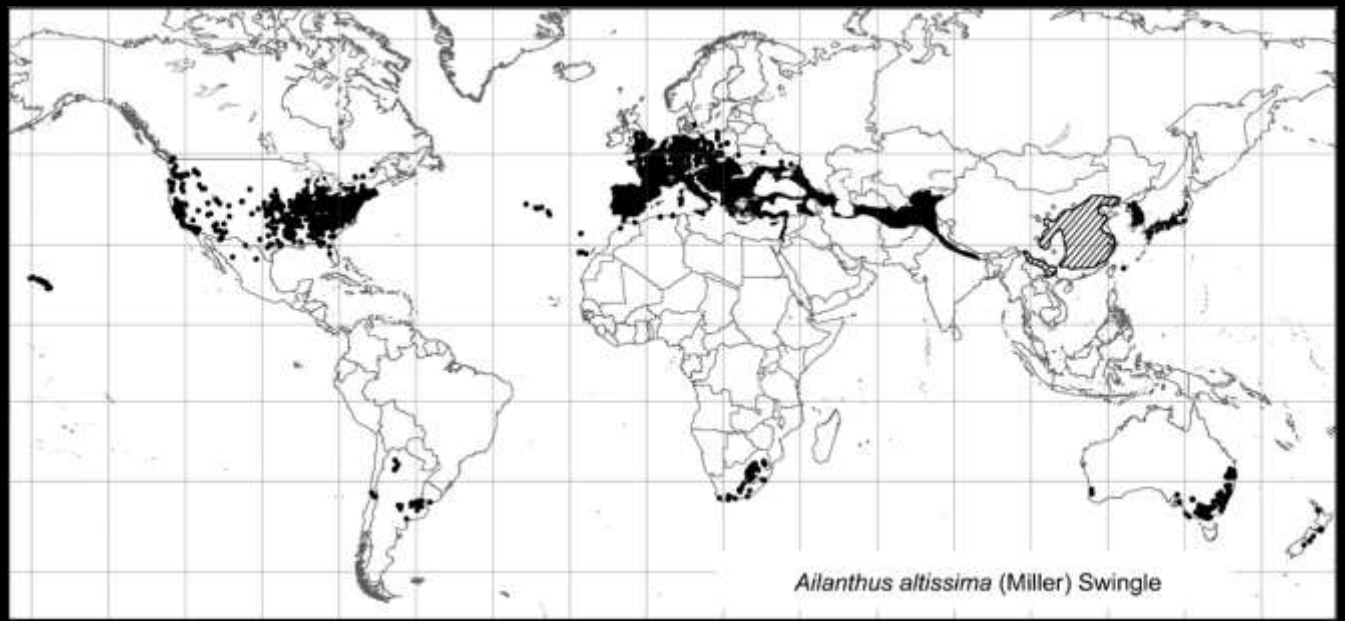


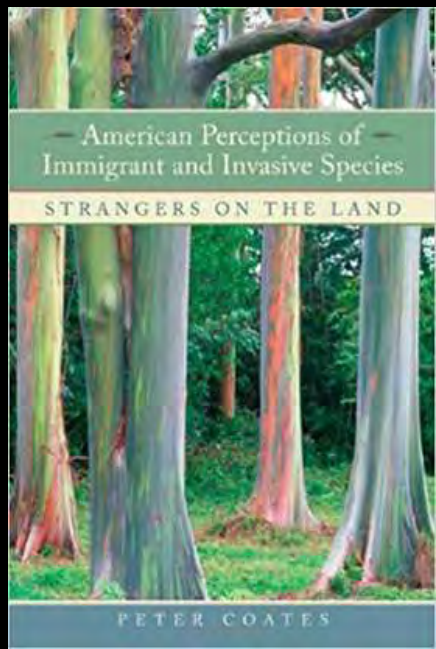




Tree of Heaven - the Ultimate Urban Tree

1. Ailanthus is traditionally used in Chinese folk medicine as an astringent, antispasmodic, parasiticide, and narcotic.
2. The superior range expansion of Ailanthus on all continents except Antarctica
3. Ailanthus was first introduced to France by the French missionary Pierre d'Incarville in the 1740s who sent seeds to Paris.
4. It was first introduced from European seed sources to North America via Philadelphia in 1784.
5. Ailanthus colonizes a broad array of urban habitats ranging from walls, fence rows, cracks of sidewalks, and road and railroad embankments to abandoned lots and urban parks
6. Coates – "*Native* is often synonymous with *natural* as well as *national*."





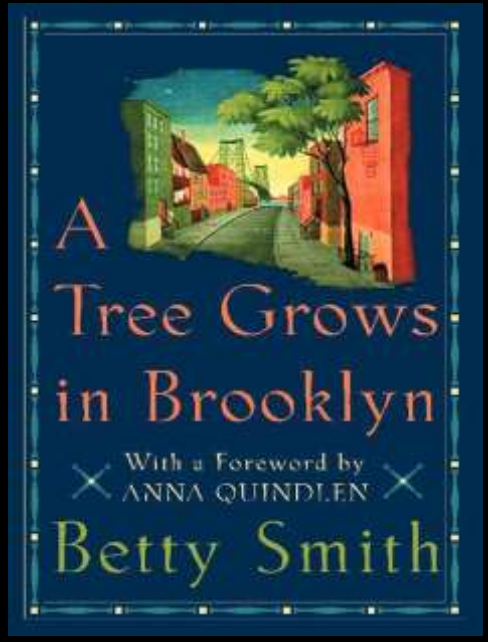
Tree of Heaven - The Immigrant Urban Tree

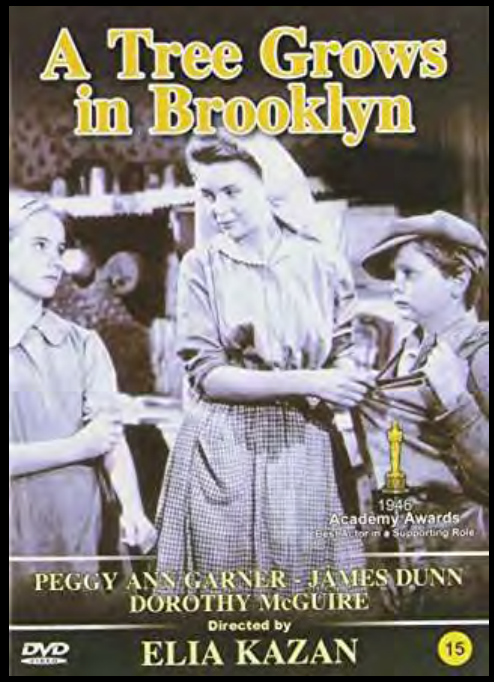
A Tree Grows in Brooklyn (1943) Like the Tree of Heaven, Brooklyn's inhabitants fight for the sun and air necessary to their survival.

“There's a tree that grows in Brooklyn. Some people call it the Tree of Heaven. No matter where its seed falls, it makes a tree which struggles to reach the sky. It grows in boarded-up lots and out of neglected rubbish heaps. It grows up out of cellar gratings. It is the only tree that grows out of cement. It grows lushly . . . survives without sun, water, and seemingly without earth. It would be considered beautiful except that there are too many of it.”

“Who wants to die? Everything struggles to live. Look at that tree growing up there out of that grating. It gets no sun, and water only when it rains. It's growing out of sour earth. And it's strong because its hard struggle to live is making it strong. My children will be strong that way.”

"A new tree had grown from the stump and its trunk had grown along the ground until it reached a place where there were no wash lines above it. Then it had started to grow towards the sky again...this tree that men chopped down...this tree that they built a bonfire around, trying to burn up its stump - this tree had lived! It lived! And nothing could destroy it.“





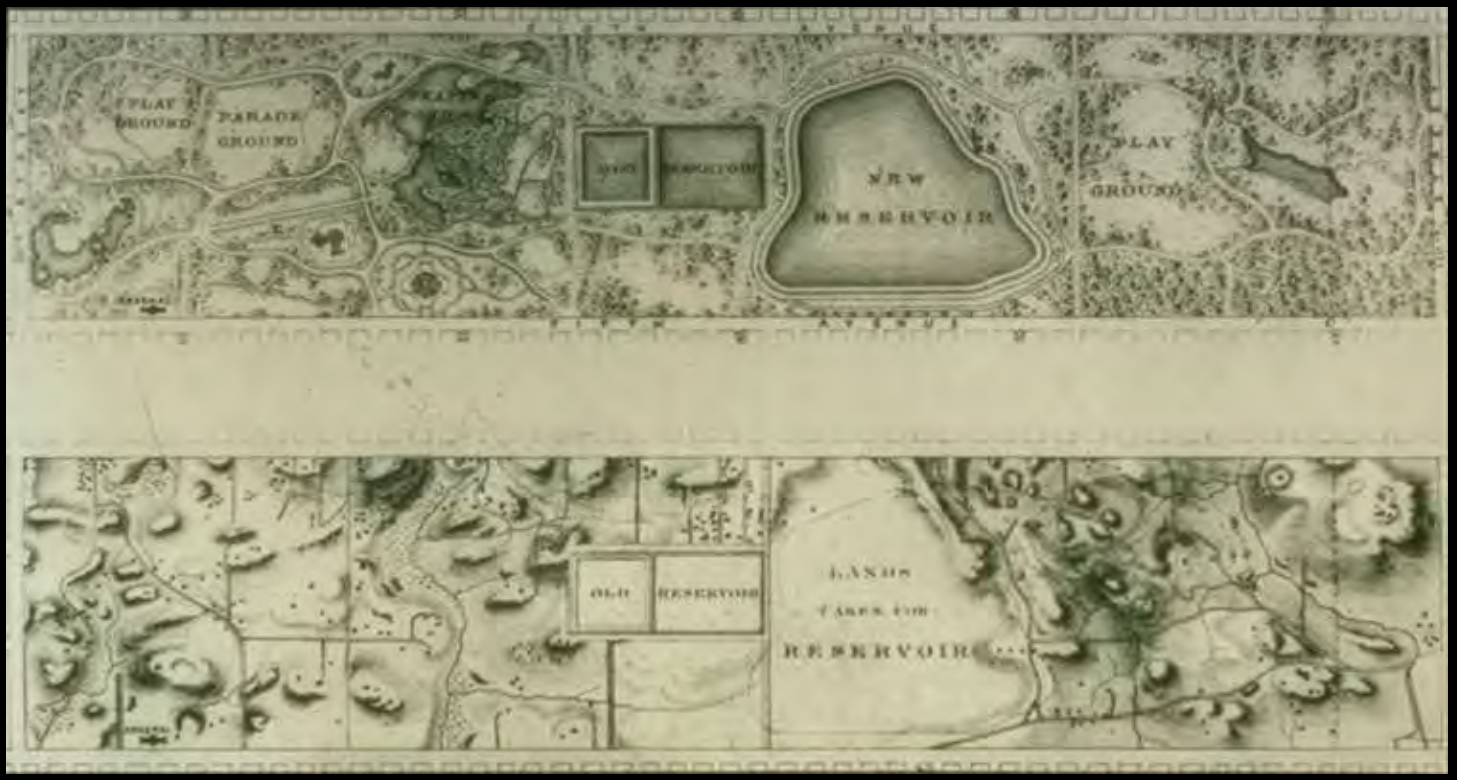
Redemptive Urban Nature - “banish the plague-spots of democracy”

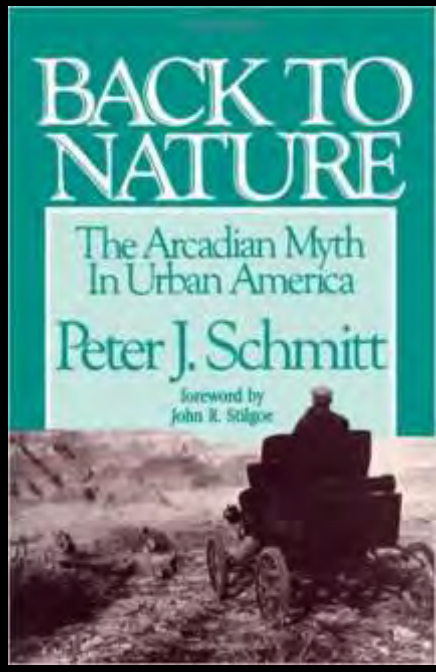
The Social and Political Role of American Urban Greenspace

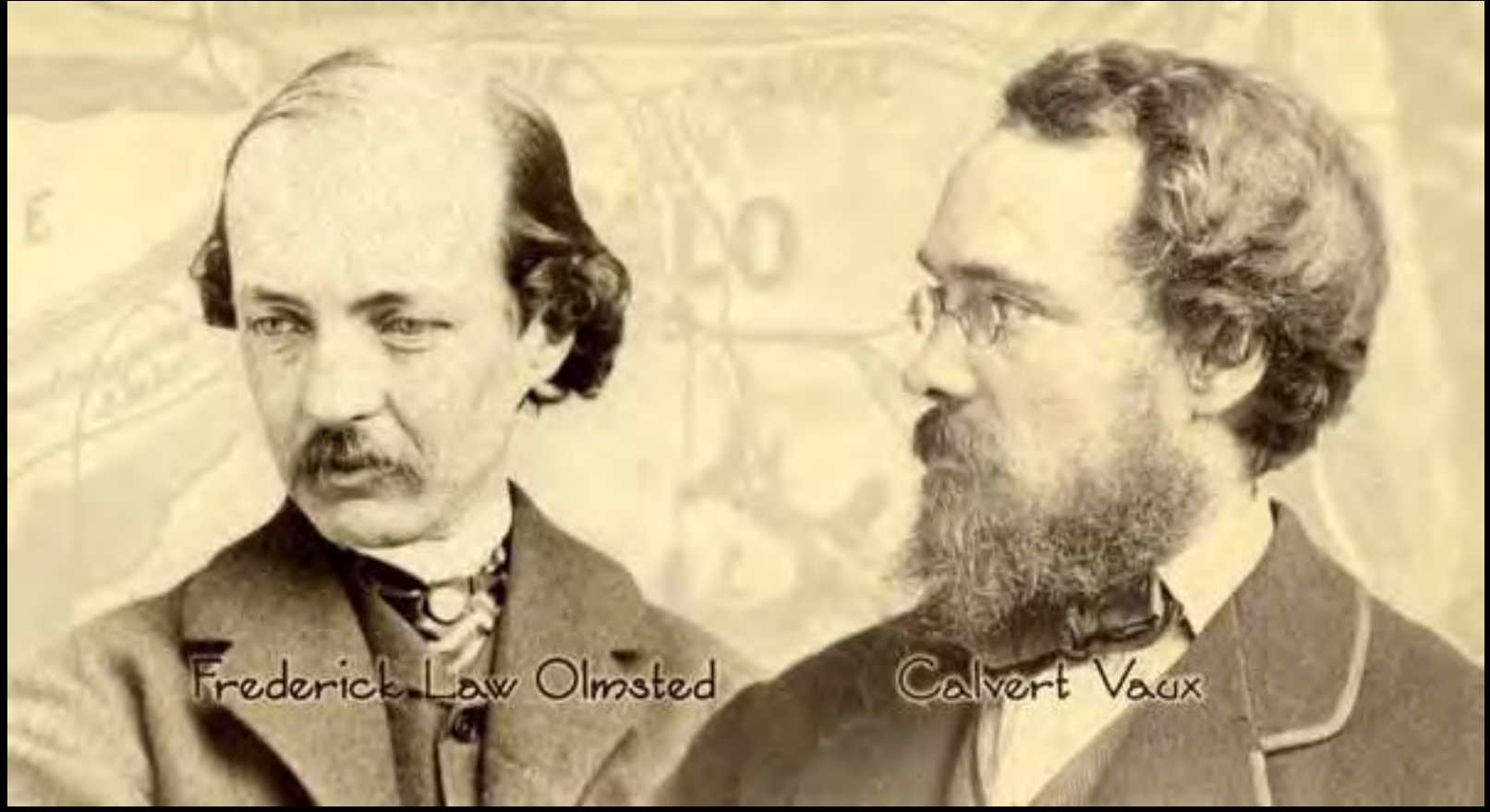
“Plant spacious parks in your cities, and unloose their gates as wide as the gates of morning to the whole people.

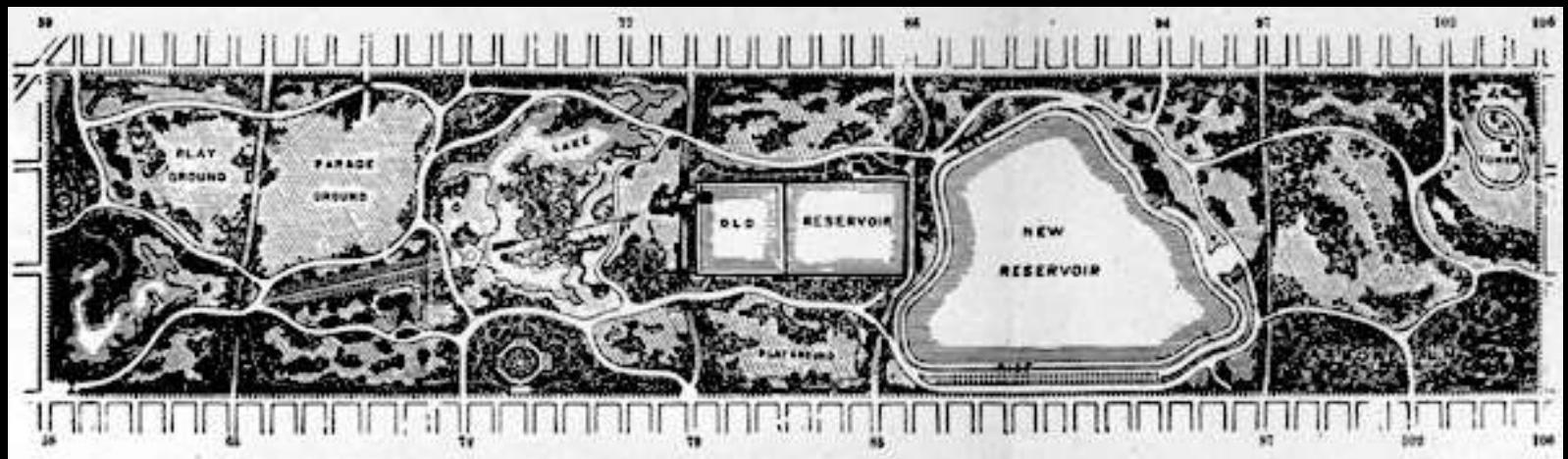
As there are no dark places at noonday, so education and culture – the true sunshine of the soul – will banish the plague-spots of democracy.”

The New York Park 1851









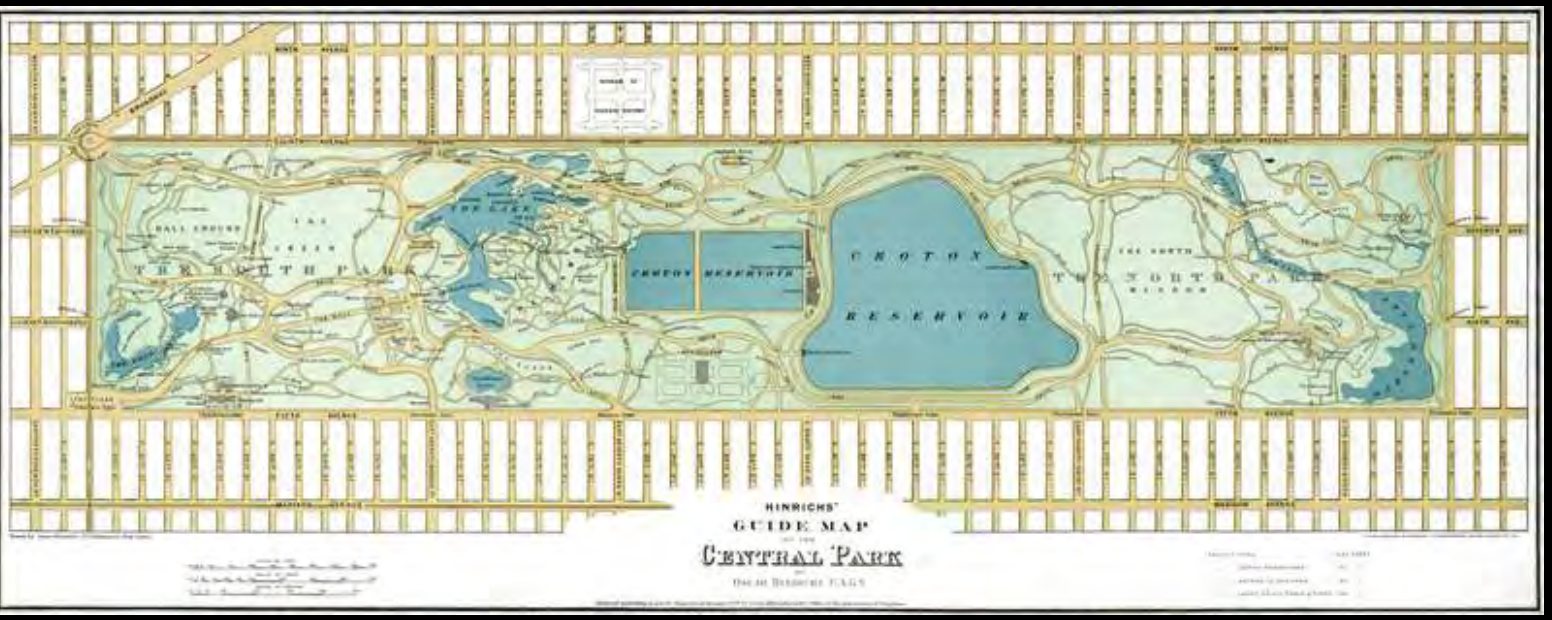
FIRST STUDY OF DESIGN FOR THE CENTRAL PARK.

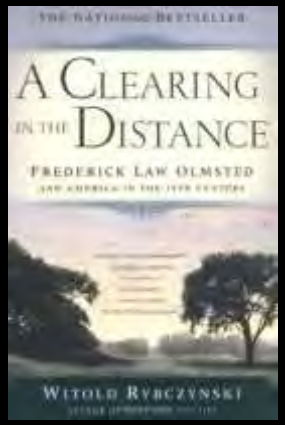
From a Wood-cut made in 1858.

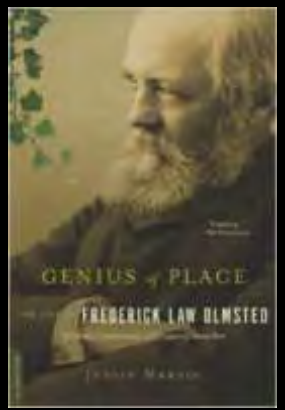
The Aesthetics of Urban Nature

The Greensward Plan - Frederick Law Olmsted 1822 – 1903

New York City Central Park 1853-1873 (843 acres)







The American Urban Park – Olmsted's "Pastoral" Style

Broad spaces of greensward, broken occasionally by groves of trees.

Imported Aesthetic "green, dripping, glistening, gorgeous“

The reflection of foliage by bodies of water

The effect was reminiscent of parks on estates that Olmsted had seen in England, and it was the image of the rich turf of that country, which he described as "green, dripping, glistening, gorgeous," when he first saw it, that remained for him the model of the Pastoral style.

The Native Urban Tree - The American Elm

Tree groves for a soothing, restorative atmosphere

Narrative of Redemptive Urban Nature

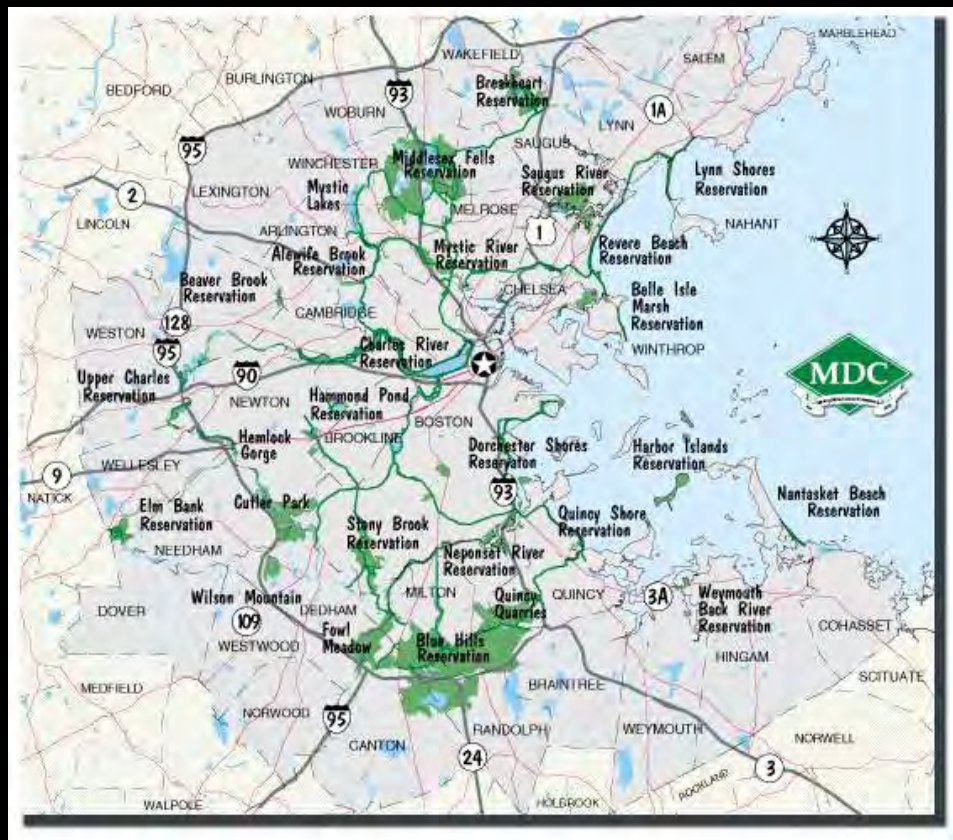
Urban Green Landscapes

Should the forces which push men into the arms of ignorance, sin, and death, be allowed a free field in our cities or should there be parks and open spaces to redeem the city with all that mingling of the natural and the human which we call landscape?
Charles Elliot, Jr. 1891

Charles Eliot Jr.
1859-1897

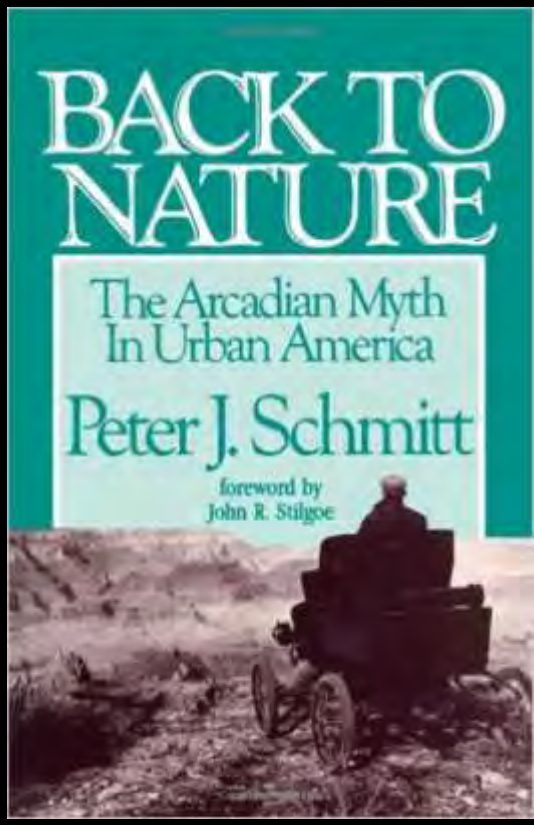
Metropolitan Park System of Greater Boston

First Regional Park System – First Land Trust



Urban Pastoral Democracy – "banish the plague-spots of democracy"

Like Downing, Olmsted believed that the rural, picturesque landscape contrasted with and counteracted the confining and unhealthful conditions of the crowded urban environment and served to strengthen society by providing a place where all classes could mingle in contemplation and enjoyment of the pastoral experience.



Confident in their Romantic philosophy, men like Downing, Olmsted, and Eliot saw themselves as educators teaching with shovel and pen a new meaning for nature in urban society.

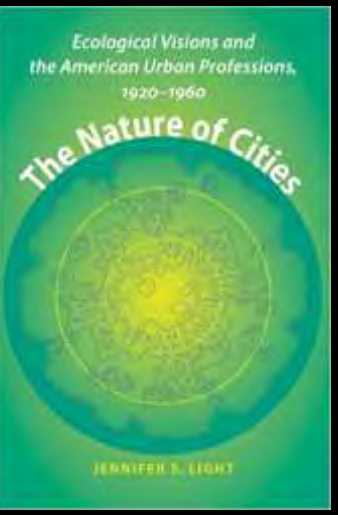
Peter J. Schmitt, Back to Nature: The Arcadian Myth in Urban America 1969

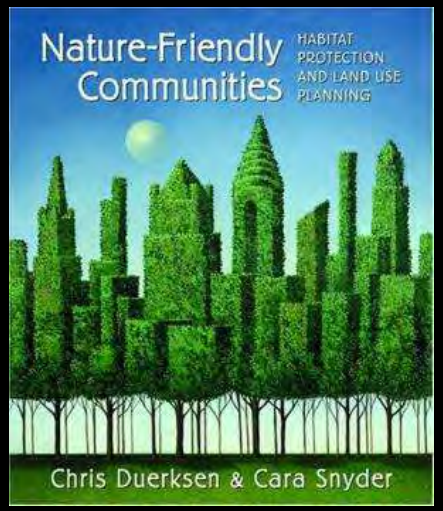
The Meaning of Urban Nature in Contemporary Society? Urban Design, Management, and Science

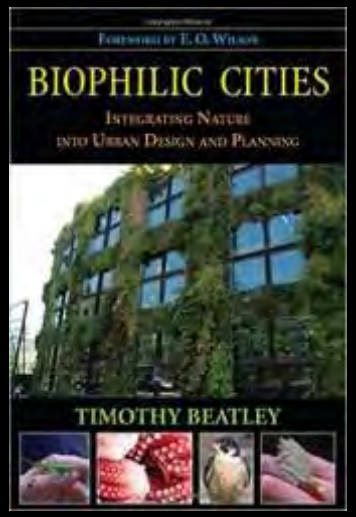
The Nature of Cities is a “boundary organization” interested in ideas at the frontiers of science, design, policy, and the arts—an idea hive that puts different approaches and points of view together, to discover what novel perspectives might emerge.

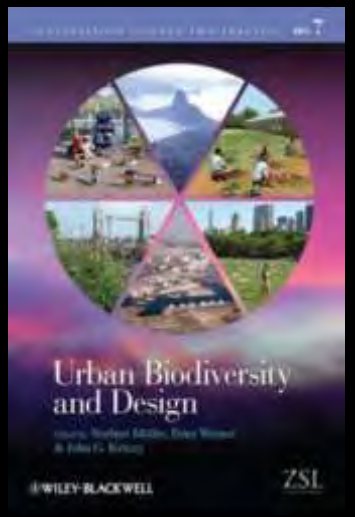
a virtual magazine and discussion site

https://www.thenatureofcities.com/



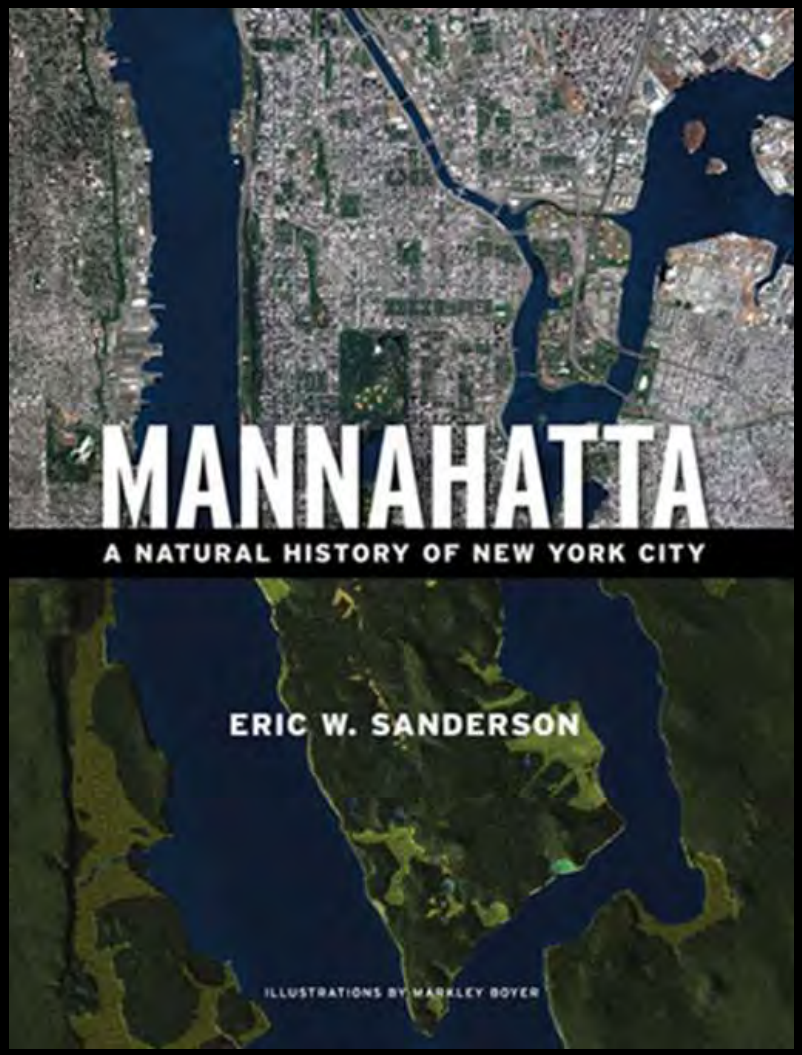


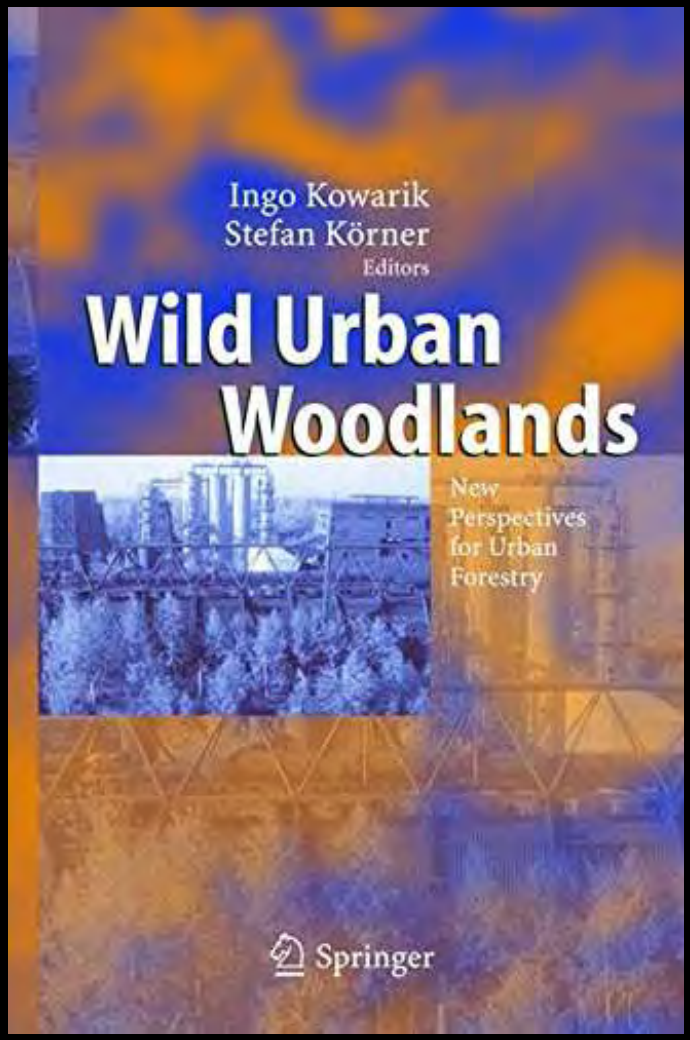


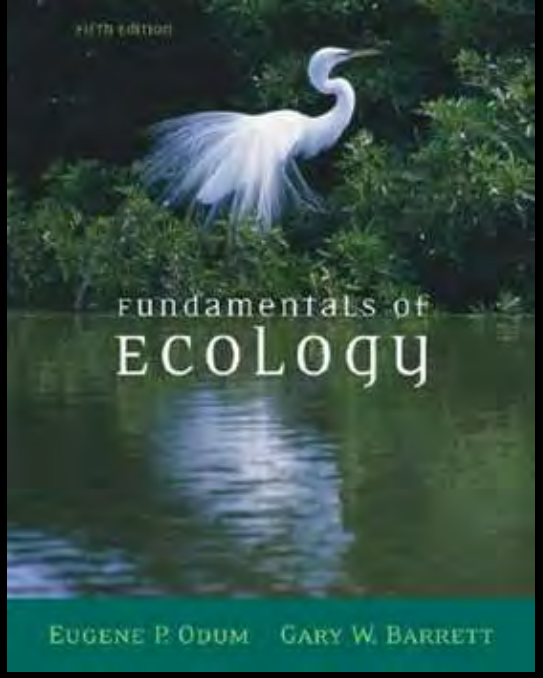


Science and the Urban Forest – Retrospective vs. Prospective Ecology

Scientific Knowledge and Urban Nature

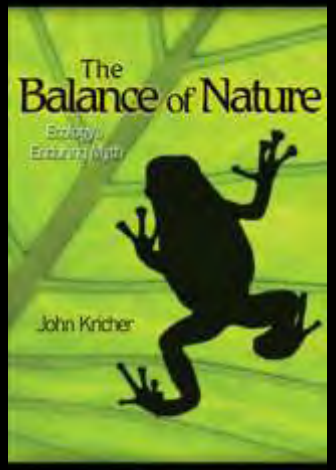


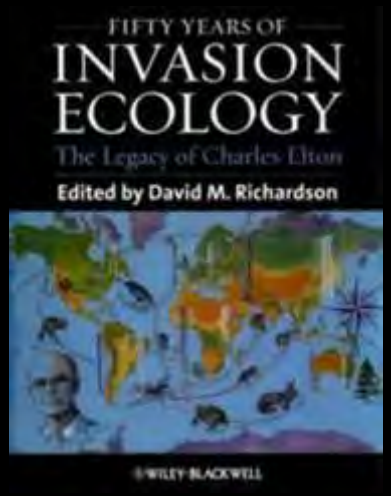


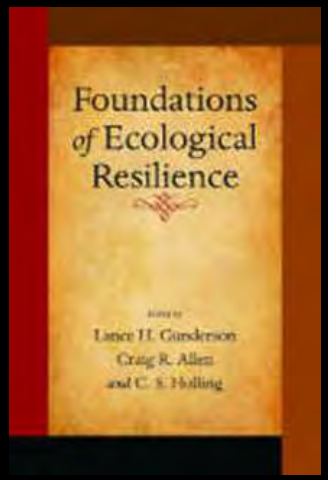


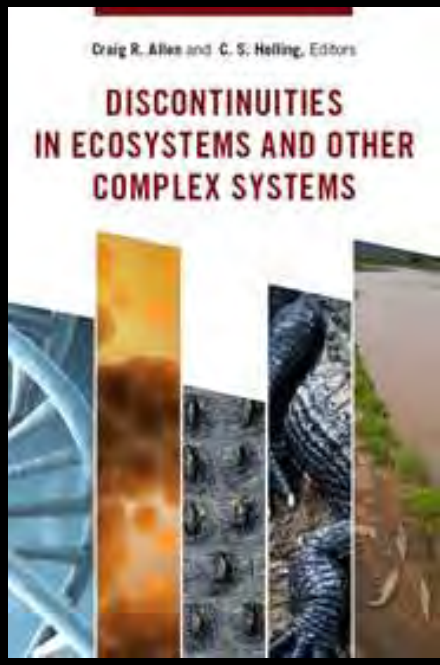
"Old" Ecology 1864-1960s – Humans the Great Disruptors

"New" Ecology 1973 onwards – Disruption is how nature works





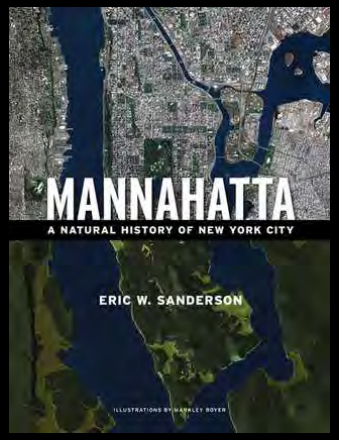




"traditional concept of naturalness oriented toward historical comparisons runs aground."

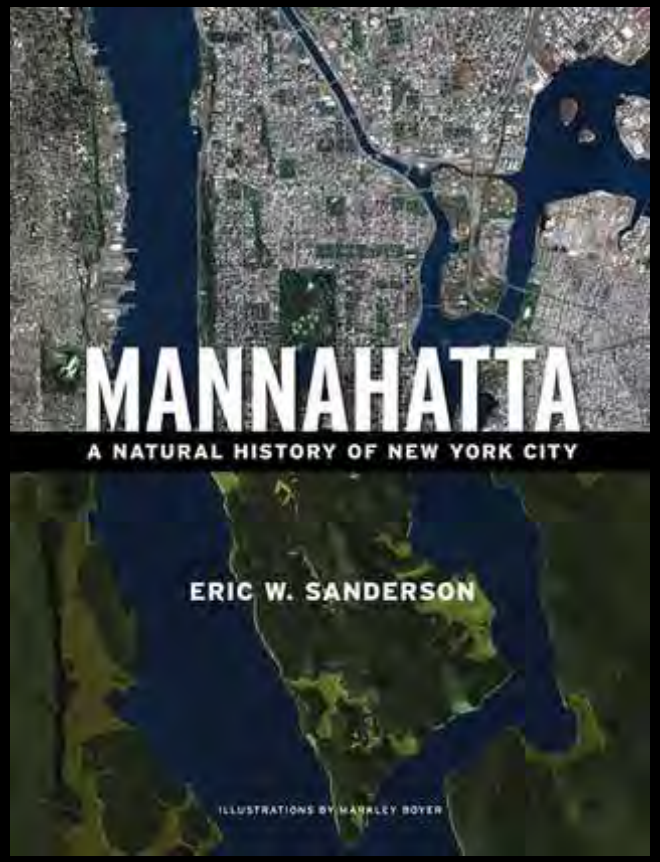
For a natural or agricultural landscape, these patterns would be bizarre.
In urban areas, they predominate.

Natural vs. Artificial - Understanding the Ecology of the Terrestrial City



Retrospective Ecology and Historical Naturalness

On a hot, fair day, the twelfth of September, 1609, Henry Hudson and a small crew of Dutch and English sailors rode the flood tide up a great estuarine river, past a long, wooded island…locally the island was called Mannahatta, or “island of Many Hills.”



Retrospective Ecology and Historical Naturalness

The Mannahatta Project began in 1999, when landscape ecologist Dr. Eric Sanderson moved to New York City to work for the Wildlife Conservation Society. Dr. Sanderson realized that, to fully appreciate the concrete landscape of streets and buildings that was his new home, he would have to “go back in time” to recreate the its ecology from the “ground up.”

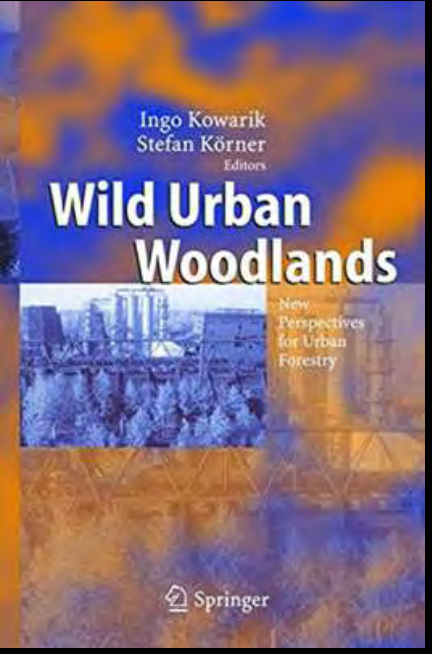
Going back to 1609 allows us to see what New York City was before it was a city and to reimagine the city’s development in a way that would incorporate more of the natural cycles and processes (such as the hydrological cycle) that made the island the ecological gem that it was.

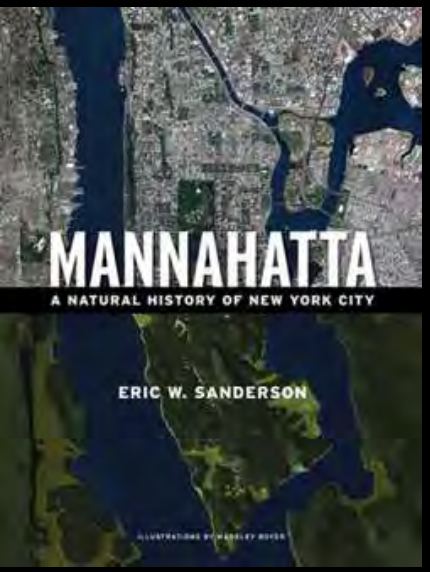
The British Headquarters Map 1782

By chance, Dr. Sanderson came across the British Headquarters Map, created by the British military in 1782 when they controlled New York City during the American Revolution.

This detailed military map illustrates locations of natural features, such as salt marshes, streams, hills, and woods, that army cartographers considered important obstacles to soldiers as they traveled the island.

Retrospective Ecology and Historical Naturalness





Scientific approaches to naturalness
Retrospective naturalness or Prospective naturalness

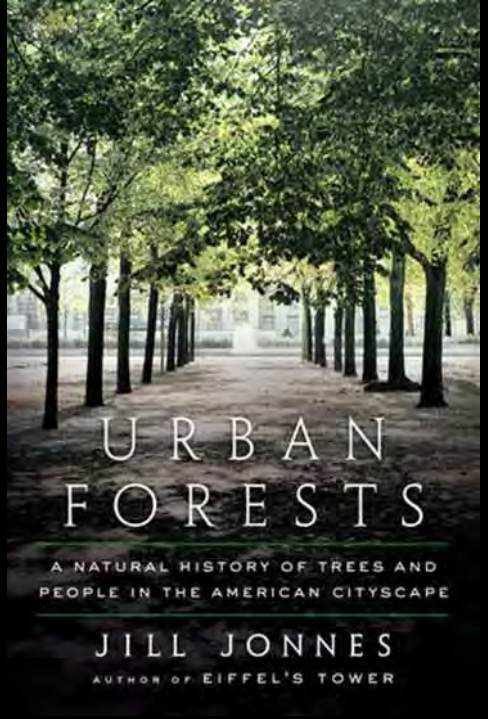
Wild Urban Woodlands Ingo Kowarik 2005

Two perspectives on naturalness can be fundamentally differentiated: retrospective naturalness or prospective naturalness

Retrospective naturalness

- The point of reference is therefore, pristine vegetation uninfluenced by humans. Based on the cultural history of the relevant area, the reference period may lie decades or a few millennia in the past.
- In the retrospective perspective of naturalness, remnants of pristine woodlands are most natural and woodlands used for forestry are at least semi-natural.
- In summary this means that from the retrospective perspective the development back to nearly natural or natural woodlands can be analyzed well.

With the evaluation of new development of “wild” urban woodlands, however, the traditional concept of naturalness oriented toward historical comparisons runs aground.

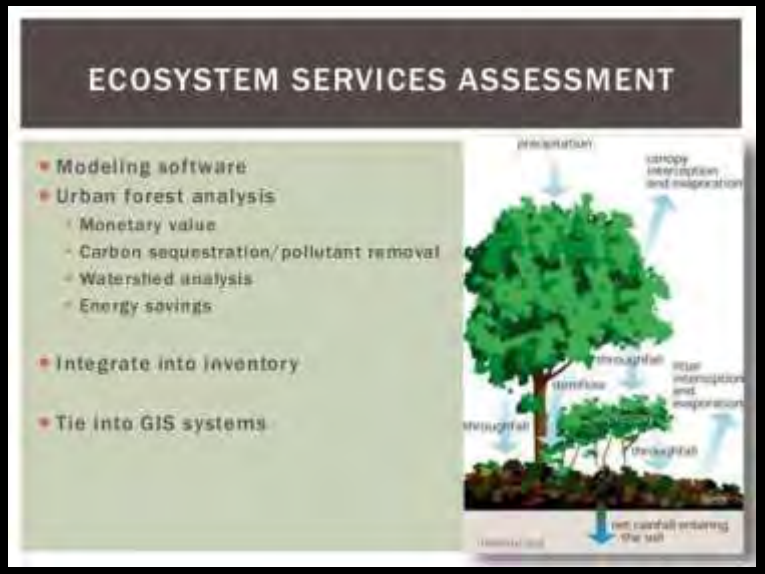


Scientific Methodology and the Urban Forest

i-Tree – Inventory of Tree Resources: Economic and Environmental

A collection of urban and rural forestry analysis and benefits assessment tools. It was designed and developed by the United States Forest Service to quantify and value ecosystem services provided by trees using standardized field data.

Austin's Urban Forest Inventory



i-Tree
Tools for Assessing and Managing Forests & Community Trees

USDA
United States Department of Agriculture

Austin's Urban Forest 2014

- Contribute significantly to the environment, the economy, and the residents' well-being
- Include an estimated 33.8 million trees and 30.8% tree canopy cover
- Store approximately 1.9 million tons of carbon (valued at $242 million)
- Reduce annual residential energy costs by an estimated $18.9 million per year
- Reduce storm water runoff by an estimated 65 million cubic feet per year
- Are valued (compensatory value) at an estimated $16.0 billion

The most common tree species are
Ashe juniper, cedar elm, live oak, sugarberry, and Texas persimmon.

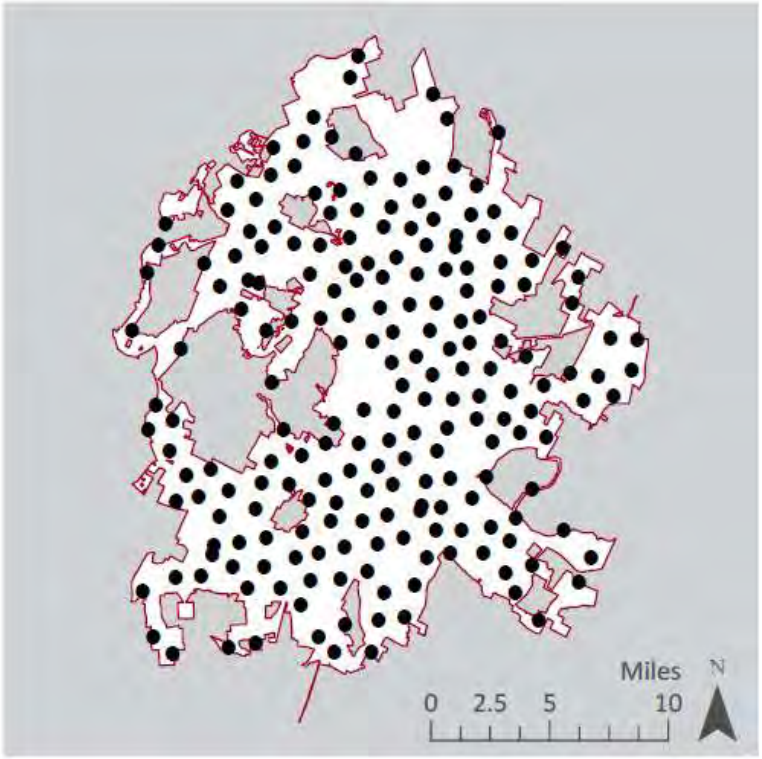


Figure 2.—Approximate locations for 206 urban inventory plots, Austin, 2014

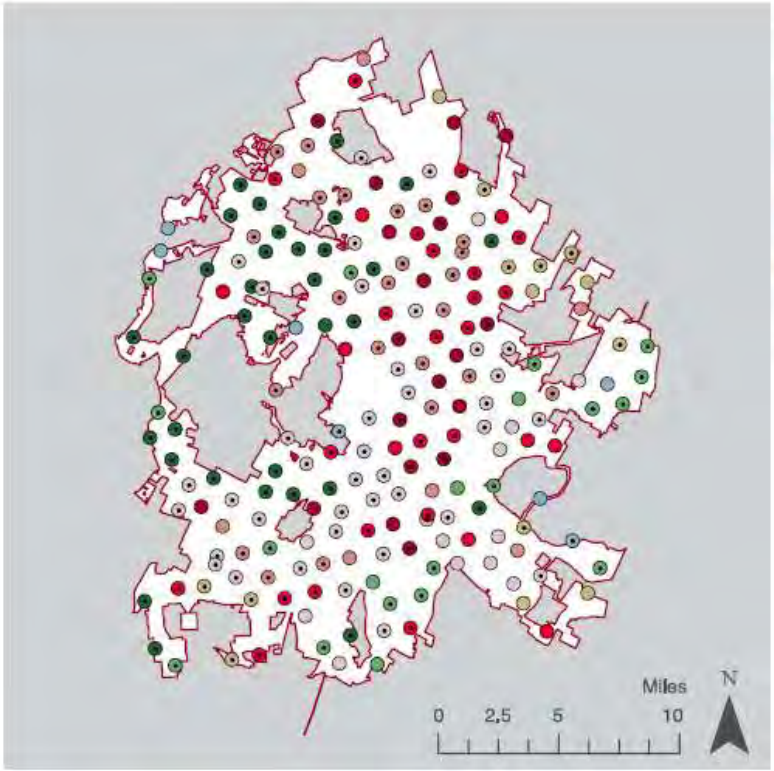
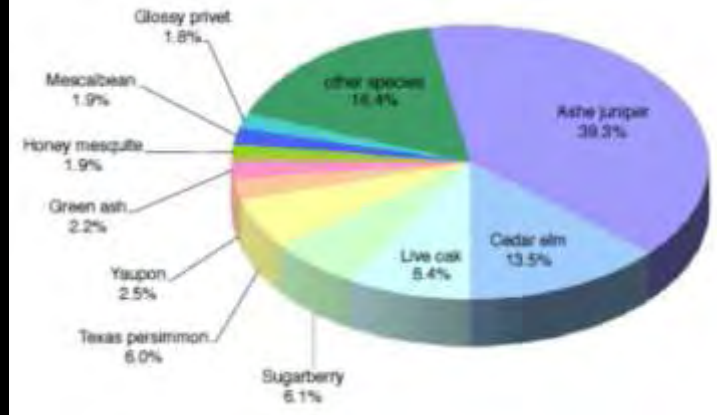
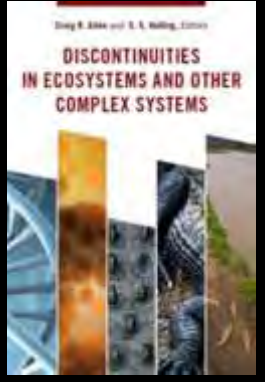


Figure 6.—Plot distribution by land cover, Austin, 2014.

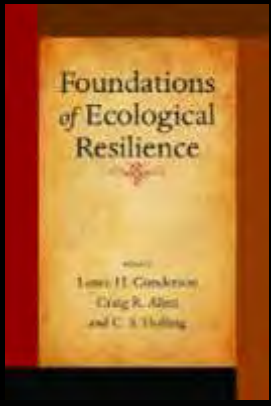
A New Ecology and Scientific Methodology

- New Forest - Austin's urban forest is a mix of native tree species and exotic species that were introduced by residents or other means.
- Higher Biodiversity - Urban forests often have higher tree species diversity than the surrounding native landscapes because of the large impact of species imported from outside the region and the country





Resilience and Wild Urban Woodlands



…the ability to absorb disturbances, to be changed and then to reorganize and still have the same identity (retain the same basic structure and ways of functioning).

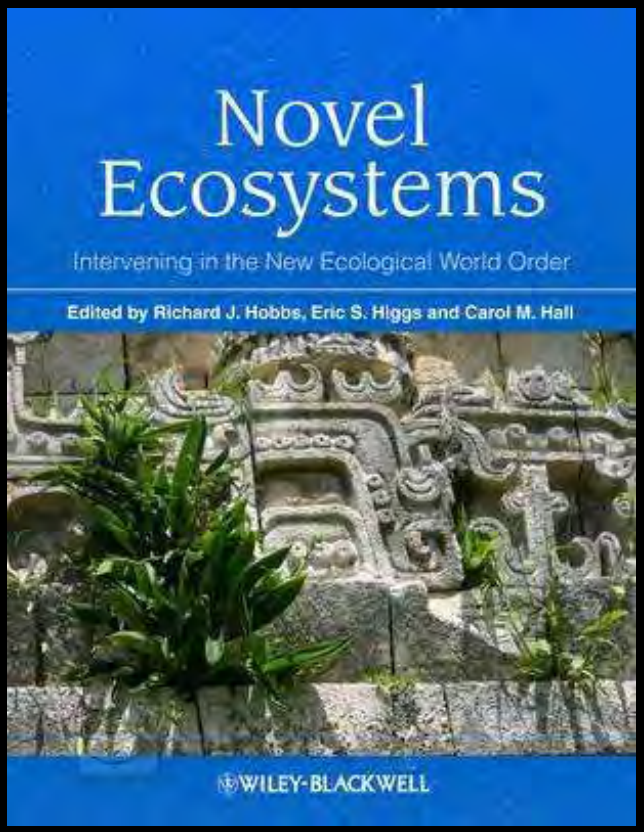
A resilient ecosystem can withstand shocks and rebuild itself when necessary.

2017

2005 2007 2009 2012

Maybe it's not nature at all
Novel Ecosystems

- Assemblages of species in a given area that have not previously occurred.
- Novel ecosystems are not under human management, but they are mostly the result of direct or indirect human activities.
- They lack natural analogs
- Novel ecosystems are not really all that novel, except in their species composition.
- The Adaptive Cycle



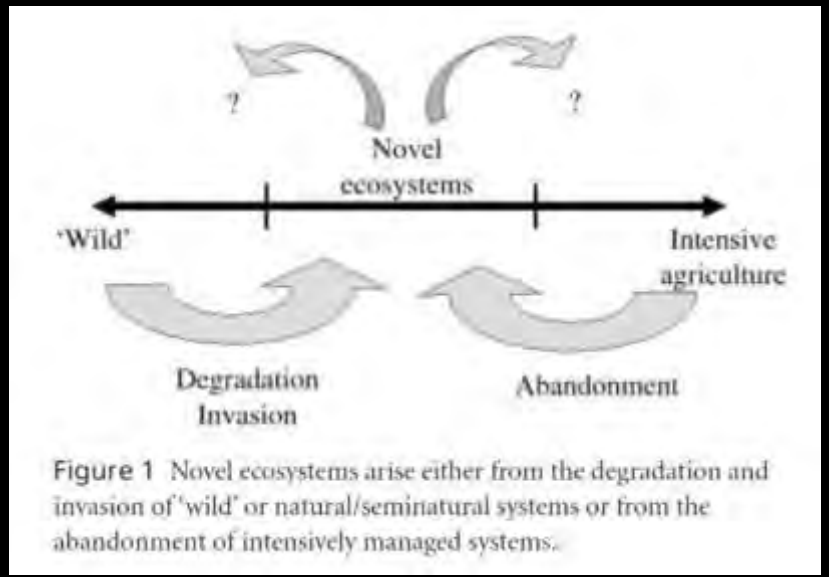


Figure 1 Novel ecosystems arise either from the degradation and invasion of 'wild' or natural/seminatural systems or from the abandonment of intensively managed systems.

Unplanned Urban Greenspace

Wastelands - whole patches

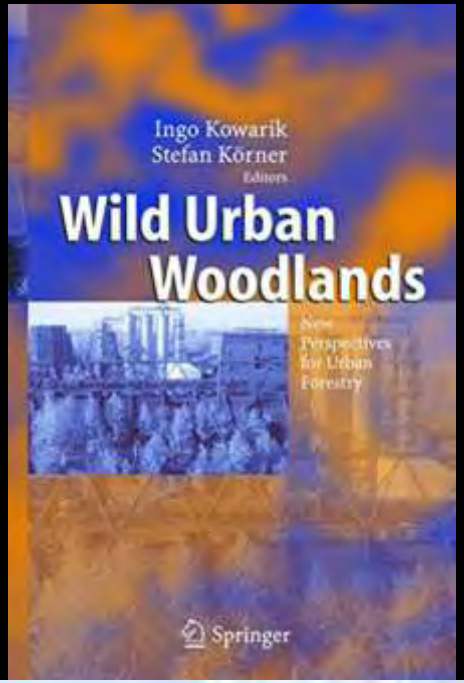
- Vacant lots
- Dumpsites
- Industrial Wasteland
  - Brownfields
  - Greenfields
  - Quarries and Gravel Pits
- Urban Infrastructure Land
  - Power plants
  - Water treatment plants
  - Reservoirs
  - Wastewater treatment plants
    - Sewage ponds
    - Constructed wetlands
  - Stormwater retention structures
- Unusable Land - bits and pieces
  - Slopes, gullies, corners, fragments

Margins – edges and ledges

- Urban waterways
- Canals, drainage channels
- Utility corridors
- Waysides
  - road waysides
  - railway verges
- Alleys – paved, unpaved, grass
- Walkways and pathways
- Fencelines
- Walls and ledges
- Pillars and bridge abutments

“oddly enough, there’s also too much wildness, too many weeds and wooded borders and tangled banks, not to mention vacant lots going to brush.”

Although we think of these kinds of places as idle, degraded, vacant urban space, this unplanned waste space is transformed by nonhuman agents into the green background of the city and is far more ubiquitous in the urban landscape than planned, managed urban nature in “open space” or “green space”.



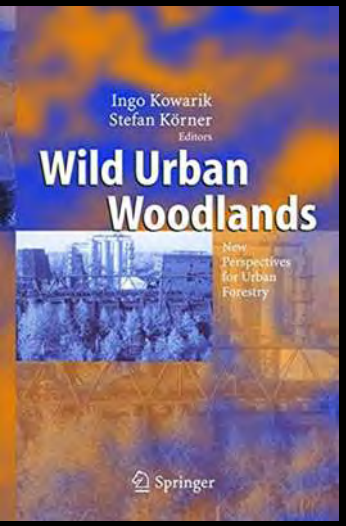
Wild Urban Woodlands vs. Remnant Woodlands
The Natural and the Artificial
Wild Urban Woodlands Ingo Kowarik 2005

• What shapes the character of the new wild urban woodlands is, briefly, the sharp contrast between a cultural layer of rubble, ruins and rusted iron and a natural layer that grows untamed and often surprisingly quickly.

• In the context of the remnant woodlands and retrospective ecology, one could evaluate wild urban woodlands as completely artificial, but, in the context of the urban landscape as having a special natural wilderness character – bipolar kind of nature.

• This bipolarity…brings about confusion and insecurity in the general classification as well as in the scientific classification of these spaces.

• The perception of and the value given to urban wild woodlands is revealed through terminology, with whose help those value judgments are further conveyed.



Natural Agency - Agency of natural mechanisms

The leeway for the agency of natural mechanisms is significantly greater in urban wild woodlands than in woodlands used for forestry or in those resulting from urban greening. The latter two are usually heavily influenced by the initial plantings, and by use and maintenance.

Cultural Agency - Agency of cultural mechanisms

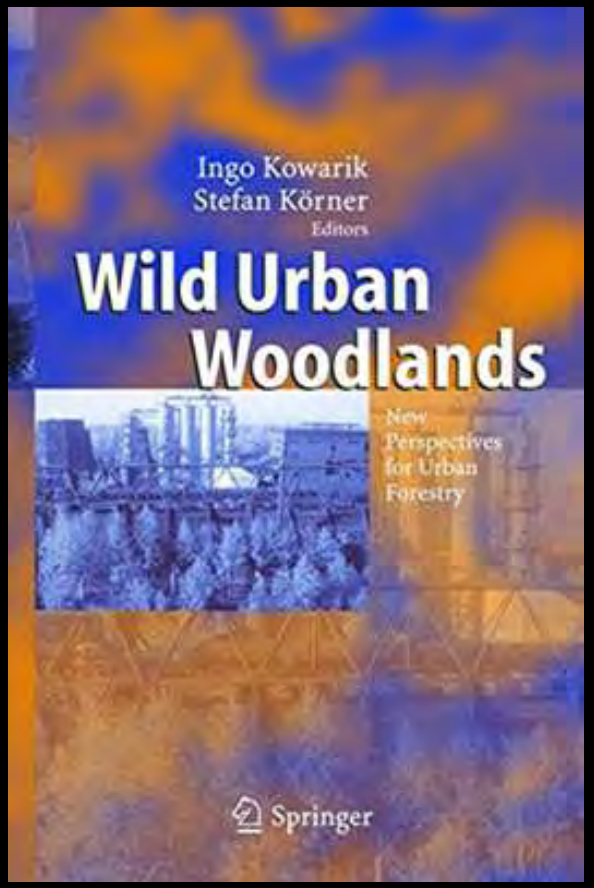
In contrast to pristine forests, urban wild woodlands are heavily culturally influenced. This is true of abiotic conditions as well as biotic.

Process and Prospective Ecology - *Wild Urban Woodlands* Ingo Kowarik 2005

A second type of naturalness can be identified beyond a historic naturalness....the reference point is not an original condition of a natural landscape, but rather a condition defined based on the current site potential and the greatest possible degree of self-regulation. From this perspective, therefore, the natural capacity for *process* is the central point, not a particular, retrospectively determined and often idealized, *picture* of nature.

Table 2. Historical differentiation of woodlands according to the history of their development and use. The four types of woodlands vary conspicuously in terms of the agency of natural versus cultural mechanisms and in their habitat continuity. The forest types are further classified according to the "four natures approach," see text for explanation). H – Habitat continuity; N – Agency of natural mechanisms; C – Agency of cultural mechanisms

Types of forests	Types of ecosystems	Types of "nature"	H	N	C
Remnants of pristine forests	Pristine ecosystems	Nature 1: "old wilderness"			
Forests strongly characterized by silviculture	Ecosystems shaped by silvi-/agriculture	Nature 2: "traditional cultural landscape"			
Planted tree stands in green spaces	Ecosystems established by urban greening	Nature 3: "functional greening"			
Woodland succession on urban-industrial sites	Ecosystems evolved on urban-industrial sites	Nature 4: "new wilderness"			



Four Kinds of Nature - *Wild Urban Woodlands* Ingo Kowarik 2005

1. First Nature is the "original" nature (old wilderness) - Natural Agency
2. Second Nature includes elements of the landscape that arose through traditional or modern agriculture and forestry practices, for example, meadows and pastures, crop fields, intensively managed forests, etc. – Cultural Agency
3. Third Nature comprises the greenery that has emerged through horticultural plantings, maintenance and upkeep. This includes, fundamentally, gardens and parks created during different eras of garden history, but also other urban greenery such as street trees or trees planted to define spaces in developments. – Cultural Agency
4. Fourth Nature encompasses the natural development that occurs independently on neglected urban sites, without horticultural planning or design. This starts with cracks in sidewalks or in colonization of walls and buildings as "artificial cliffs" and leads to growth in abandoned areas and to impressive wild urban woodlands. - Natural and Cultural Agency

Wilderness

Pastoral

Urban Nature?

Urban Flora and Fauna – Wildness and The Agency of Nature

“there’s also too much wildness”

Wildness - Agency of Nature

Agency - Active subjects inhabiting the urban landscape

rather than passive objects for human observation and appreciation

Wildness - Non-humans do unexpected things

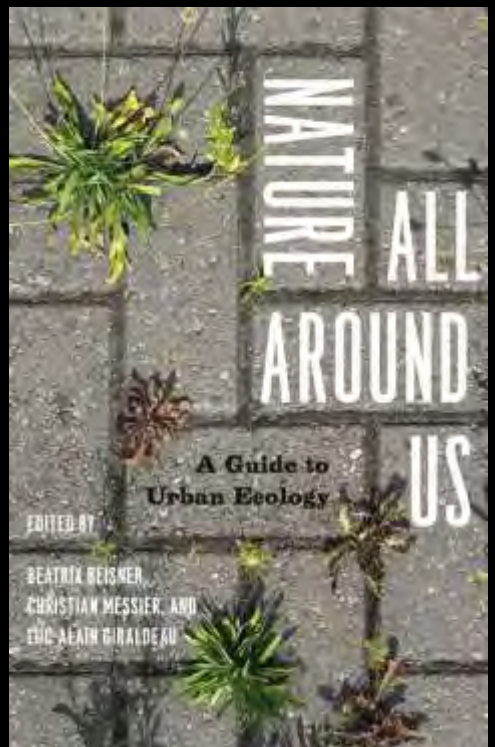
They defy our expectations of what nature should be and how non-humans should behave…

Perceptions of “Wild” Urban Flora
Agency of Nature

Beautiful flower in your garden
But the most beautiful by far
Is the one growing wild in the garbage dump
Even here, even here, we are

Song by Paul Westerberg, “Even Here We Are” (*14 Songs*, 1993)

“I like it when a flower or a little tuft of grass grows through a crack in the concrete. It's so … heroic.”
George Carlin



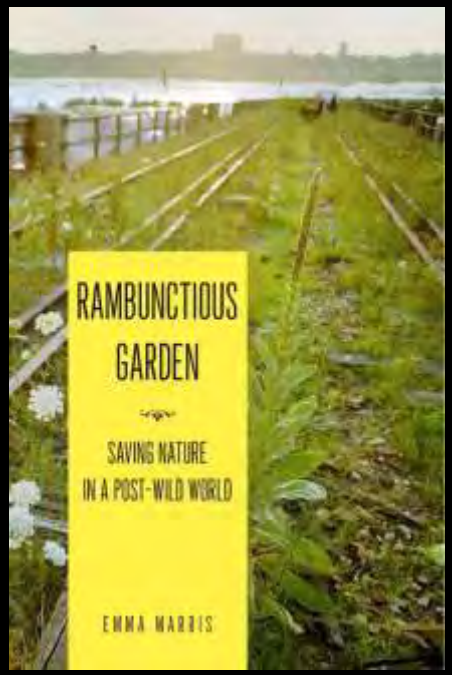
Retrospective Ecology – Negative Natural Agency

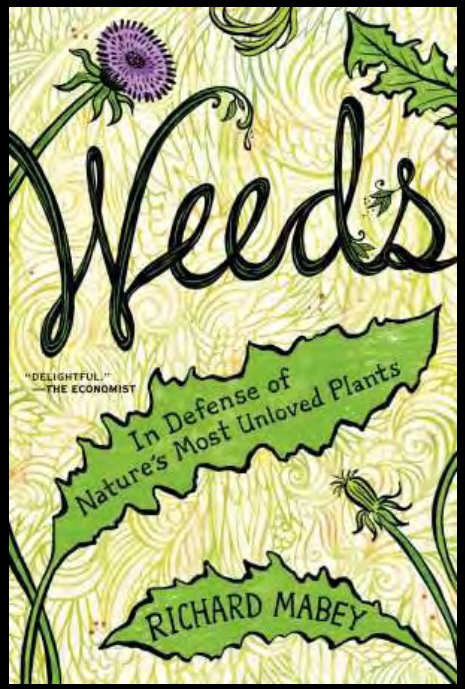
Non-native species - An invading force of alien species destroying the integrity of our homeland

"(Urban growth) replaces the native species that are lost with widespread "weedy" nonnative species. This replacement constitutes the process of biotic homogenization that threatens to reduce the biological uniqueness of local ecosystems."

Michael L. McKinney, "Urbanization, biodiversity, and conservation". Bioscience 52(10), (2002)

Usually assessments of "Urban Biodiversity" exclude non-native species





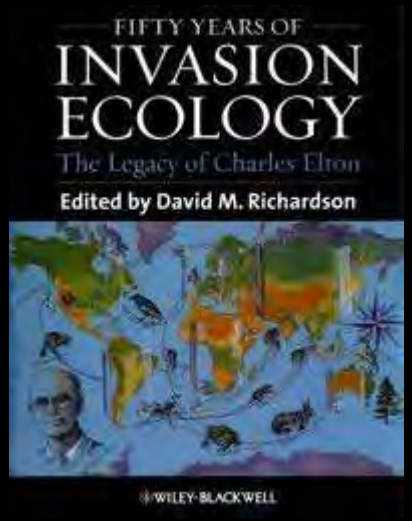
…and so non-native urban flora (and some fauna) are actively destroyed.

Invaders of Texas

a Citizen Science Program to Detect and Report Invasive Species

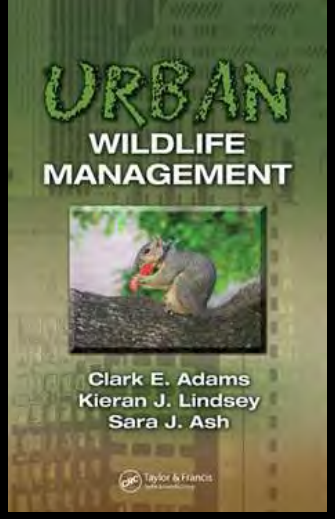
"Invaders of Texas" website was created by the Lady Bird Johnson Wildflower Center as a tool for mobilizing the public against non-native invaders and the website employs the rhetoric of war and a resistance composed of "citizen scientists" defending the homeland.

The Invaders of Texas Program is a campaign whereby volunteer "citizen scientists" are trained to detect the arrival and dispersal of invasive species in their own local areas.



Urban Wildness - The Challenge of Urban Wildlife

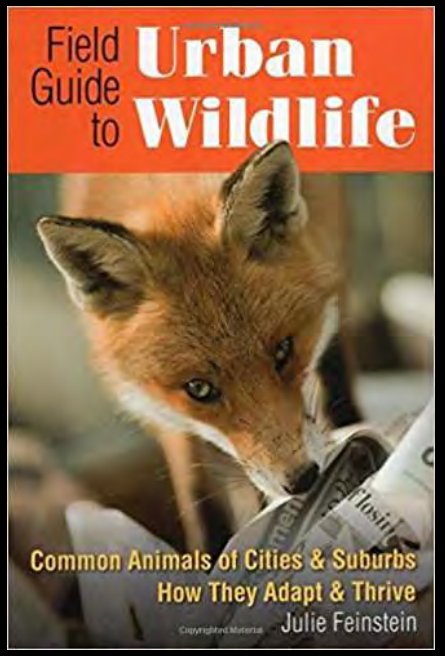
This urban fauna is judged favorably when it in some way fulfills our expectations of wild nature or condemned as pestilent when it fails to follow the narrative for good fauna in the city – and stay in the proper places for nature in the city.



This narrative of urban wildlife declares that transgressive coyotes, rats, grackles, and pigeons are urban pests that further degrade the city…

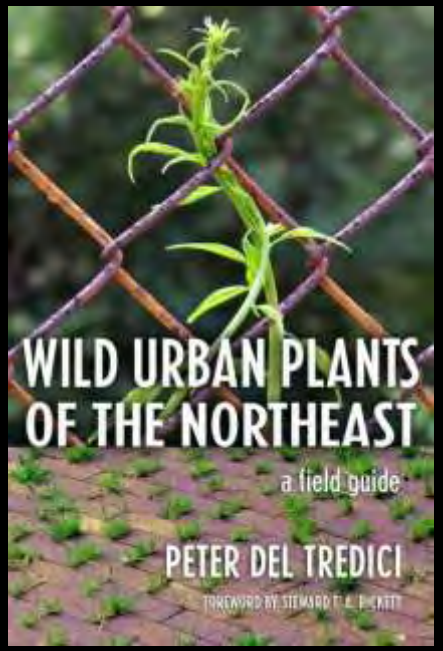
…but nesting red-tailed hawks and peregrine falcons are redemptive wild additions to the urban scene.

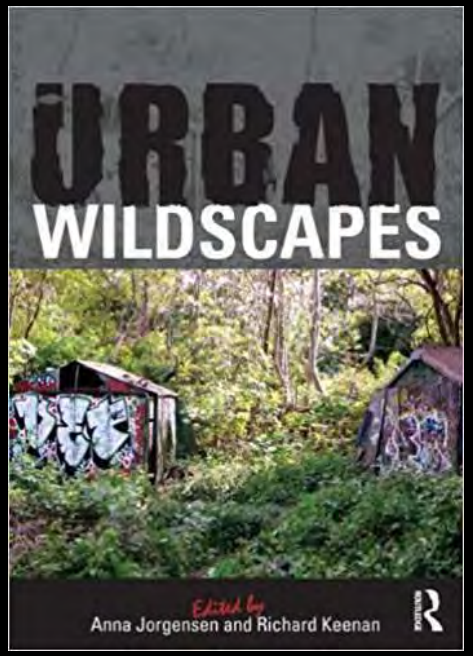
Proper Place for Urban Wildlife?
All of the city is habitat

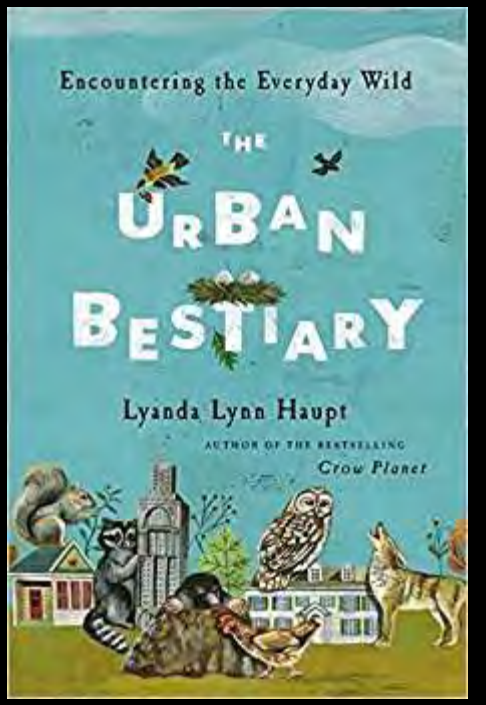


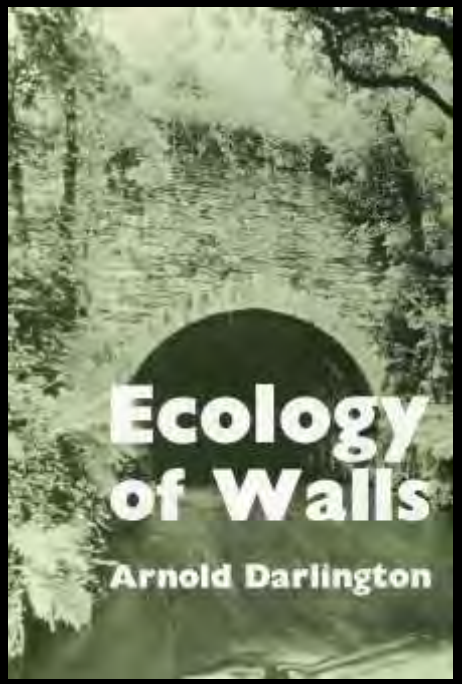
The mobility of urban wildlife allows them to exploit the entire city as habitat.

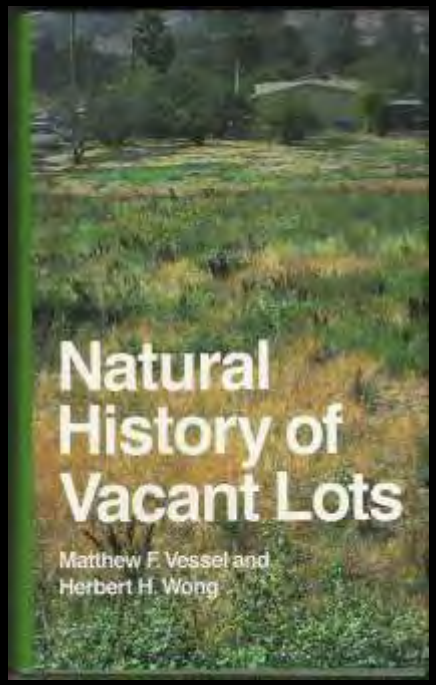
Non-traditional Narrative – Heroic Plants and Urban Wildlife

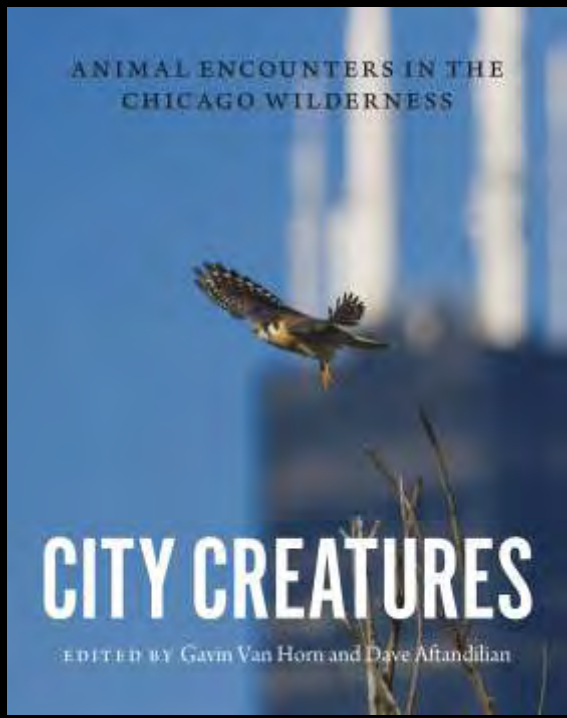












The Terrestrial City: Greenspace and the Urban Forest

Nature vs. Culture

Retrospective vs. Prospective

Natural vs. Artificial

Wilderness vs. Urban

Pastoral vs. Urban

Pristine vs. Degraded

Wild vs. Tame

Native vs. Non-native

Humans vs. Non-humans