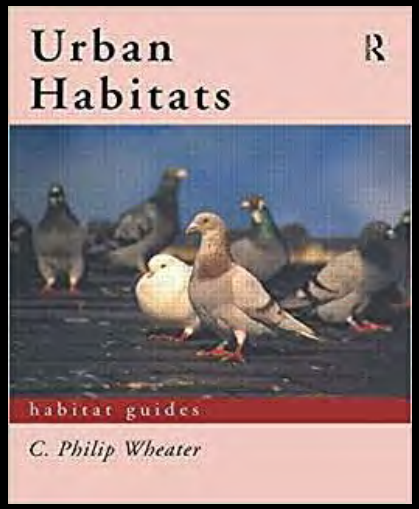
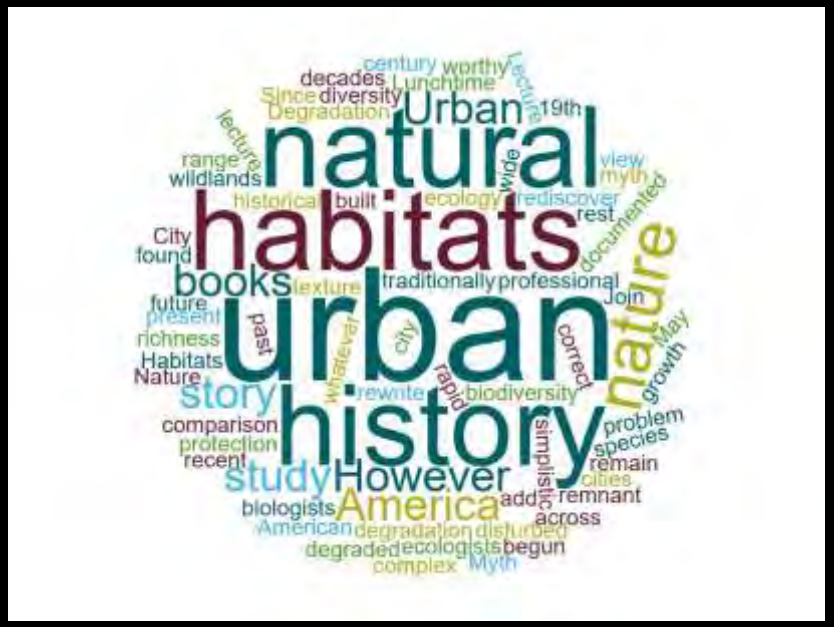
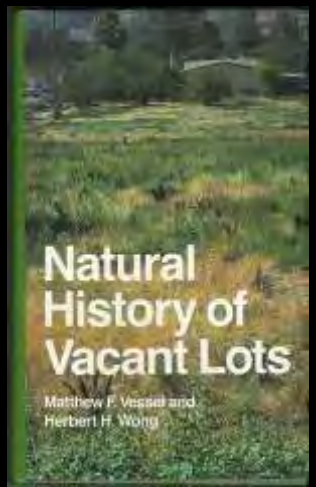
Center for Environmental Research at Hornsby Bend

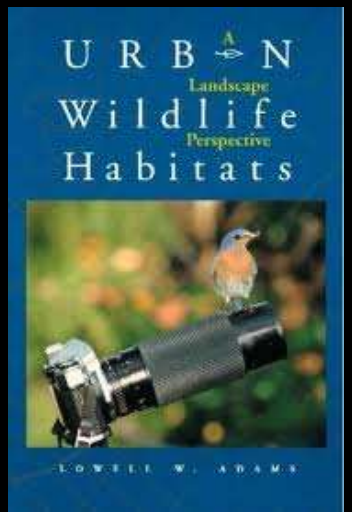
Austin WATER

Nature in the City: Urban Habitats and the Degradation Myth









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

Center for Environmental Research at Hornsby Bend

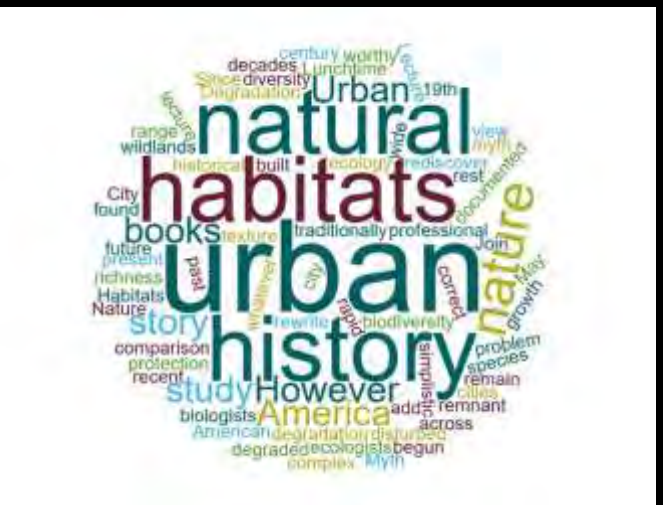
Austin WATER

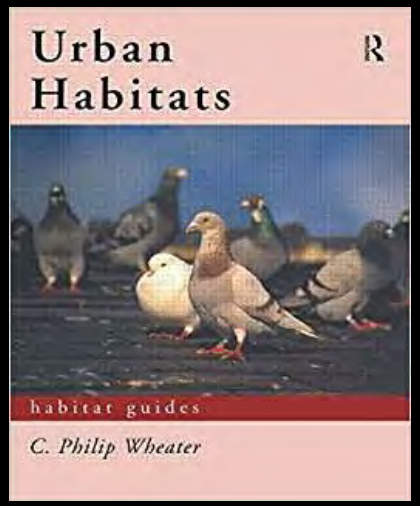
The CER Lunchtime Lectures 2017

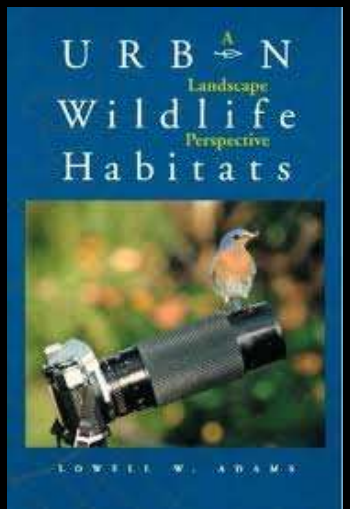
Understanding Urban Nature: Ecology, Culture, and the American City

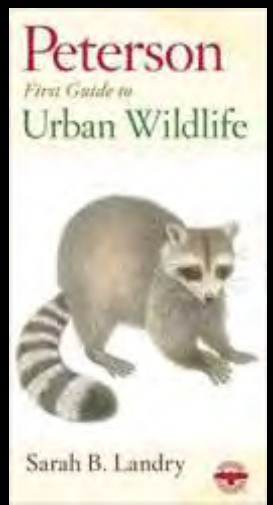
The Nature of Cities – Urban Natural History and Ecology – The Nature in Cities

May	Nature in the City: Urban Habitats and the Degradation Myth
June	The Aquatic City: The Ecology of Urban Waterways
July	The Terrestrial City: Greenspace and the Urban Forest
August	The Subterranean City: Soil and the Urban Microcosmos
September	The Aerial City: Urban Birds, Bats, and Denizens of the Sky









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.
- Our understanding of what constitutes "official" urban nature in cities is shaped by culturally dominant metaphors of nature.
- Official urban nature – subjects of human planning and management in parks, gardens, landscaping, and preserves.

By restricting our discourse of nature to these traditional concepts, we fail to come to terms with a new kind of nature that has emerged in the city.

Urban nature is neither pristine nor pastoral, but rather it is a new kind of nature whose ecological and cultural meaning is an open question.

Nature in Cities: The Open Question and The Degradation Myth

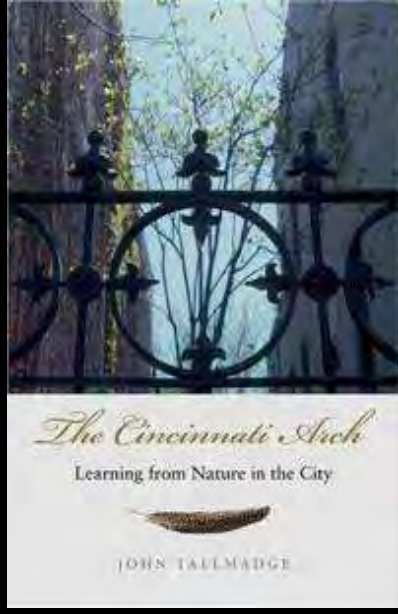
John Tallmadge *The Cincinnati Arch: Learning from Nature in the City* (2004)

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.



Perspectives on Urban Nature and the American City

The Sacred and the Mundane

Wilderness and the City

Natural vs. Artificial

Pristine vs. Degraded

Native vs. Non-native

Invasive Non-native Species

Once a rock dove, now the winged rat of the city

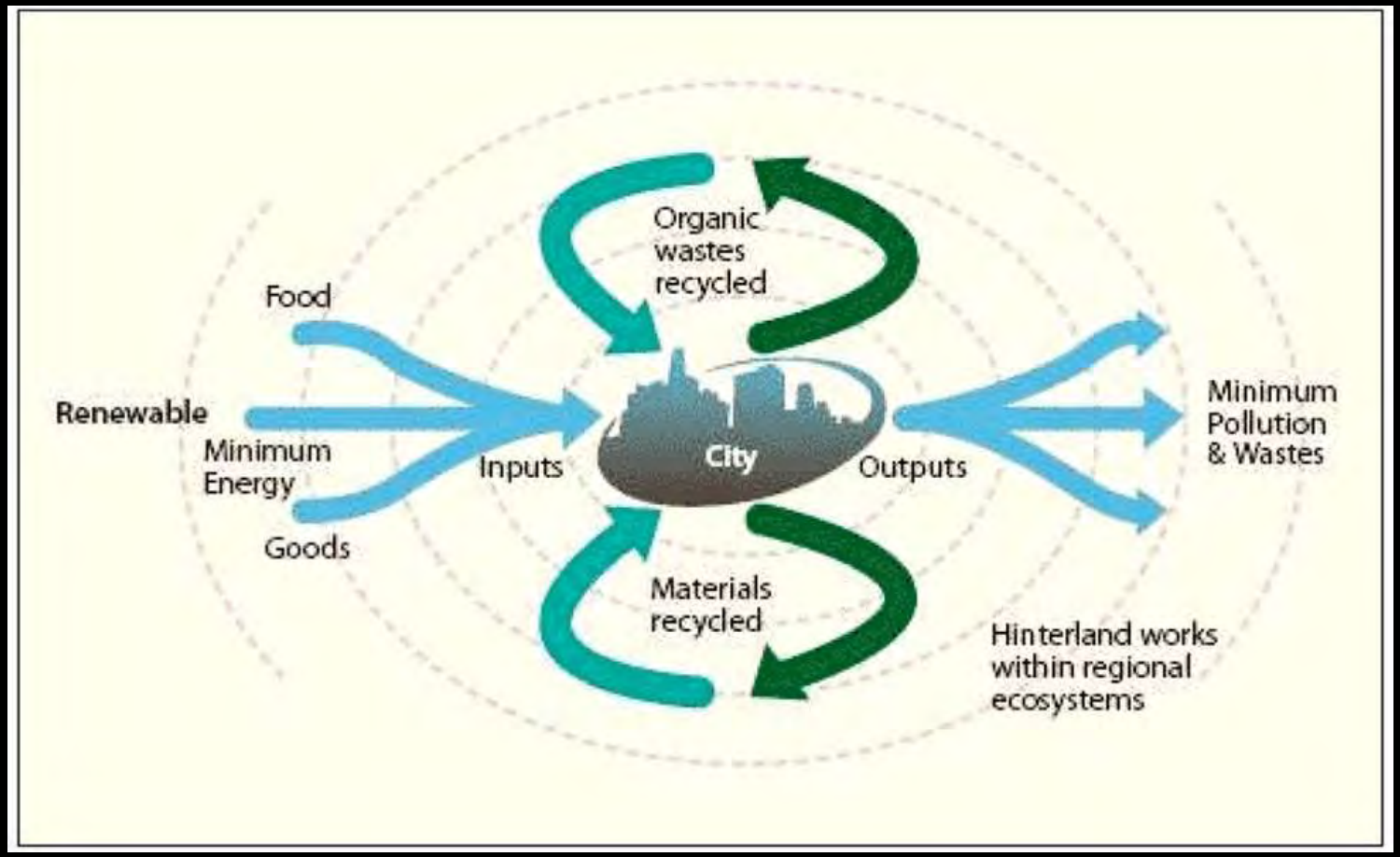
Non-native species and Biodiversity?


Natural What?

A Scientific Answer? Urban Ecology

The Socioecological Elemental City

The ecology ‘in’ cities
or
The ecology ‘of’ cities

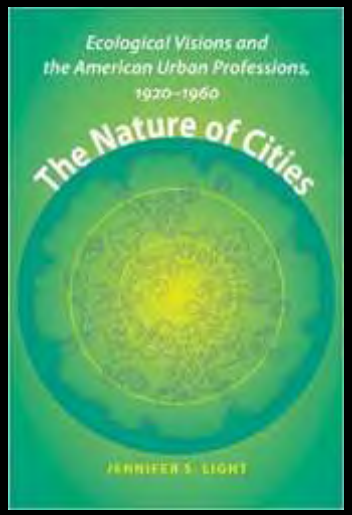


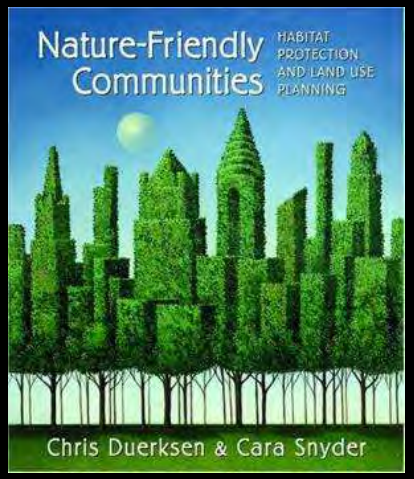
A Socioecological Answer?

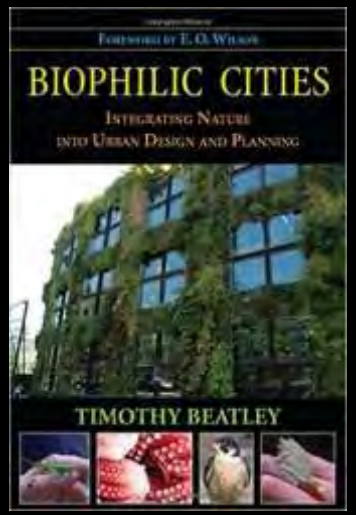
The Nature of Cities is a “boundary organization” interested in ideas at the frontiers of science, design, policy, and the arts—an idea hive that puts different approaches and points of view together, to discover what novel perspectives might emerge.

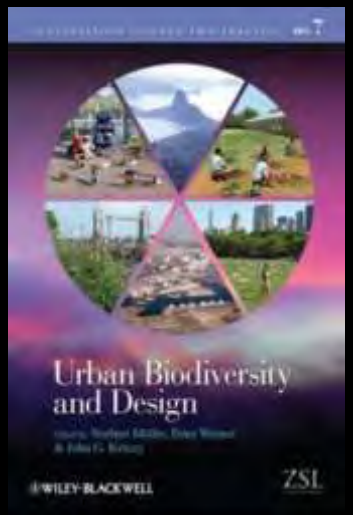
a virtual magazine and discussion site

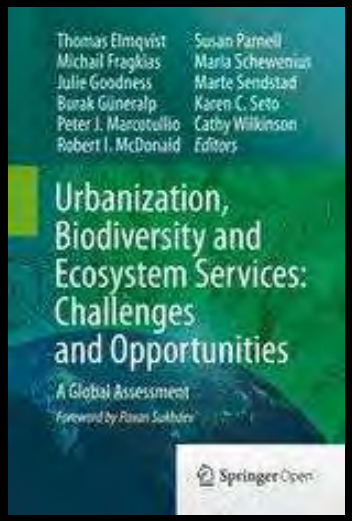
https://www.thenatureofcities.com/









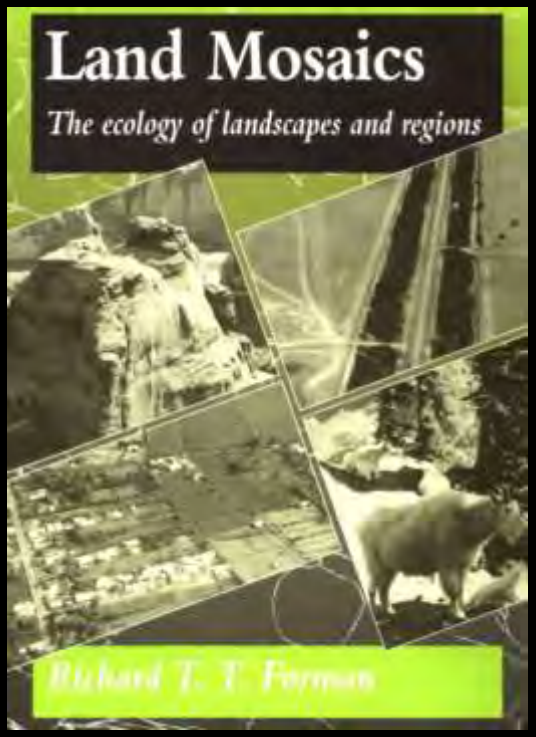


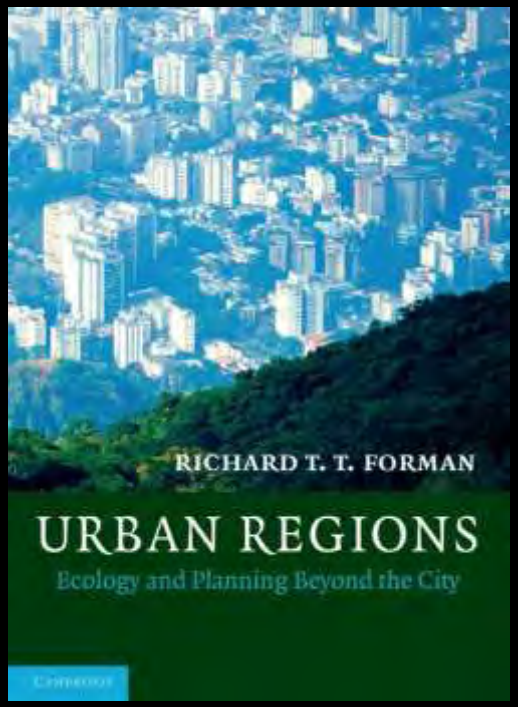
Contemporary American Approaches to Urban Ecology
Ecology “of” Cities

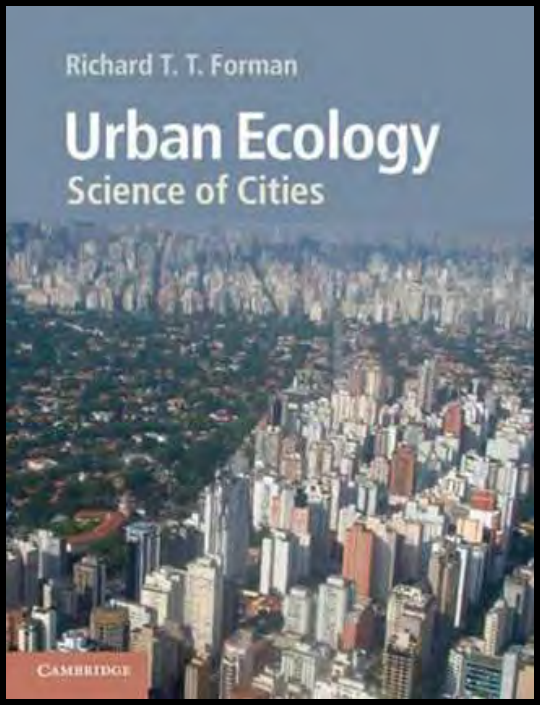
Landscape Ecology to Urban Ecology
Richard Forman – Harvard University

Spatial Patterns – Cities as heterogeneous mosaics

In short, then, it takes the whole region to make the city.
Patrick Geddes, *Cities in Evolution*, 1914



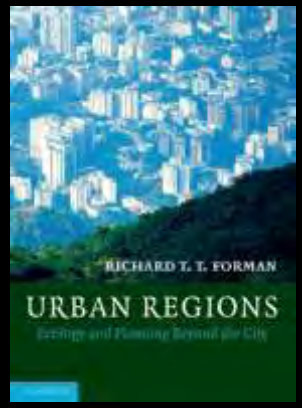




Nature “in” cities - Distinctive attributes, hierarchical scales, and gradients

1. Habitats and species
   - Usually diverse intermixed greenspaces and built patches cover the area.
   - Small sites tend to have few species, whereas large areas are often species rich.
   - Planted ornamentals, as well as spontaneous colonized species, are widespread.
   - Generalist species survive and predominate in urban conditions.

2. Patches and areas
   - Housing developments and house plots emphasize rectilinear repetition.
   - Boundaries are overwhelmingly straight, abrupt, and in high density.
   - Mowed grassy areas range from abundant to essentially absent.
   - Widespread impervious surfaces absorb solar radiation, generate heat, and greatly increase stormwater runoff.
   - Air and water are often heavily polluted.



3. Corridors and flows
   - Rectilinear road networks channel hordes of moving vehicles and people.
   - Underground branching conduits permeate and connect the place.
   - Animal movement is often along stepping stones rather than continuous strips.
   - Watercourses are channelized and flood-prone areas common.

4. Change
   - Many ecological changes are human-caused, rapid, and drastic.
   - Abundant species from afar endlessly arrive, while both native and non-native species disappear.
   - The city expands directionally over suburbs, and suburbs over rural land.

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

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

Humans as Disruptors - Narrative of Degraded Nature in American (Urban) Ecology

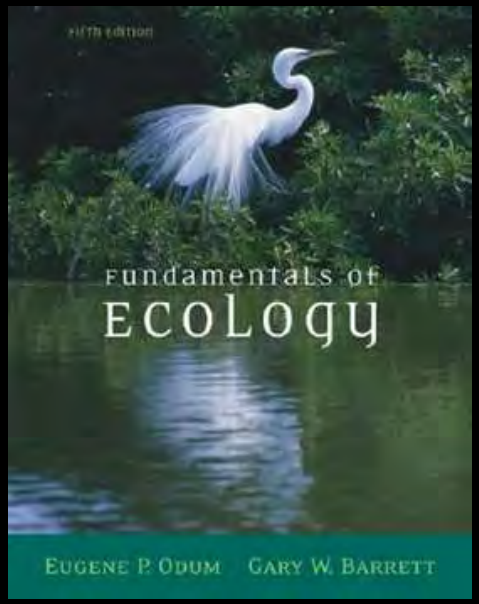
Perceptions of American Urban Biologists, Ecologists, and Environmentalists

Ecology "in" cities – "Bizarre" - A weedland community of inappropriate nature

(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), 883–890.

the human-nature dualism



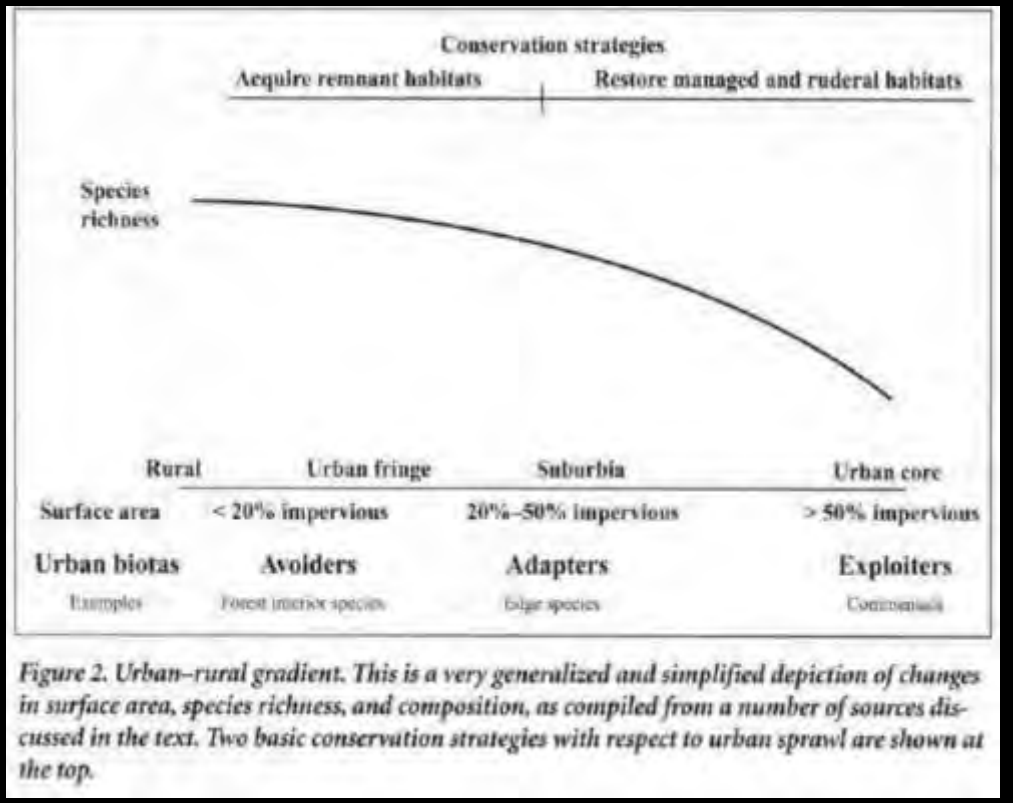


Figure 2. Urban–rural gradient. This is a very generalized and simplified depiction of changes in surface area, species richness, and composition, as compiled from a number of sources discussed in the text. Two basic conservation strategies with respect to urban sprawl are shown at the top.

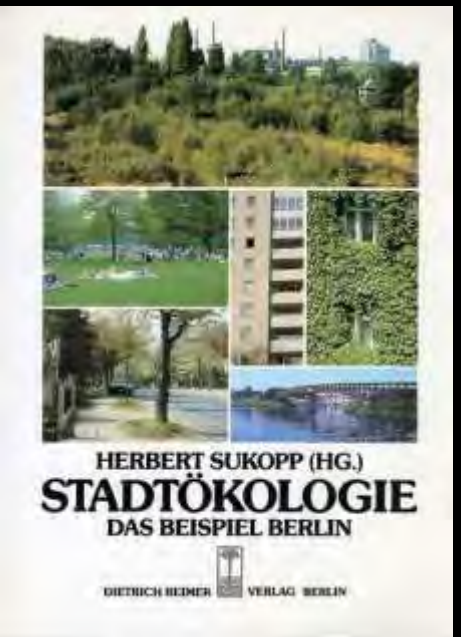
Alternative Ecological Perspectives on Ecology “in” cities

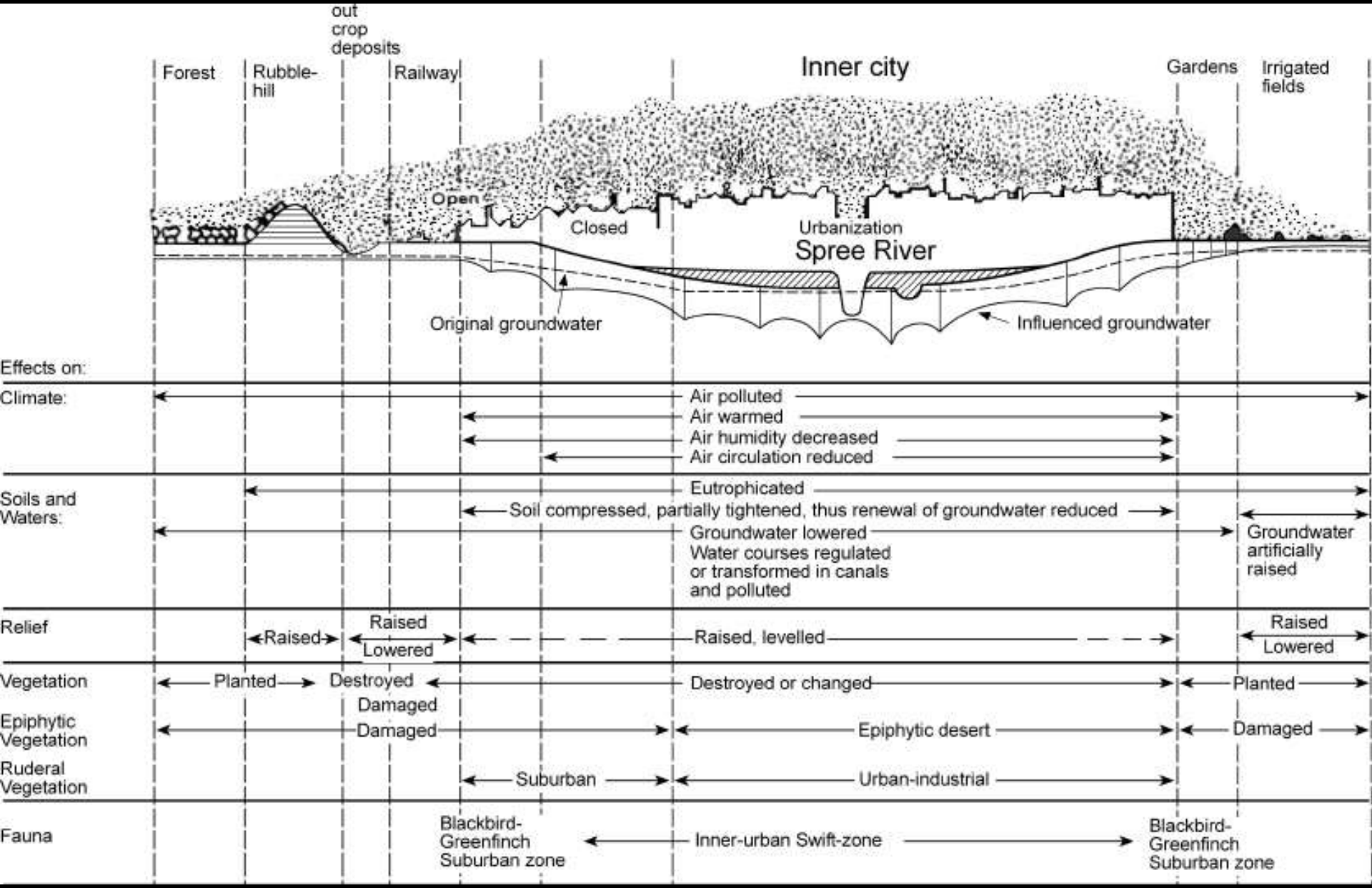
Perceptions of European Urban Ecologists – Cosmopolitan Community

German urban ecologist, Herbert Sukopp

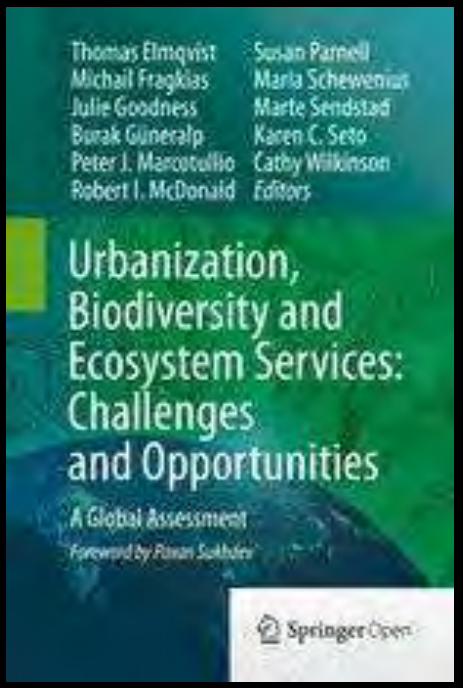
Urban ecosystems are:

- A cosmopolitan community of uniquely adapted organisms
- the field laboratories where possibly new and well-adapted ecotypes of our native or naturalized wild plants will originate in the changed environmental conditions.
- Ecosystems which have developed in urban conditions may be the prevailing ecosystems of the future.




out crop deposits
Forest
Rubble-hill
Railway
Inner city
Gardens
Irrigated fields
Open
Closed
Urbanization
Spree River
Original groundwater
Influenced groundwater
Effects on:
Climate:
Air polluted
Air warmed
Air humidity decreased
Air circulation reduced
Soils and Waters:
Eutrophicated
Soil compressed, partially tightened, thus renewal of groundwater reduced
Groundwater lowered
Water courses regulated or transformed in canals and polluted
Groundwater artificially raised
Relief
Raised
Raised
Lowered
Raised, levelled
Raised
Lowered
Vegetation
Planted
Destroyed
Damaged
Destroyed or changed
Planted
Epiphytic Vegetation
Damaged
Epiphytic desert
Damaged
Ruderal Vegetation
Suburban
Urban-industrial
Fauna
Blackbird-Greenfinch Suburban zone
Inner-urban Swift-zone
Blackbird-Greenfinch Suburban zone

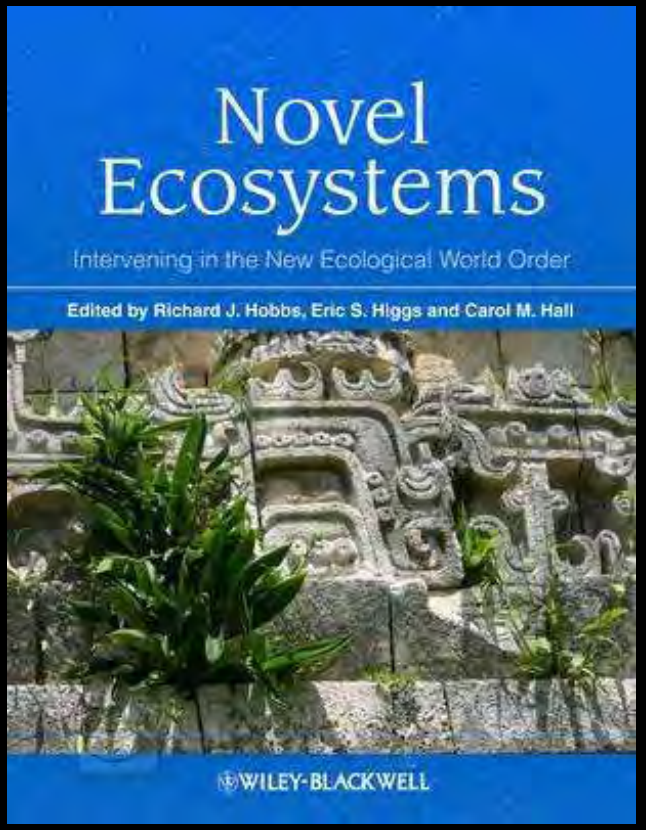
1. Configuration of buildings, technical infrastructure and open spaces where the extent of hard surface (including buildings, paving and other structures) covers an average of 30–50 % of the land surface in the urban fringe and suburban areas, and well in excess of 60 % in the core areas.
2. Formation of an urban heat island effect in temperate and boreal zones with longer periods of plant growth, warmer summers and milder winters than the surrounding countryside.
3. Modification of the soil-moisture regimes, tending to become drier in temperate zones, but with opposite effects in desert areas due to irrigation.
4. High levels of nutrient input at both point source and broad-scale.
5. High biomass production in parks, private and community gardens, and similar intensively cultivated or managed areas.
6. Intentionally and unintentionally elevated food availability for animals both wild and domesticated.
7. Soil contamination, air pollution, and water pollution; with particular impacts on soil organisms, lichens, and aquatic species.
8. Disturbance such as trampling, construction (often with removal of all vegetation), mowing, radical soil change, light and sound pollution, and litter or illegal dumping.
9. Fragmentation of forests, grasslands and waterways as well as existing green spaces.
10. High proportion of introduced plant- and animal species.
11. High proportion of habitat generalists and common plant and animal species.

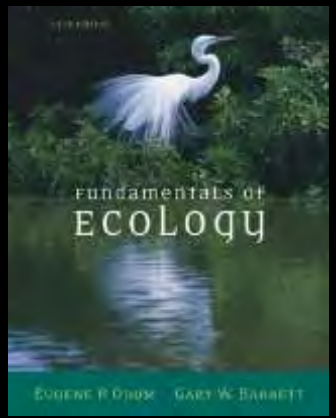


Ecosystems which have developed in urban conditions may be the prevailing ecosystems of the future.

New Nature - 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.
- We need to develop a new ecology that is not prejudiced by the human-nature dualism.





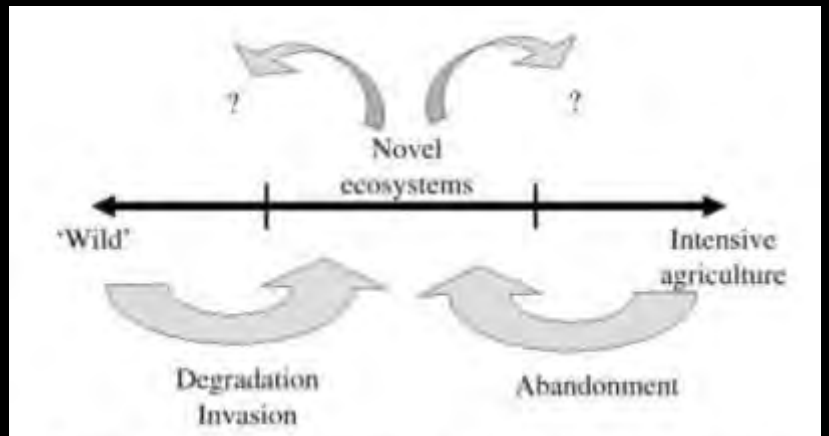


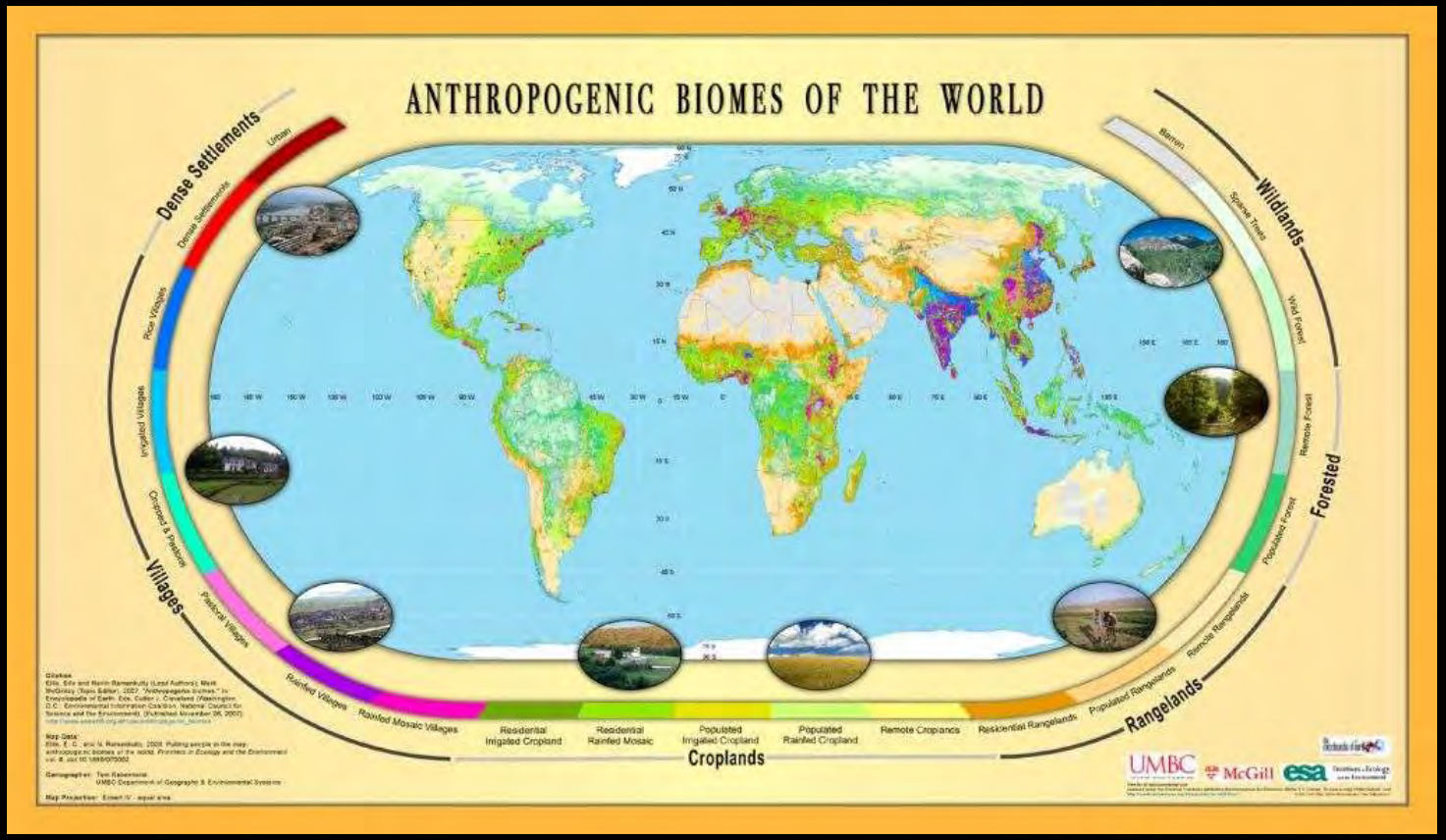
Figure 1 Novel ecosystems arise either from the degradation and invasion of 'wild' or natural/seminatural systems or from the abandonment of intensively managed systems.

Anthropogenic Landscapes, or "Human Landscapes"

http://ecotope.org/ Dr. Erle Ellis

Areas of Earth's terrestrial surface where direct human alteration of ecological patterns and processes is significant, ongoing, and directed toward servicing the needs of human populations for food, shelter and other resources and services including recreation and aesthetic needs.

Anthropogenic Biomes ("Anthromes"), describe the globally-significant types of anthropogenic landscapes.

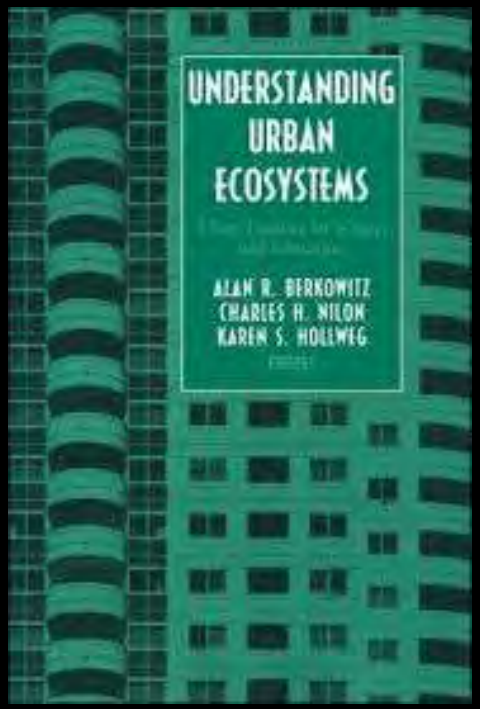


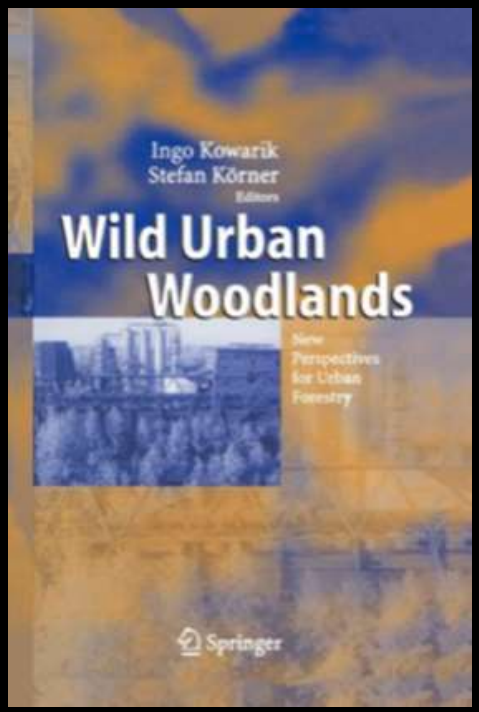
Ecology “in” cities – urban landscape patterns and processes not “bizarre”

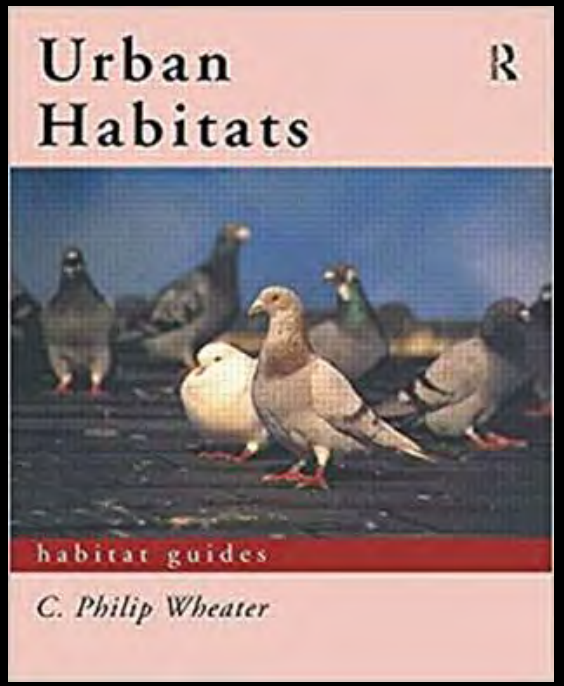
Process, Biodiversity, and European Urban Ecology

…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.
- Ingo Kowarik *Urban Wild Woodlands* (2005)

…although wild and rather specialist species may be missing, cities are great havens for biodiversity, in terms of both ecology and species, even in industrial areas.
- Anthony Bradshaw in Berkowitz, *Understanding Urban Ecosystems: A New Frontier for Science and Education.* (2003)







Science for Environment Policy
DG Environment News Alert Service

08 November 2007

Benefits of Wastelands for the Protection of Urban Biodiversity

Recent research has emphasised the role urban wastelands can play in preserving biodiversity in urban areas. Large connected wasteland seems to be a significant source of floristic diversity and thus disseminates and colonises surrounding neighbourhoods. Scientists suggest that preserving wasteland in urban areas could be necessary to protect urban biodiversity.

Land use planning can have a significant impact on biodiversity. To address this concern, the European Commission issued a strategy on biodiversity[1] in 1998 and four biodiversity action plans in 2001. In May 2006, the Commission adopted a Communication[2] which sets out an ambitious policy approach to halting the loss of biodiversity by 2010. In particular, it provides an EU Action Plan which proposed concrete measures and outlines the responsibilities of EU institutions and Member States, respectively. Furthermore, the European Commission also adopted a Thematic Strategy on the Urban Environment[3] in January 2006 aiming at improving the quality of the urban environment. However, even with this initiative, the specific link between urban wasteland and biodiversity has still received limited attention.

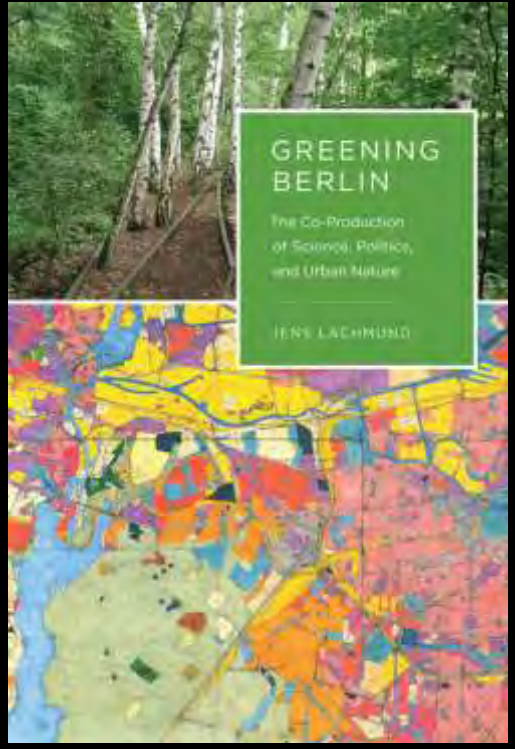
Recently, French researchers tried to determine the role of urban structures in the distribution of wasteland flora in urban areas. Within the framework of this study, they focused on 98 wastelands ranging from a few square meters to more than 18,000 m² over a French department in the greater Paris region. Researchers assessed three parameters quantifying the floristic importance of wastelands: the number of species, the frequency of occurrence of species and the proportion of indigenous versus naturalised species.

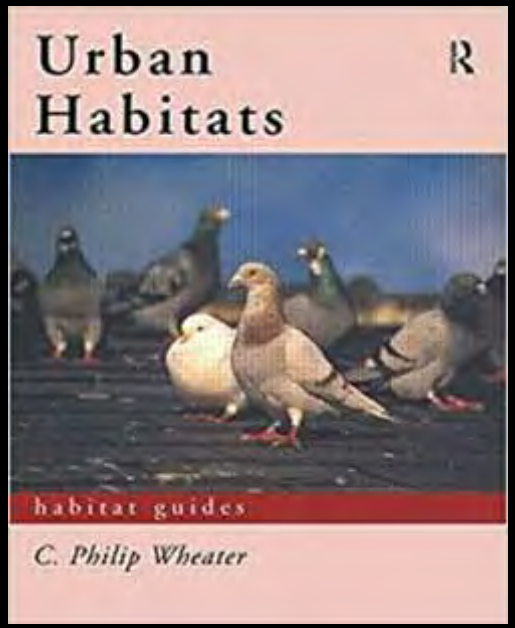
The main results from this study are as follows:

- Urban wastelands host a substantial proportion of the floristic diversity of cities: nearly 60% of the total species recorded over the whole department were found in the wastelands under study.
- Large wastelands and wastelands of intermediate ages contain the highest number of species. This is the result of the traditional evolution of floristic diversity: after some years of colonisation and competition among species, a relatively small number of species remain settled.
- Wastelands witnessing the presence of water within a close radius have a higher chance of containing rarer species. Adversely, acting as a biodiversity pool, urban wastelands could have a positive impact on the biodiversity of neighbouring areas according to the authors.
- Individual and collective dwellings around sites have a negative influence on the floristic significance of areas by reducing their overall quality: rare species are less frequent in this type of wasteland.
- Unexpectedly, the environmental characteristics of the area, such as geomorphology and exposition, were not crucial factors in the floristic importance of wastelands. Though these parameters are considered unavoidable by the authors, no evidence could be provided by the study: the fragmentation of the landscape, and the introduction and covering of alien substances in wastelands could have hindered these parameters.

Overall, the authors suggest that the maintenance of wastelands is necessary considering their role in the spreading of species and the colonisation of surrounding areas. Large and connected wastelands contribute to the preservation of biodiversity in urban areas. Therefore, this study provides new insight in the dynamics of biodiversity in urban areas that could be taken into consideration when planning urban land use.

[1] The European biodiversity strategy is available at http://ec.europa.eu/environment/pubs/pdf/factsheets/biodiversity_strategy.pdf







Unplanned Urban Habitats

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






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”.

2017

Improper Urban Nature – Wildness and the Agency of Nature

Nature flourishes through its own agency in unplanned, neglected urban spaces and margins

2005

2007

2009

2012

Agency of Nature – Perceptions of Urban Flora

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

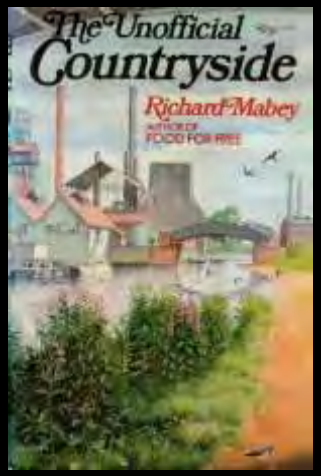
Perceptions of Urban Natural History

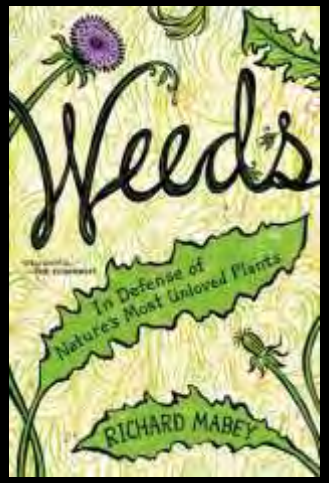
- a bunch of weeds and exotics mixed up with human junk

Biological slumming?

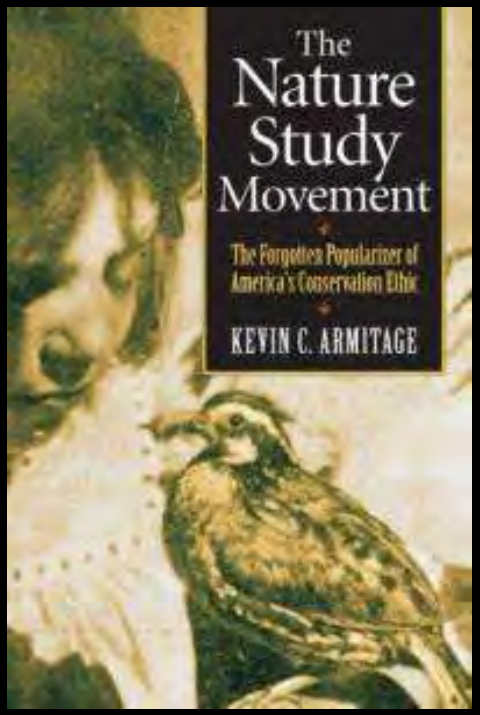
…the danger…is being tempted into some biological slumming. The habitats I've described in this book are in no way a substitute for the official countryside. Nor are they something to be cherished in their own right, necessarily.

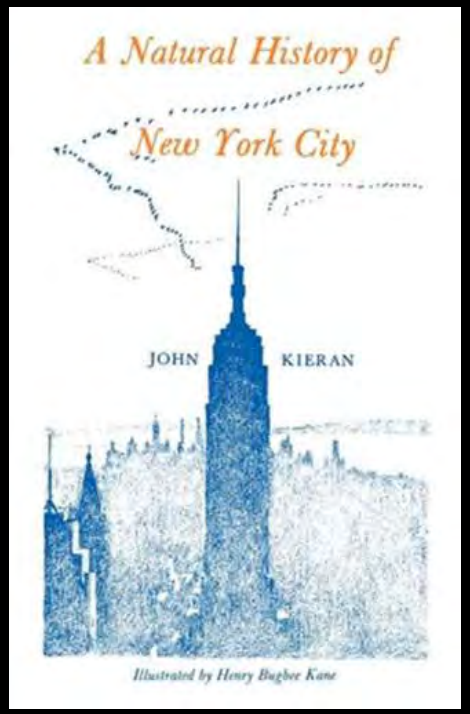
Richard Mabey, *Unofficial Countryside* (1973) also, Mabey, *Weeds: In Defense of Nature's Most Unloved Plants* (2010)

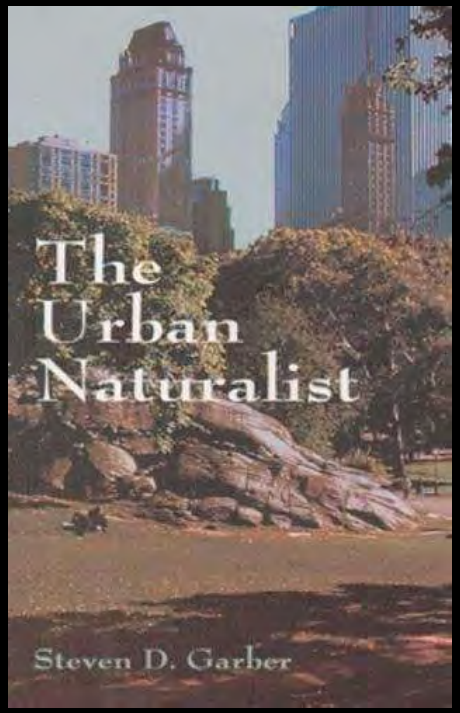


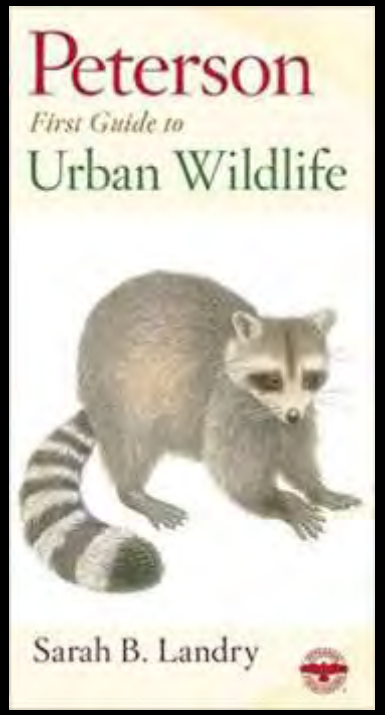


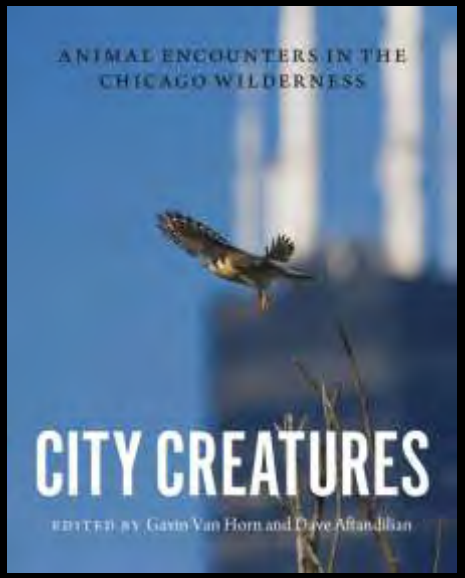
The History of American Urban Natural History

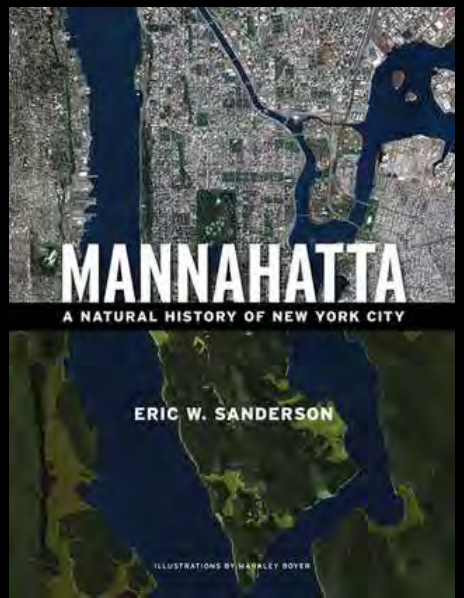












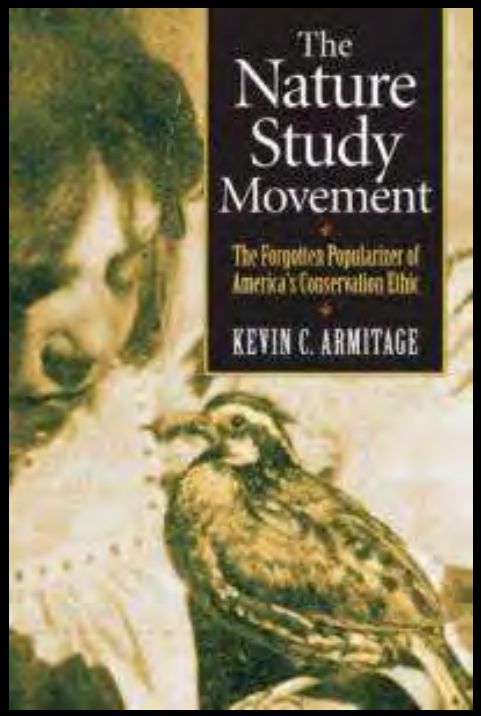
Biological Slumming in America - Urban Natural History
The Nature Study Movement 1890-1930

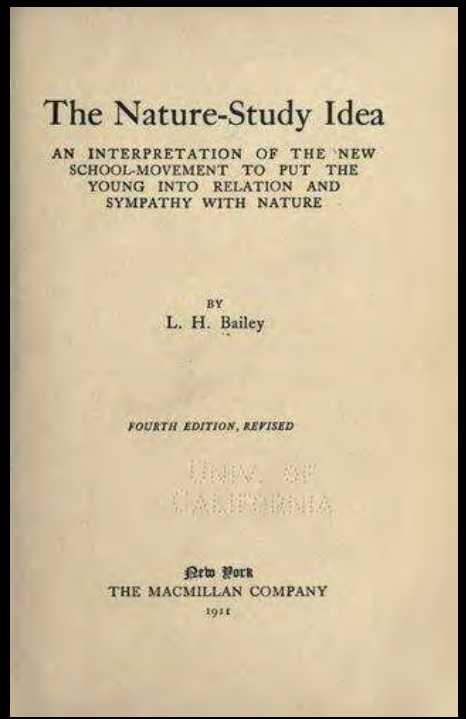
"Study Nature, Not Books" Louis Agassiz and "Genetic Psychology" G. Stanley Hall

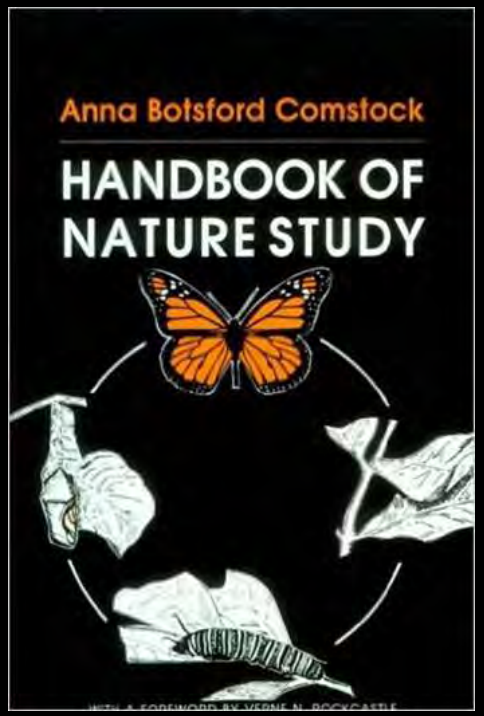
Liberty Hyde Bailey, *The Nature-Study Idea* (1903)
"we must live closer to nature and we must perforce begin with the child"

Anna Comstock defined the idea extensively in her book, *Handbook of Nature Study* (1911)
"Nature Study is for the comprehension of the Individual life of the bird, insect or plant that is nearest at hand."

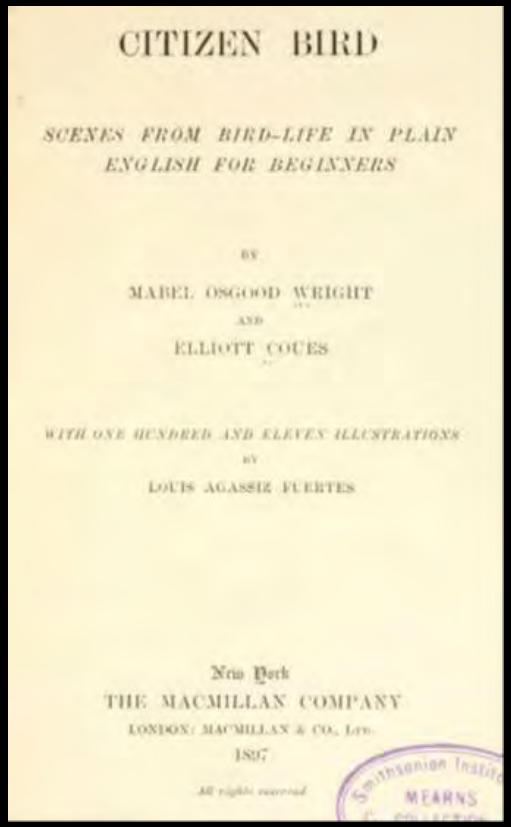
Tension with science education - "the nature study movement…reflected the scientific aspirations as well as the spiritual longings of the professional middle class." Armitage 2009







Birds and Nature Study – Nature behaving properly


CITIZEN BIRD

SCENES FROM BIRD-LIFE IN PLAIN ENGLISH FOR BEGINNERS

BY

MABEL OSGOOD WRIGHT

AND

ELLIOTT COUES

WITH ONE HUNDRED AND ELEVEN ILLUSTRATIONS

BY

LOUIS AGASSIZ FUERTES

New York

THE MACMILLAN COMPANY

LONDON: MACMILLAN & CO., LTD.

1897

All rights reserved

Citizen Bird (1897) About city children learning scientific terminology on an abandoned farm in New England

Bird Stories (1921) Christian ornithology as introductory science. For city children to learn to learn scientific observation and touching parables of virtues

Nature Study as civic and moral education

Urban Nature must teach civic and moral lessons

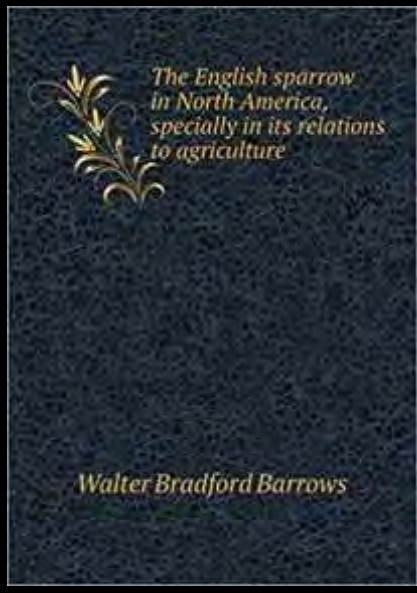
Good Birds and Bad Urban Birds – Invasive Foreigners
"Amalgam of Science and Sentiment"

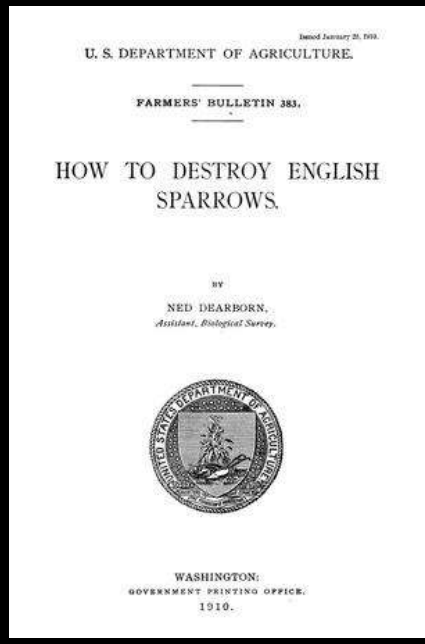
Invasive Species - In 1889, the U.S. Bureau of Biological Survey devoted its first bulletin entirely to "The English Sparrow in North America" and compiler Walter Barrows concluded that these "foreigners" were "a curse of such virulence" that they should be systematically and completely destroyed.

Furthermore, it should be a crime to kill the shrike, sparrow hawk, screech owls, bluejays, or grackles, since they eat English sparrows.

ENGLISH SPARROW, PASSER DOMESTICUS.

From Terrell.





Issued January 20, 1910.

U. S. DEPARTMENT OF AGRICULTURE.

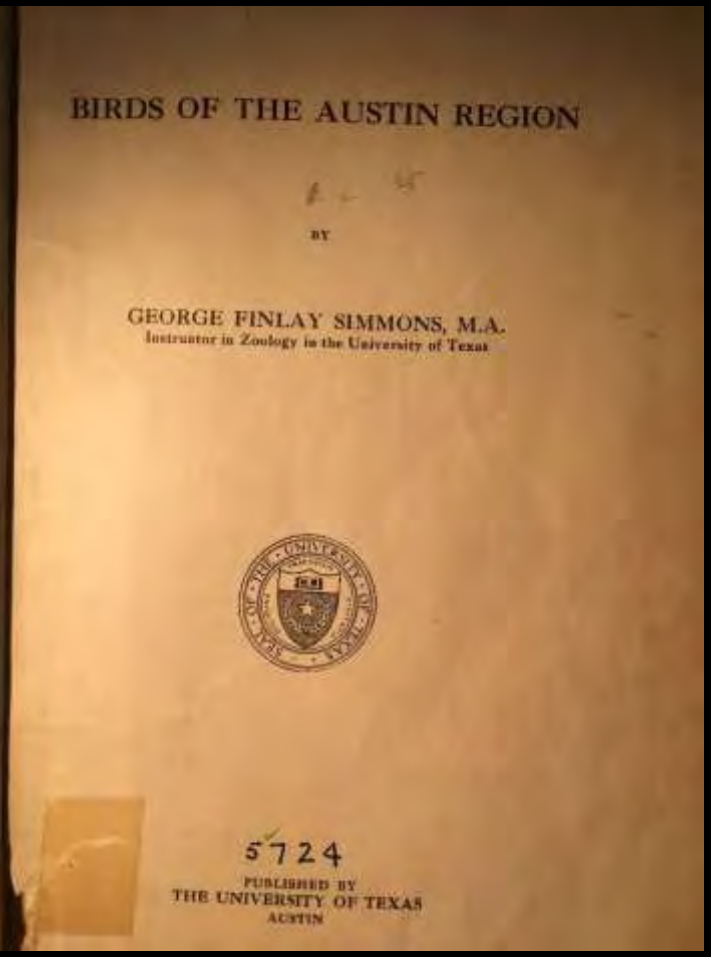
FARMERS' BULLETIN 383.

HOW TO DESTROY ENGLISH SPARROWS.

BY

NED DEARBORN,
Assistant, Biological Survey.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1910.



Austin Urban Natural History - Birds

George Finlay Simmons 1895 - 1955

In 1924 he published *Birds of the Austin Region*.

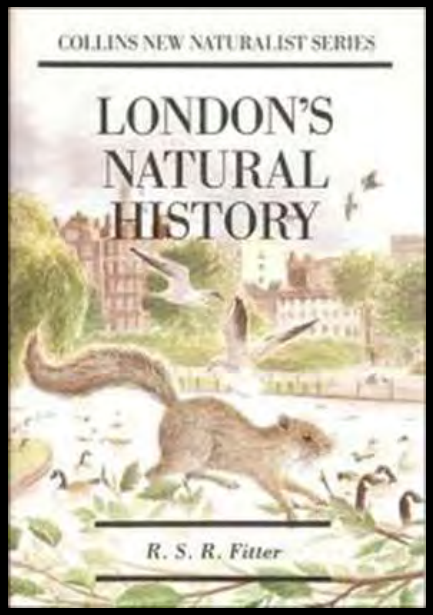
No English sparrows, starlings, cattle egrets, white-winged doves, black-bellied whistling ducks

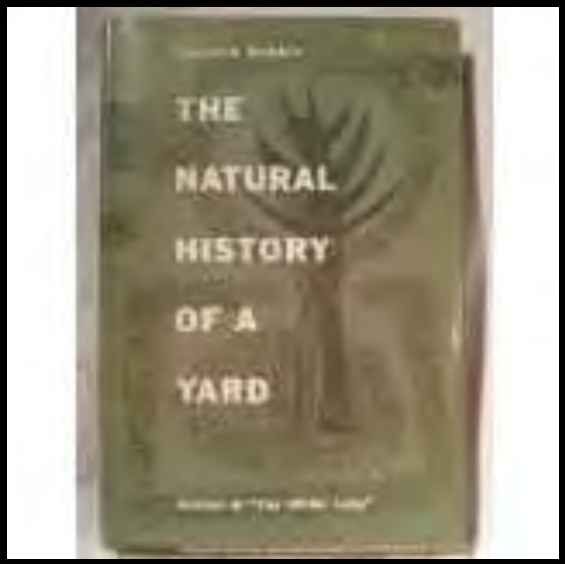
Books: Urban Natural History 1940s and 1950s

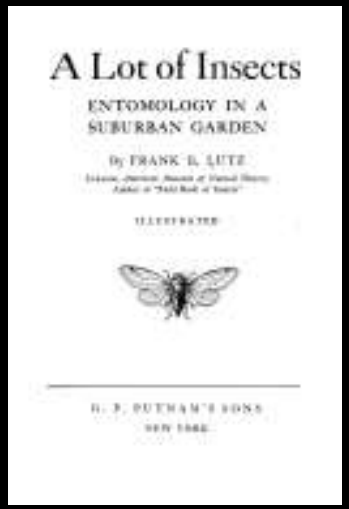
Robert Fitter, *London's Natural History* (1945)
John Kieran, *A Natural History of New York* (1959)

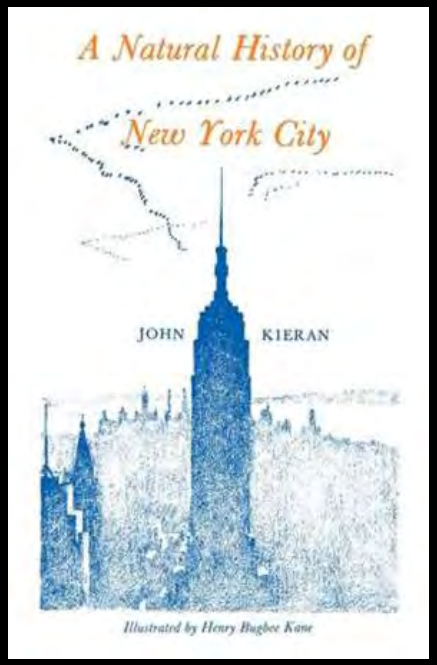
[both books include sewage ponds, waysides, and other habitats as part of their natural histories]

Popular natural history accounts of biodiversity in particular suburban backyards, like Lutz *Lot of Insects: Entomology of a Suburban Yard* (1941) and Dubkin *The Natural History of a Yard* (1953) were published in the 1940's and 1950's, and they focused on all the insects and wildlife found there and not just native species.



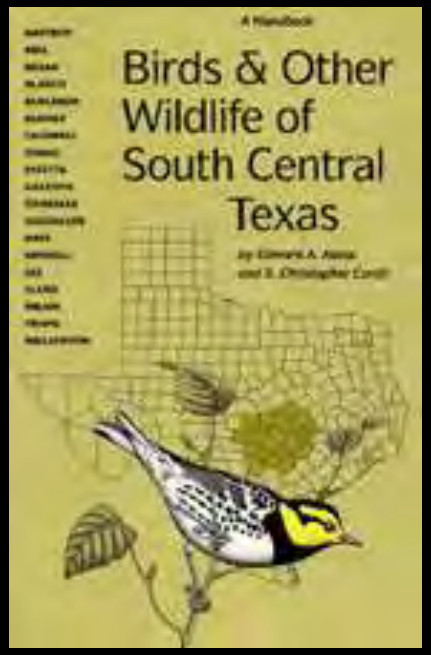


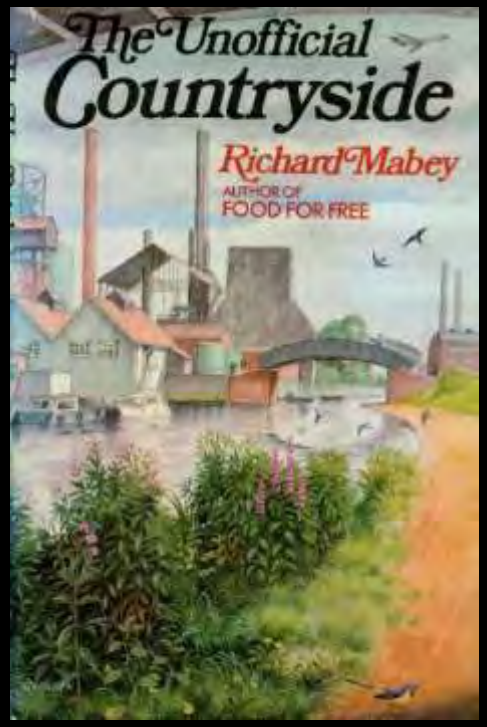


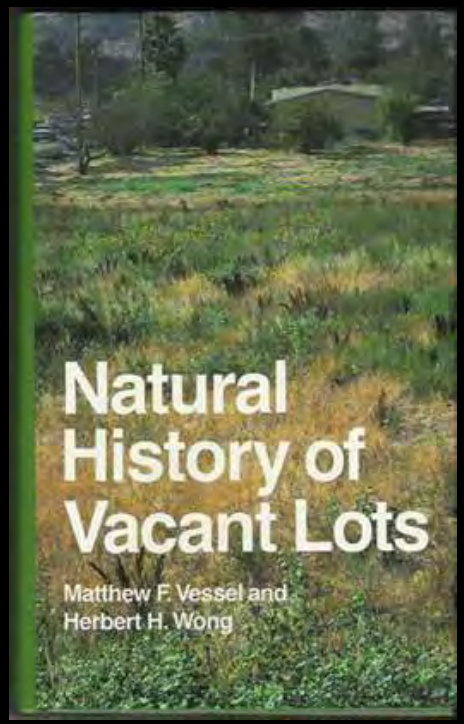


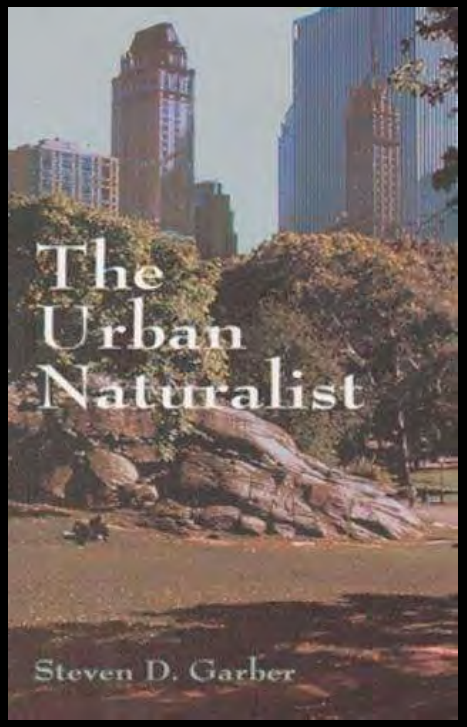
Urban Natural History 1970s and 1990s

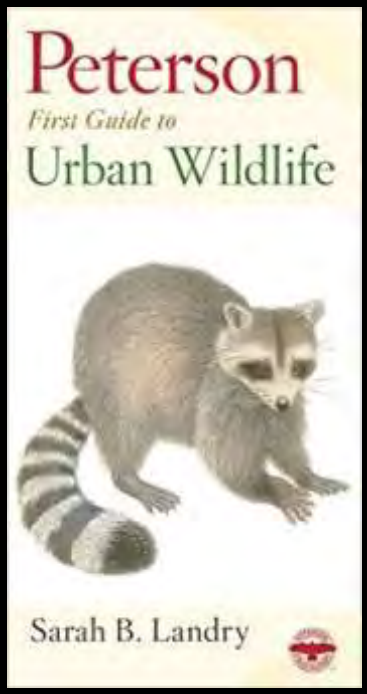
Environmentalism, Biological Slumming, and the Degradation Myth





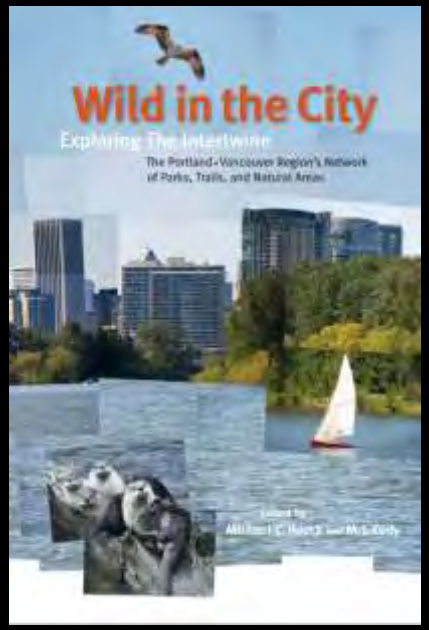


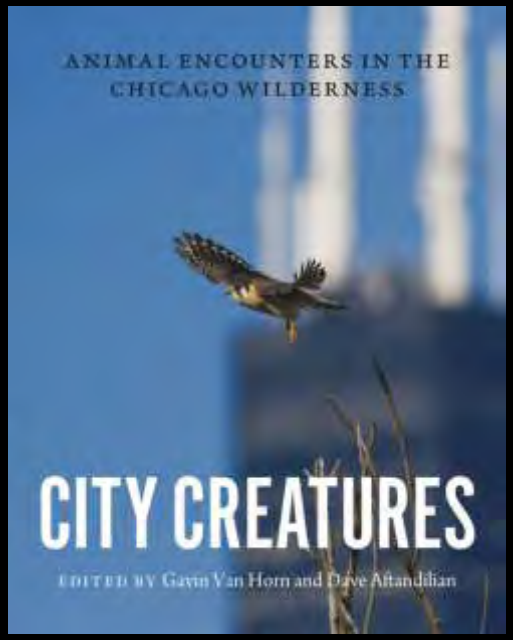


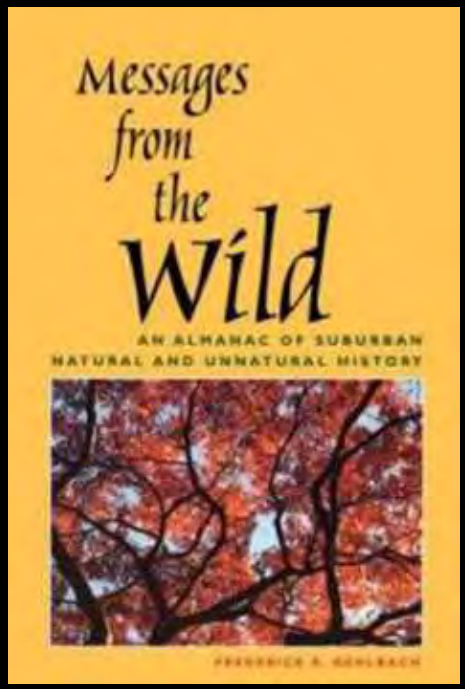


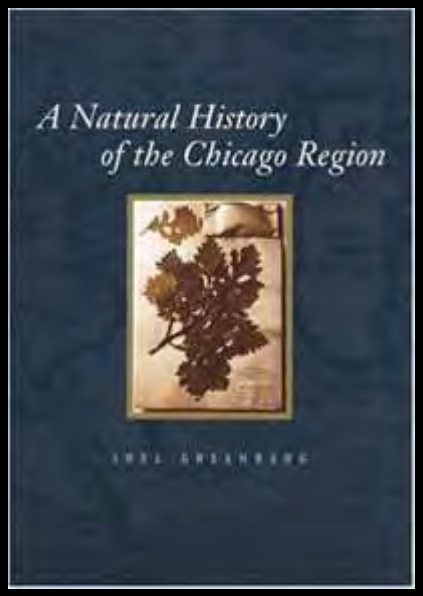
Contemporary American Urban Natural History

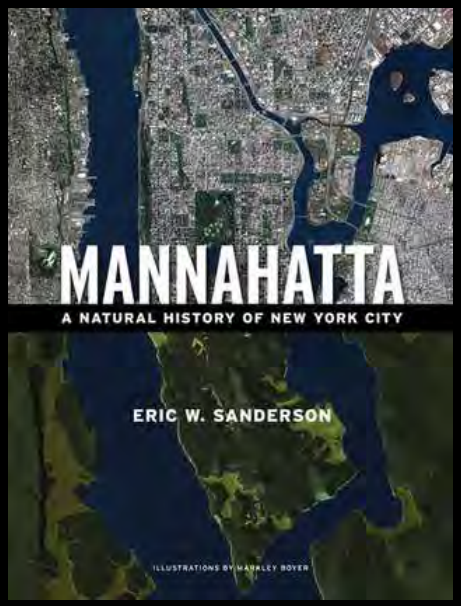
Recent traditional natural histories of cities focus on native biodiversity.

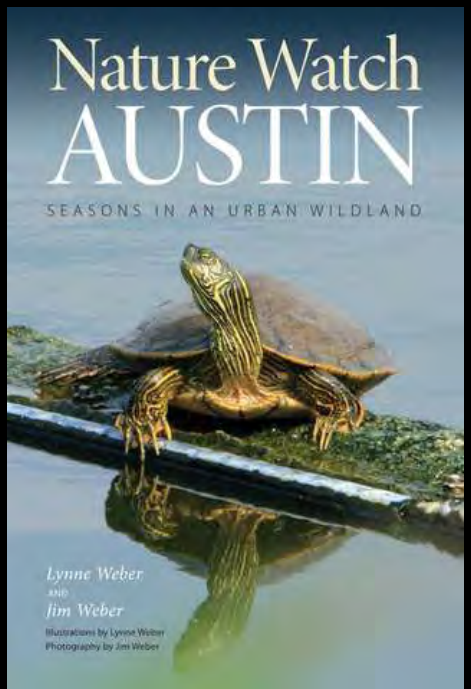






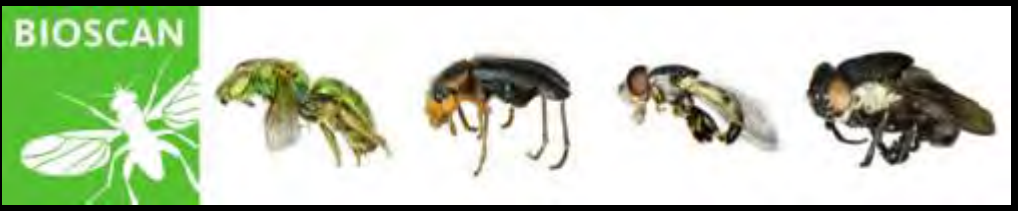






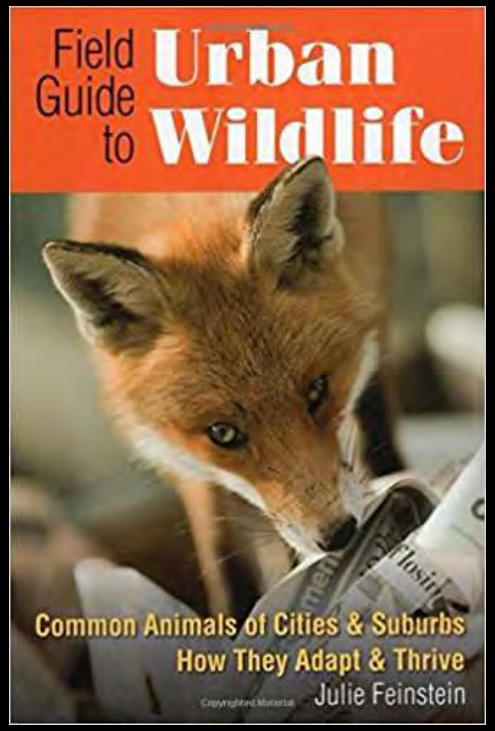
Contemporary American Urban Natural History
Urbanization, Biodiversity, and Conservation
Citizen Science and Native Species

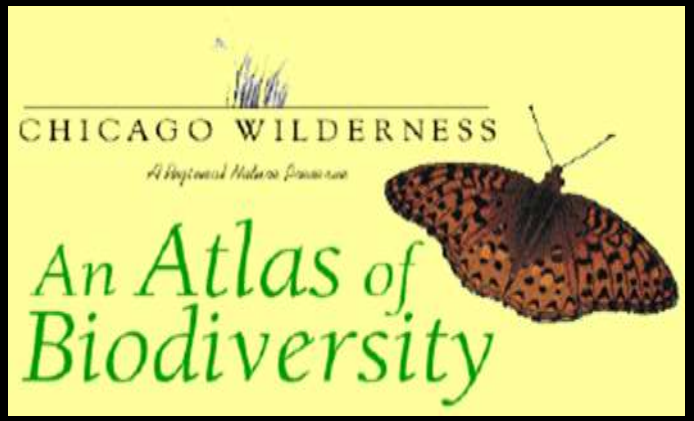
(Urban growth) replaces the native species that are lost with widespread "weedy" nonnative species. This replacement constitutes the process of biotic homogenization that threatens to reduce the biological uniqueness of local ecosystems.



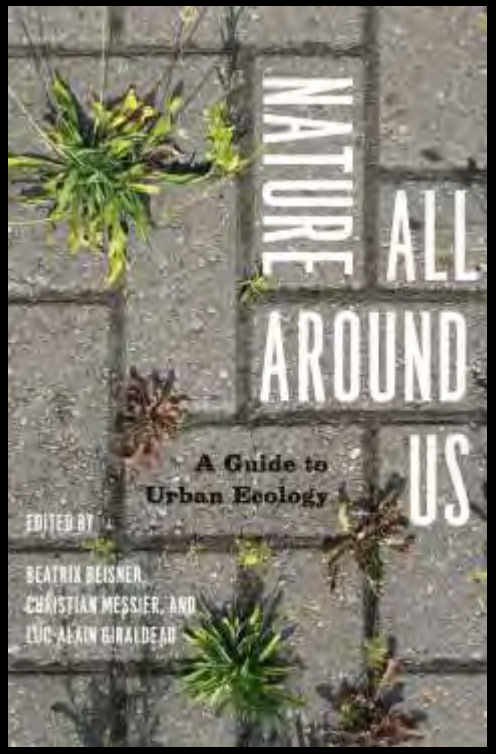
Natural History Museum of Los Angeles County

eBird





iNaturalist
Explore Learn Record



Urbanization, biodiversity, and conservation
Non-native urban flora (and some fauna) are actively destroyed

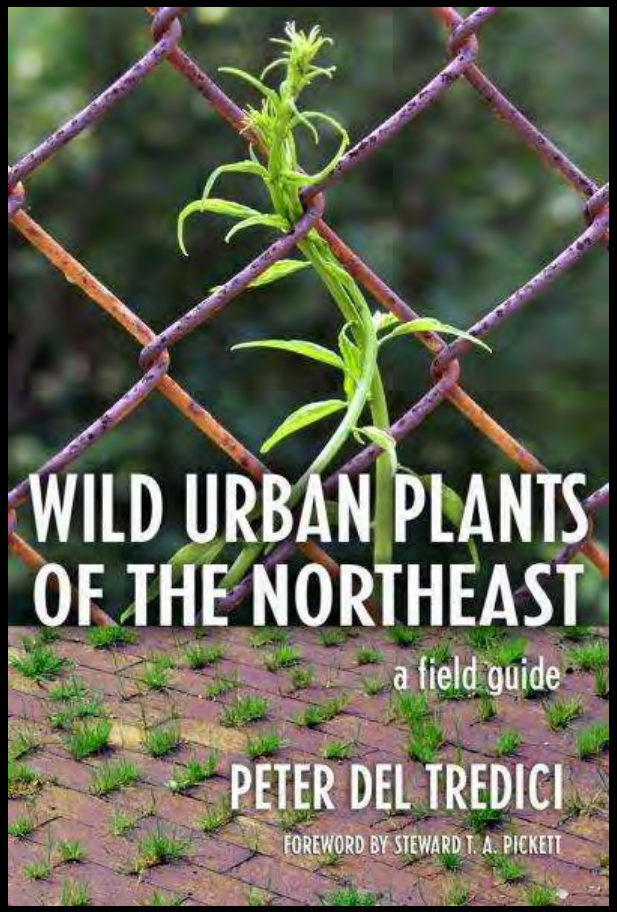
Invaders of Texas

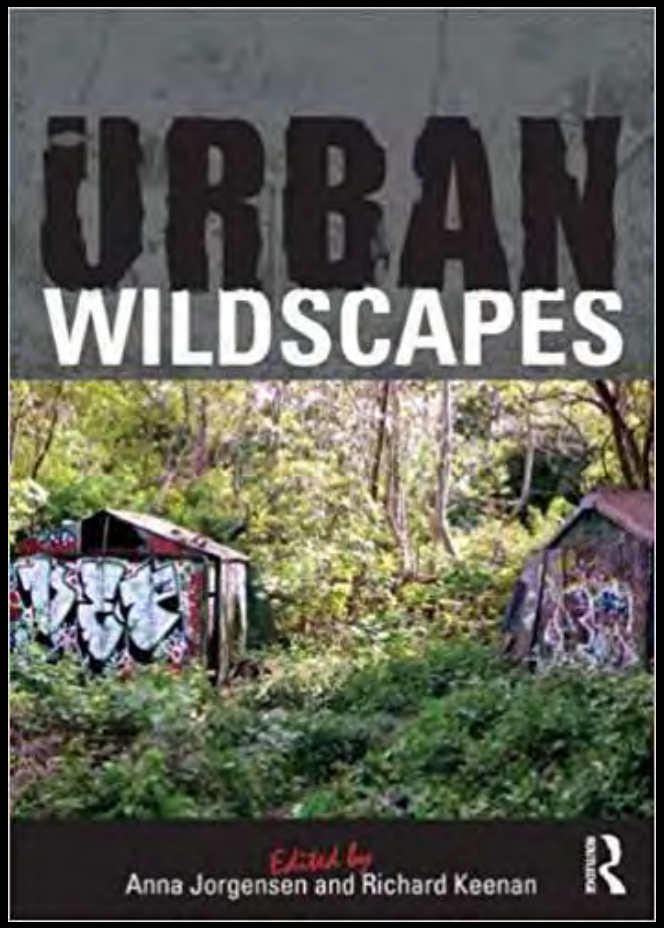
a Citizen Science Program to Detect and Report Invasive Species

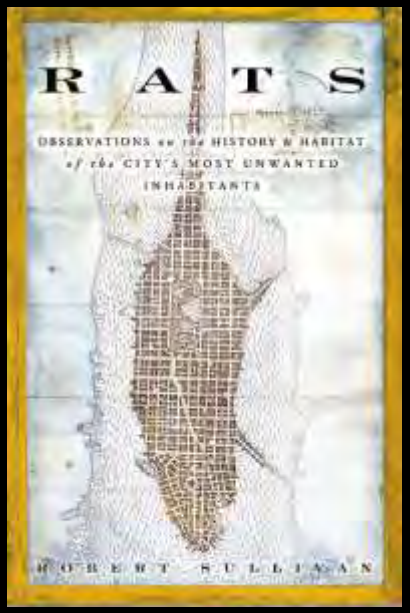
“Invaders of Texas” website was created by the Lady Bird Johnson Wildflower Center as a tool for mobilizing the public against non-native invaders and the website employs the rhetoric of war and a resistance composed of “citizen scientists” defending the homeland.

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.

Contemporary American Urban Natural History
Non-traditional Narrative – Heroic Plants and Urban Wild-Life







“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

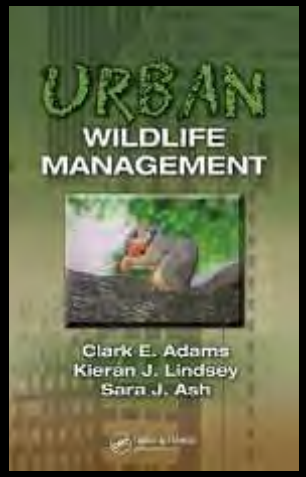
Wildness - Non-humans do unexpected things

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

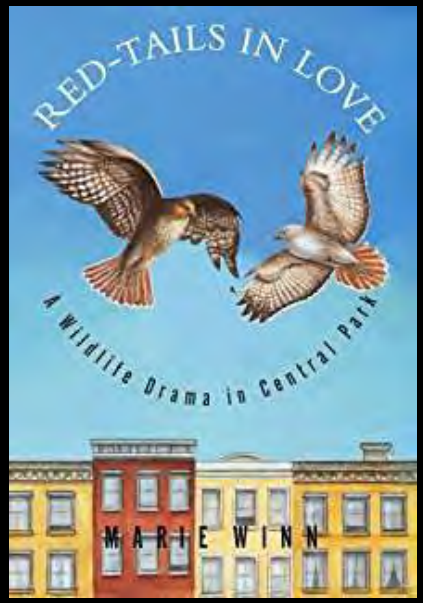
Urban Wildness - The Challenge of Urban Wildlife

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.



Down Here Below

Pale Male the famous red-tailed hawk
Performs wing stands high above midtown Manhattan
Circles around for one last pass over the park
Got his eye on a fat squirrel down there and a couple of pigeons
They got no place to run they got no place to hide
But Pale Male he's cool, see 'cause his breakfast ain't goin' nowhere
So he does a loop the loop for the tourists and the six o'clock news

Got him a penthouse view from the tip-top of the food chain, boys
He looks up and down on fifth avenue and says "God I love this town"
But life goes on down here below
And all us mortals struggle so
We laugh and cry
And live and die
That's how it goes
For all we know
Down here below

Pale male swimmin' in the air
Looks like he's in heaven up there
People sufferin' everywhere
But he don't care
But life goes on down here below
And all us mortals, struggle so
We laugh and cry

Steve Earle
Washington Square Serenade 2007

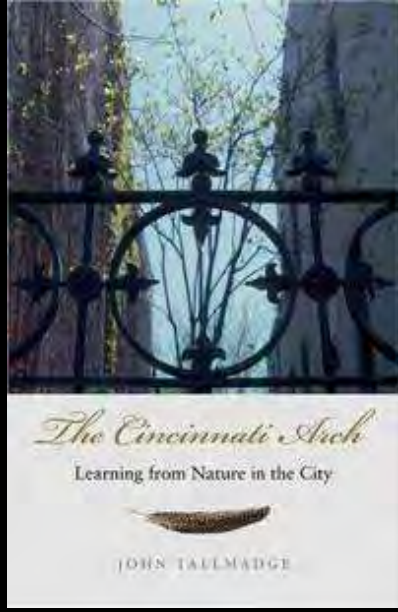
Proper Place for Urban Wildlife?

All of the City is habitat

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

Nature in Cities: The Open Question and The Degradation Myth

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.


Applause