Urban Biodiversity: Conservation and Management

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- Biodiversity
- Management and Conservation
- Bird Conservation in Midwest U.S.
- Managing the Matrix
Urban Biodiversity

Human Impacted | Human Dominated

species richness

population densities
Urban Biodiversity

- Species in Region
  - Habitats that support viable populations, etc.

  Processes that maintain those habitats
Savard et al. 2000

Urban Biodiversity

Scale
Lot / Property
Area of city
City
Region

Different approaches to management
Different groups of managers
Kinzig et al. 2005
Factors Driving Urban Biodiversity

Top-down

Local Government
- Planning and Zoning / Design
- Influences patch type
- Influences matrix
- Influences building, abandonment, redevelopment

Bottom Up
- Landowner / Resident Decision Making
- Linked to Preference
- Influences management decisions
Context of Urban Biodiversity

Social (Cilliers 2010)
- Community participation

Sustainable development

Poverty reduction
Context of Urban Biodiversity

Cultural (Millard 2010)

Cultural processes determine urban biodiversity

Urban biodiversity shapes perceptions and culture
Approaches

Wildlife Management (Caughley)

“The art and science of applying ecological knowledge in ways that seek a balance between the needs of wildlife and the needs of people.”

Conservation Biology (Gibbs et al.)

“Maintaining the planets biodiversity... Falls within a larger area of natural resource management.”
Marzluff and Rodewald 2008
Urban Bird Conservation

- Protect natural areas
- Plan explicitly for open spaces and natural habitats
- Maintain variety of arrangements of built and natural
- Improve quality of matrix
Grassland Birds
Midwest U.S.

- Many grassland and shrubland species rare and/or declining
- Habitat Loss
- Management changes
  - Fire
  - Grazing
Grassland Birds in Midwest

- Grassland and shrubland habitats
- Where did they occur
  - Size
  - Location
- How did habitats function?
- Management to maintain them?
Grassland Birds
Burhans and Thompson (2006)

Urban parks

Nest survival of 4 species

Management recommendations

Vegetation height, composition

- Reduce mowing
- Maintain burning
- Matrix
Management Context

50 ha Semi-natural habitat in urban park

Adjacent residents

Park Managers / Agency Culture

Park Users
Biodiversity in the Matrix
Biotope and Land-Use Map
Columbia, Missouri
Heynen et. al. 2006

- The place where we live
- The place where we work
- The place where we play
Places of Interest to Researchers

What are patterns of biodiversity?

- DeGraaf et al. 1970's
  - Birds

- Gaston et al. 2000's
  - Vegetation
  - Insects
  - Birds
What are we learning?

- Number of species supported
  - BUGS Project
  - Yards and gardens support higher numbers of native and exotic plant species
Conservation Value

- Conservation value of matrix habitats
- Matteson – bee species
  - Urban yards and community gardens – lower
  - Suburban yards - high
Urban Neighborhood Types and Birds (Nilon et al. 2010)

- **Urban Shoreline**: American kestrel, Brown-headed cowbird, Double-crested cormorant, Great black-backed gull, Great blue heron, Mallard, Osprey, Red-winged blackbird, Tree swallow

- **Inner City**: American crow, American goldfinch, Common grackle, European starling, House sparrow, Mourning dove, Northern mockingbird

- **Buildings & Shrubs**: American robin, Carolina chickadee, Carolina wren, Downy woodpecker, Gray catbird, House finch, Iceland gull, Killdeer, Northern cardinal

- **Mature Residential**: Blue jay, Eastern bluebird, House wren, Northern flicker, Red-bellied woodpecker, White-breasted nuthatch, Wood thrush
Variables Explaining Differences Among Bird Census Points

Lot-level (*UFORE Plot Data*)
- % Building cover, Tar, Rock vs. % Tree cover, Maintained grass, Unmaintained grass

Block level (*100m transects*)
- No. of Housing Units vs. No. of Trees, No. Housing units with trees, No. Housing units with shrubs

Neighborhood
- % Tree Cover vs. % Buildings, Other Vegetation
- %Bachelor Degree vs. %Black, %Families on Pub Asst;
What about management of the matrix?

- What people do matters
  - Brunet 2006
    - Butterflies in residential yards
      - Differences when native plant species present
      - Differences when more of yard is in flower gardens.

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Socioeconomic Status

Bird Diversity: Baltimore and Phoenix

\[ R^2 = 0.76 \]
\[ p < 0.0001 \]

Baltimore (N=50)

\[ R^2 = 0.15 \]
\[ p = 0.005 \]

Phoenix (N=16)
Management of the Matrix Guidelines for Property Owners

Programs in place

But:

In U.S. Cities

Economic Status
Race and Ethnic
Home Ownership

Shape and influence management decisions
Managing the Matrix
City and Region

Planning efforts
Special areas with guidelines for management

But often ignore common species and built environments
Collaborations
BES Biodiversity Group

Neighborhood Nestwatch
Peter Marra
Smithsonian Mig Bird Ctr

Hungarian Nat History Museum

Brian Kane
UMass-Amherst

Watershed 263

HERCULES
Mary Cadenasso

Dave Curson
MD Audubon

Michel Cavigelli,
Beltsville Ag Res Ctr
People Interested in Urban Biodiversity

Parks and People’s Green Career Ladder
Project Pigeon Watch
Bird curriculum for Baltimore City Public Schools – C. Carlson
Urban Soils and Worms - Teacher’s Workshop
Exchange of scientists and students – US Hungary (BCEB – NSF UMEB)
Urban Biodiversity

What collaborations are necessary to conserve and manage at scales from lot to region?

Residents
Planners
Property Owners
Ecologists
?

?