

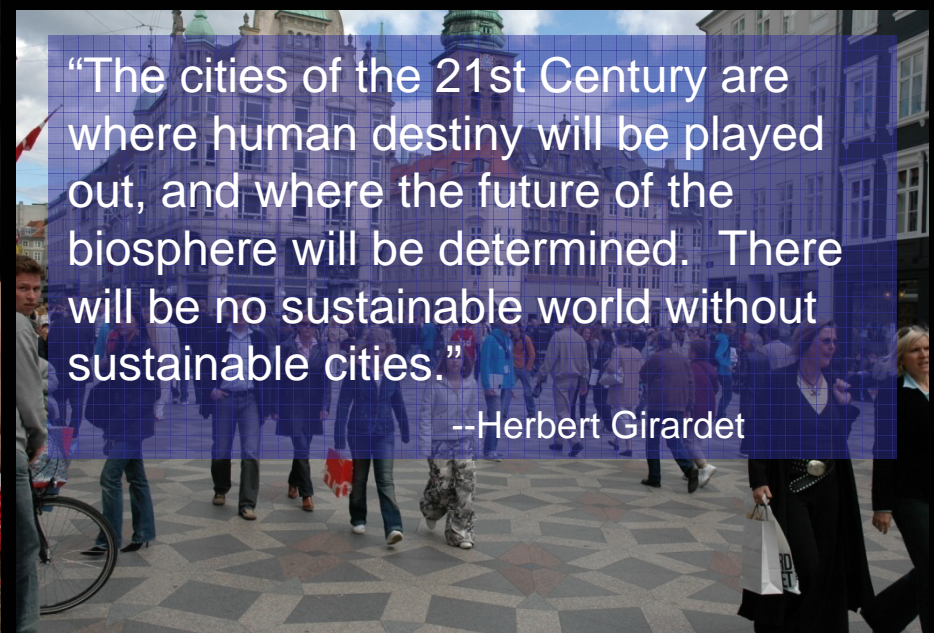


Biophilic Cities

Tim Beatley, UVA Urban and Environmental Planning



Future Cities



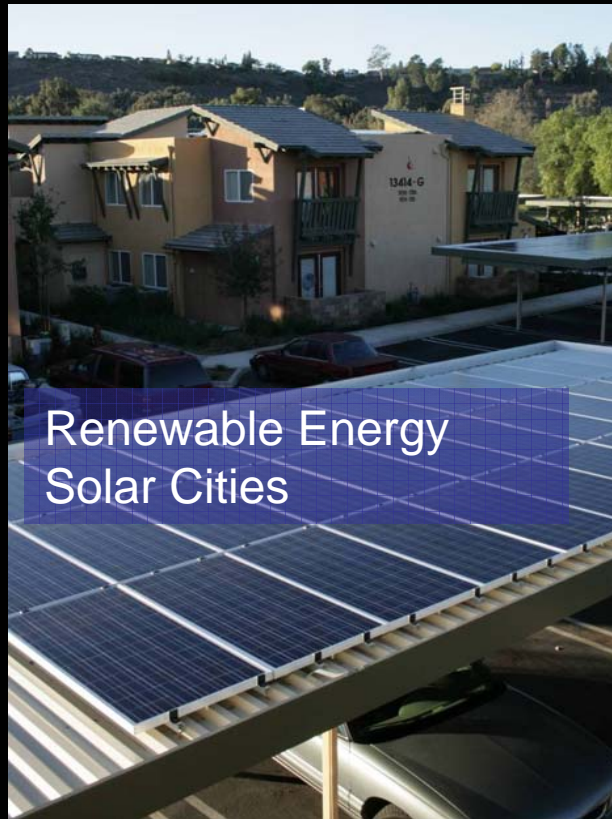
“The cities of the 21st Century are where human destiny will be played out, and where the future of the biosphere will be determined. There will be no sustainable world without sustainable cities.”

--Herbert Girardet

What is Green Urbanism?



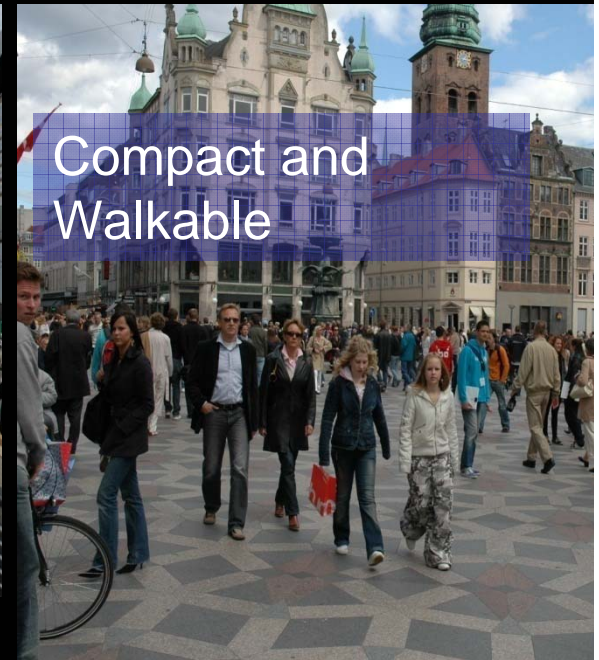
What Does Green Urbanism Look Like?



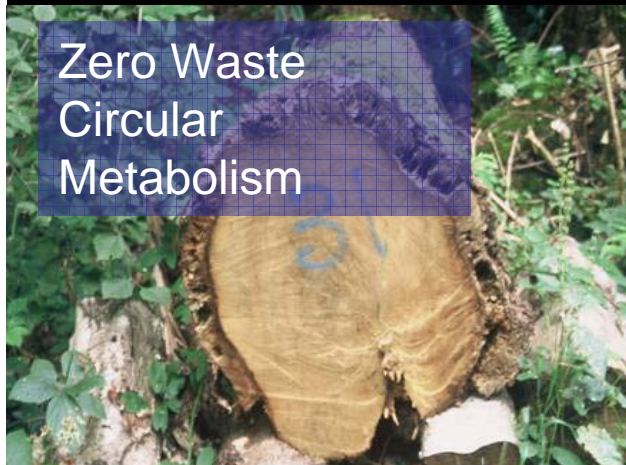
Renewable Energy
Solar Cities



Commitments to Transit



Compact and
Walkable



Zero Waste
Circular
Metabolism



Green and Natural



Local Sustainable
Food

Biophilia

“...the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature.”

--E.O. Wilson

The Evidence!

Roger Ulrich's classic study of the therapeutic effects of hospital room views;

Terry Hartig et al: emotional and intellectual restorative impacts of nature;

Judith Heerwegen's study of productivity improvements in green buildings;

Leather: Sunlight penetration and views of nature in the workplace positively correlate with job satisfaction, negatively correlate with intention to quit;

Nancy Wells: Impact of nature on cognitive function of children

Francis Kuo and colleagues at Illinois: Chicago public housing studies

Outdoor learning studies: AIR/California Department of Education study

Many others...!!!

On the Therapy of Walking in Nature:

Study by British mental health charity MIND

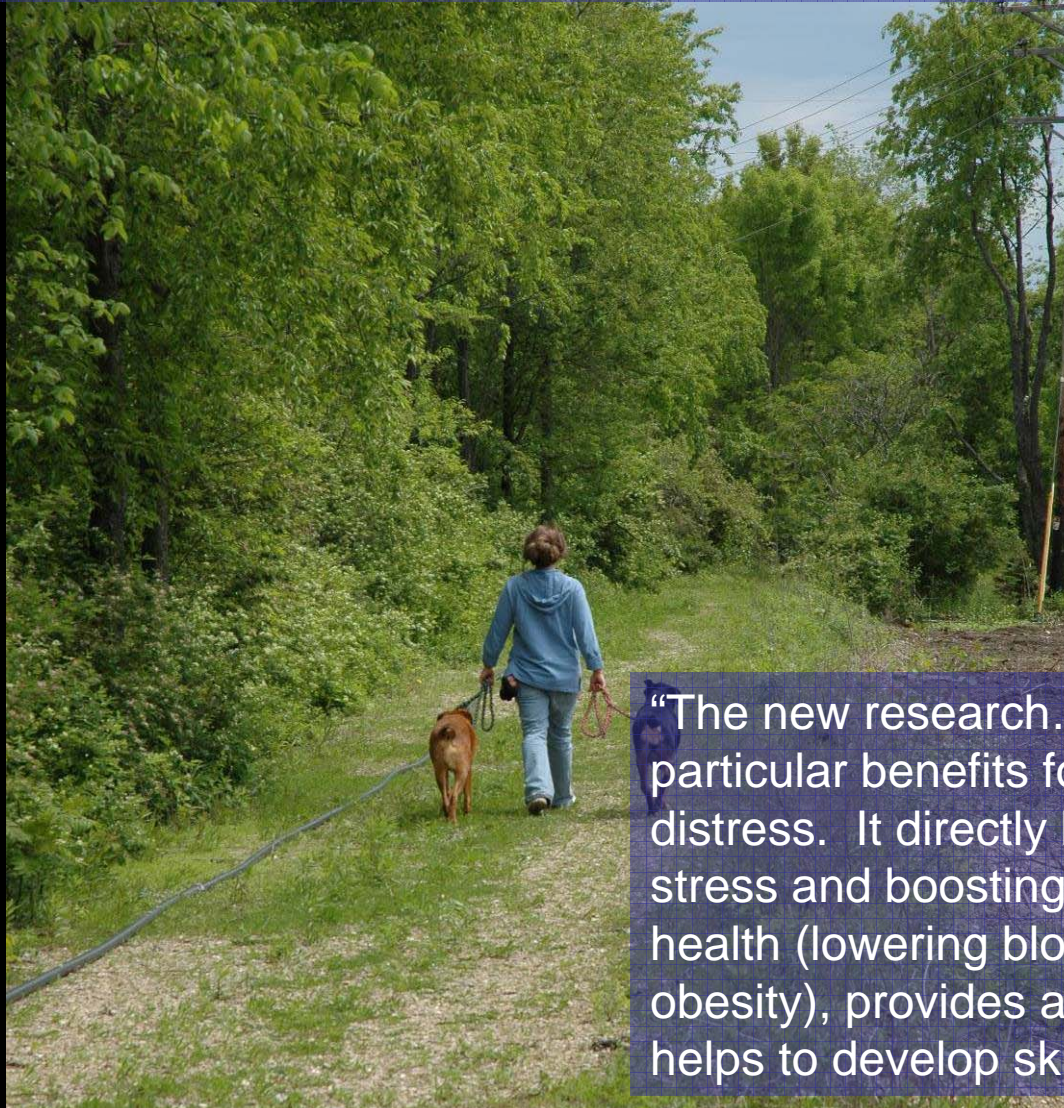
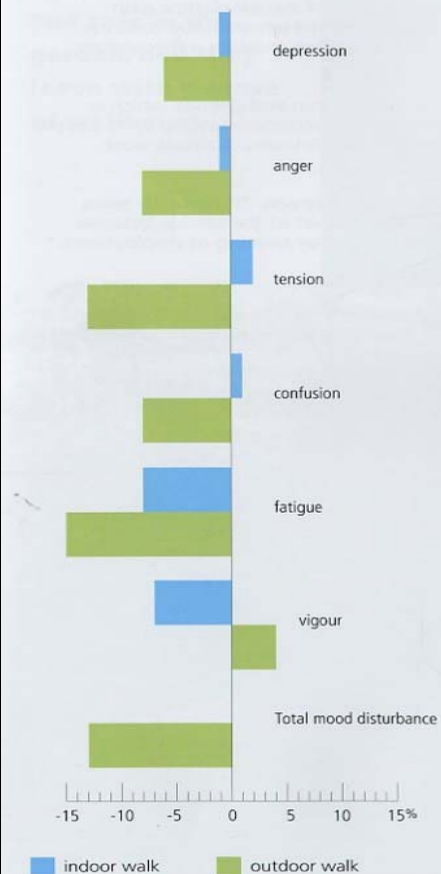


Fig. 10: Overall changes in mood following the two walks (%).



“The new research...shows green exercise has particular benefits for people experiencing mental distress. It directly benefits mental health (lowering stress and boosting self-esteem), improves physical health (lowering blood pressure and helping to tackle obesity), provides a source of meaning and purpose, helps to develop skills and form social connections.”



Kids in the
Canyons



Rachel Carson

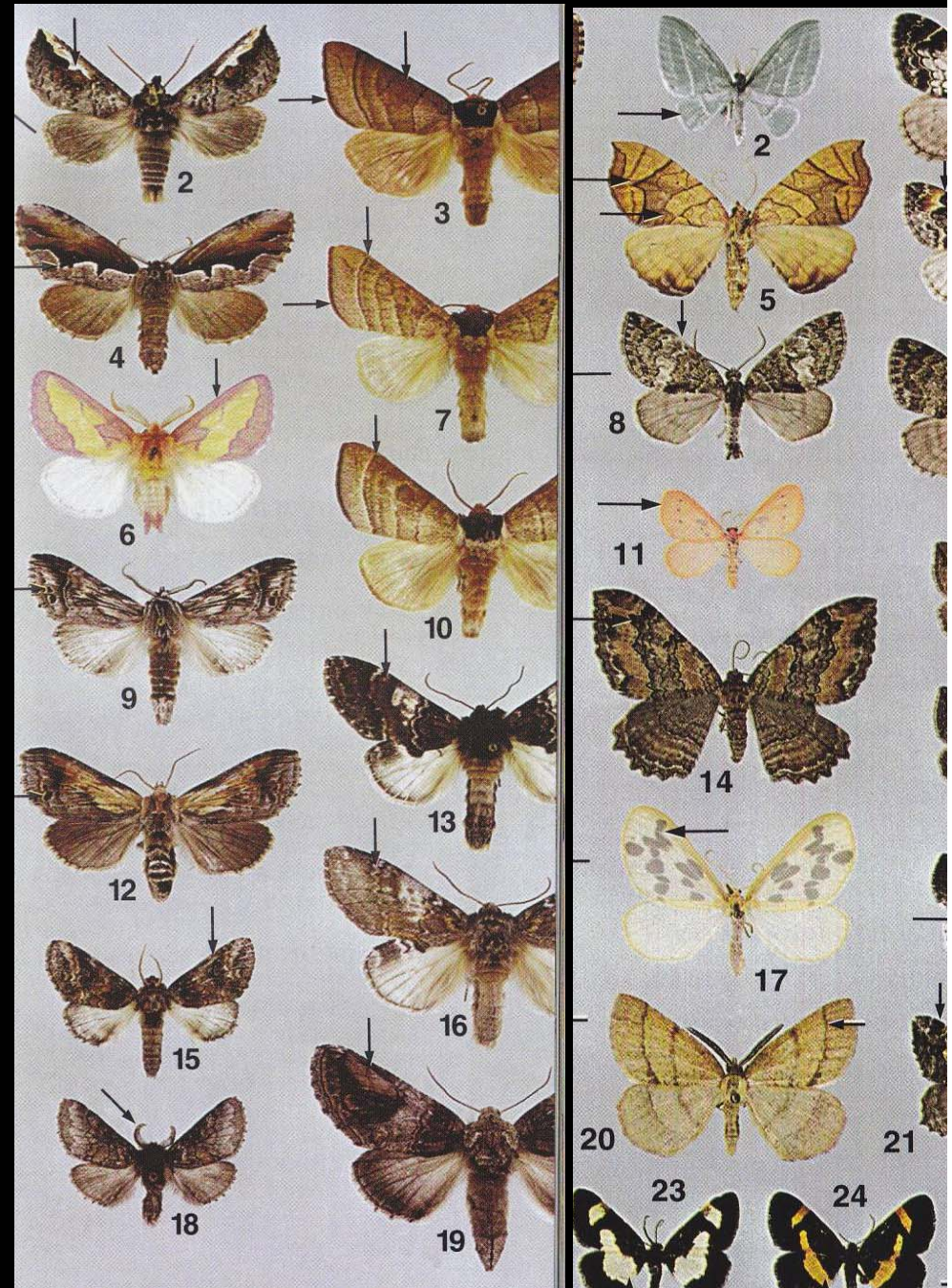


Help Your Child To Wonder

“A child’s world is fresh and new and beautiful, full of wonder and excitement. It is our misfortune that for most of us that clear-eyed vision, that true instinct for what is beautiful and awe-inspiring, is dimmed and even lost before we reach adulthood. If I had influence with the good fairy who is supposed to preside over the christening of all children I should ask that her gift to each child in the world be a sense of wonder so indestructible that it would last throughout life, as an unfailing antidote against the boredom and disenchantments of later years, the sterile preoccupation with things that are artificial, the alienation from the sources of our strength.”



Coquina Shells (*Donax variabilis*)



The Urban Healing Power of Nature

An aerial photograph of a residential neighborhood with houses, streets, and some vacant lots. A semi-transparent blue box with a grid pattern is overlaid in the center, containing text.

UPenn Philly Study of Greening Vacant Lots:

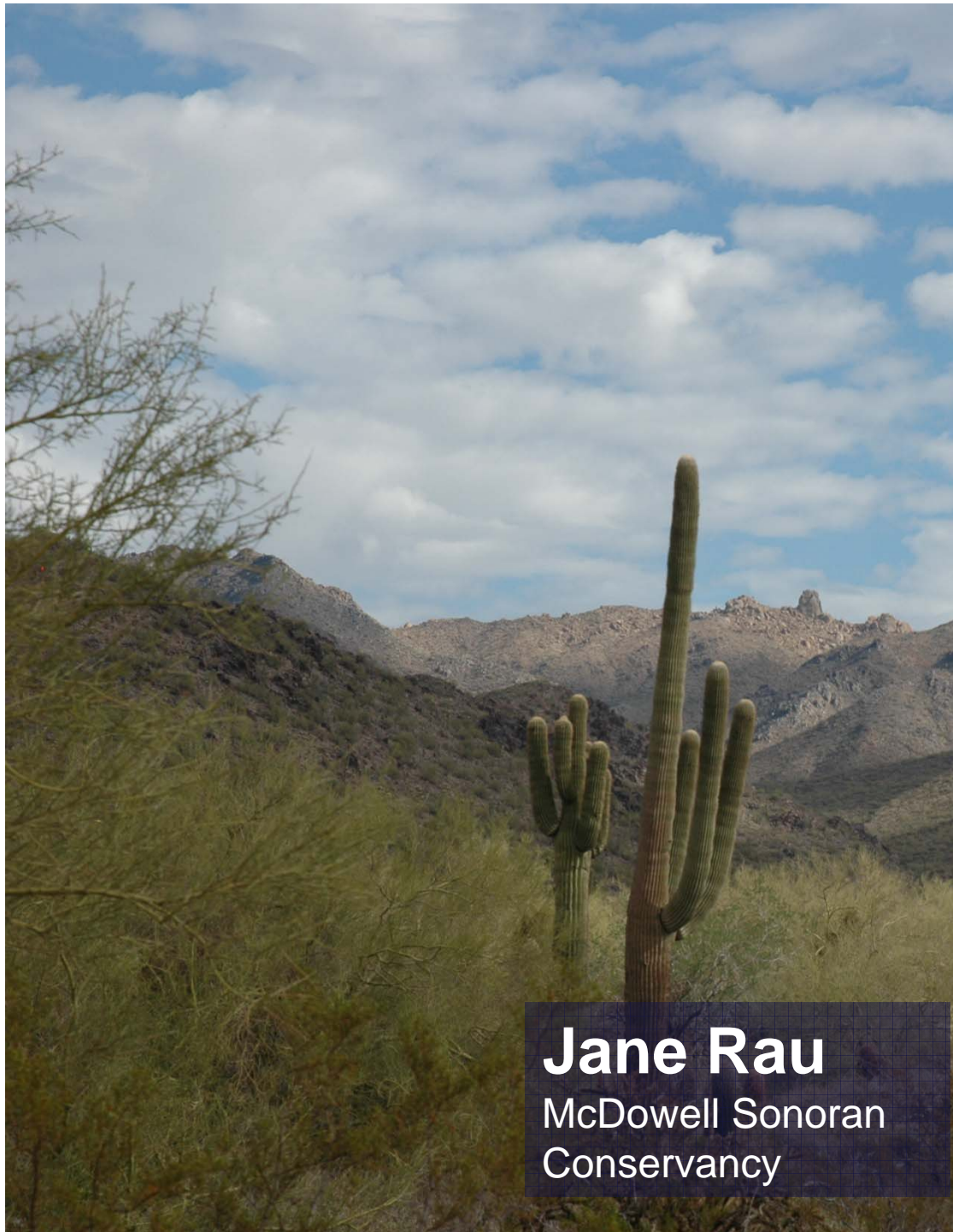
Summary of Findings: “Regression-adjusted estimates showed that vacant lot greening was associated with consistent reductions in gun assaults across all 4 sections of the city ($P < 0.0001$) and consistent reductions in vandalism in 1 section of the city ($P < 0.0001$). Regression-adjusted estimates also showed the vacant lot greening was associated with residents’ reporting less stress and more exercise in select sections of the city.” *Am J of Epidemiology* Access, Nov 11, 2011

The Rise of Eco-Epidemiology!

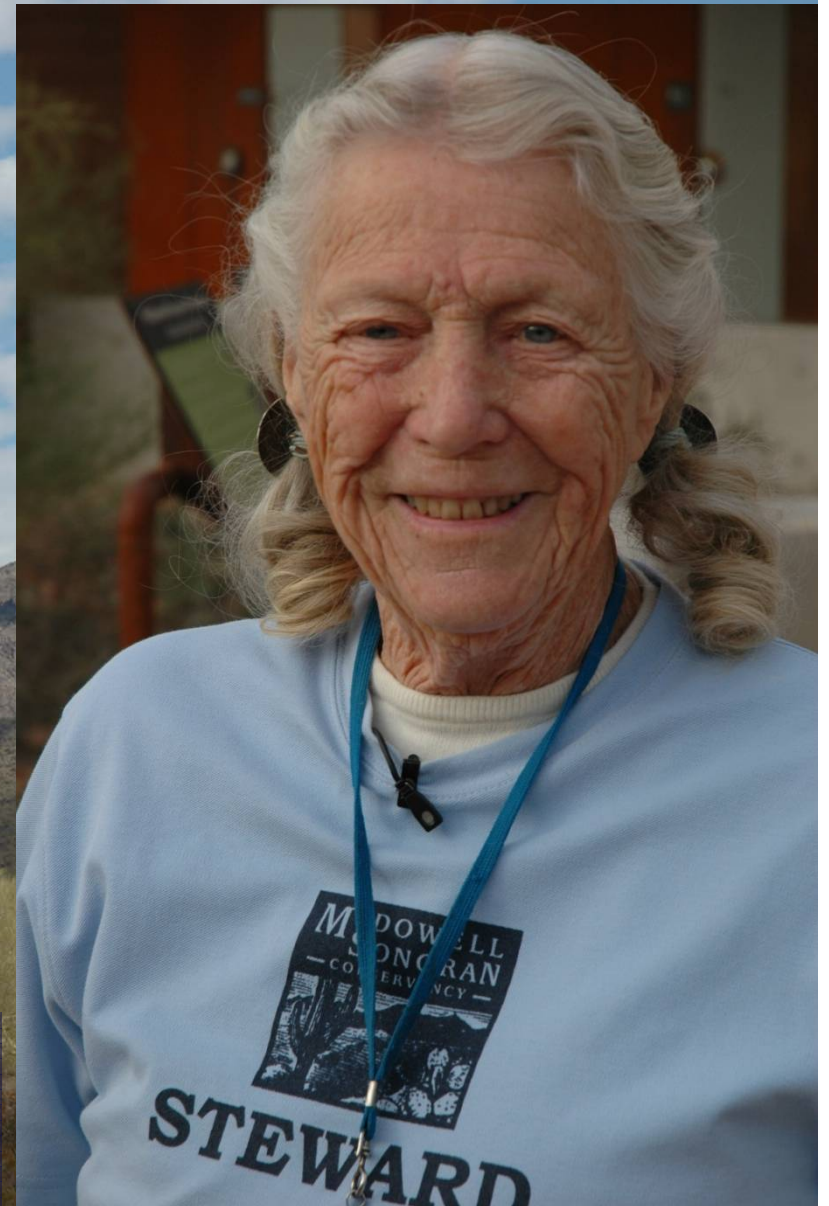
Developing Nature's Social Capital



Rose Canyon,
San Diego

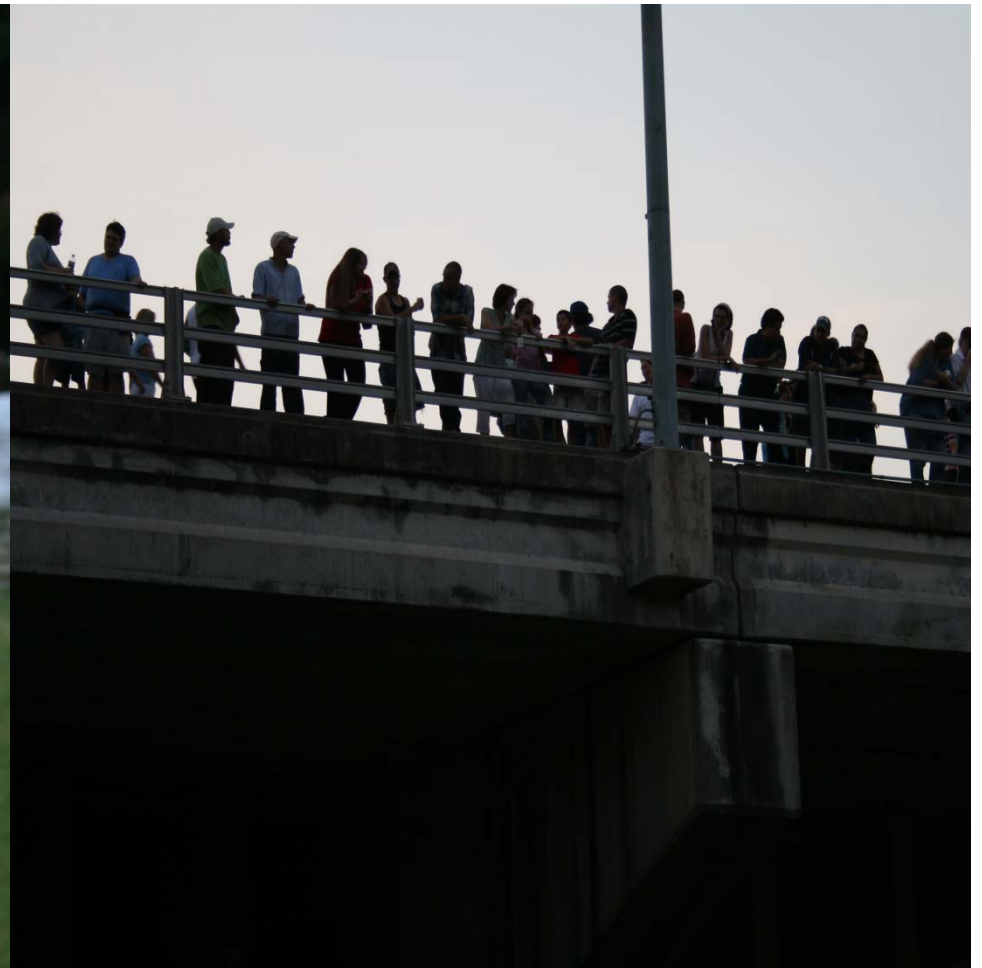


Jane Rau
McDowell Sonoran
Conservancy





Merlin Tuttle
Bat Conservation International



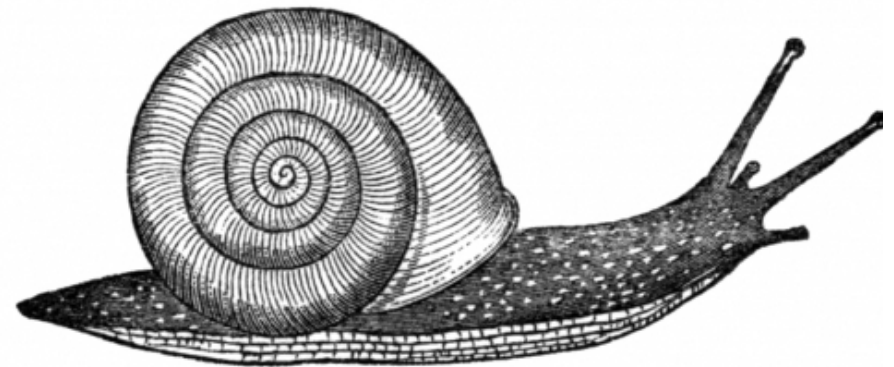
"Beautiful." —EDWARD O. WILSON

The
SOUND
of a
WILD SNAIL
EATING

ELISABETH TOVA BAILEY



www.elisabethtova.bailey.net



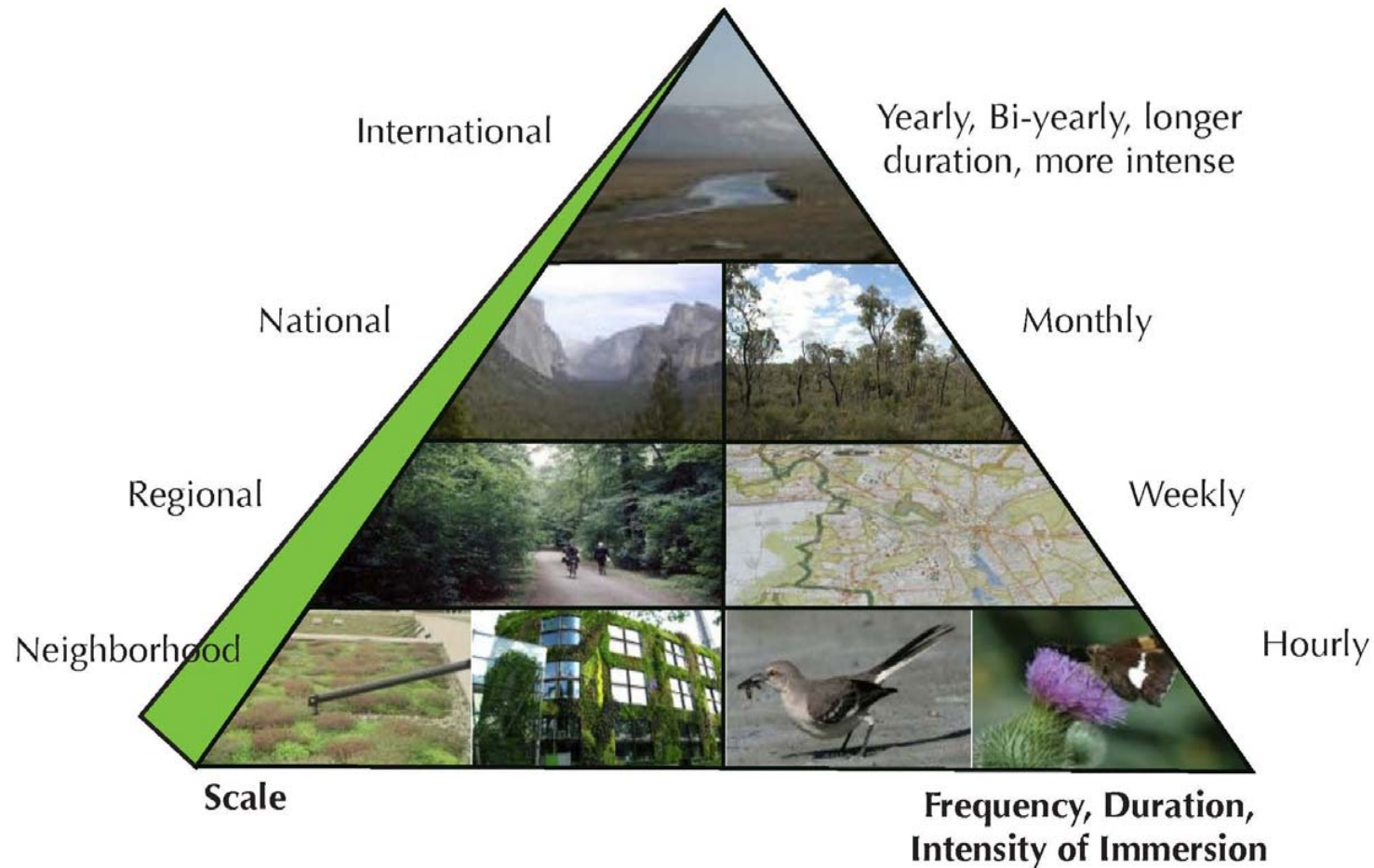
Does Nature Help Us To Be Better Human Beings?

Nature Makes Us More Generous!

“Those more immersed in natural settings were more generous, whereas those immersed in non-natural settings were less likely to give. Feelings of autonomy and nature relatedness were responsible for the willingness to give to others, indicating that these experiences facilitated a willingness to promote others’ interests as well as one’s own. In other words, autonomy and relatedness encouraged participants to focus on their intrinsic values for relationships and community rather than on personal gain.” --Weinstein, Przybylski, and Ryan, 2009

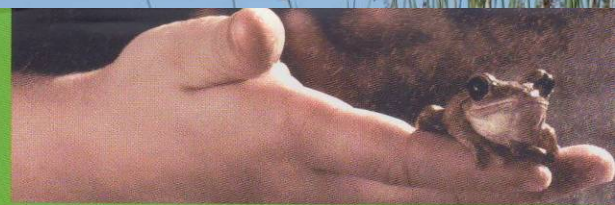


THE NATURE PYRAMID



Concept by: Tanya Denckla-Cobb

What is the Minimum Daily Requirement of Nature?



LAST CHILD IN THE WOODS

SAVING OUR
CHILDREN
FROM
NATURE-
DEFICIT
DISORDER

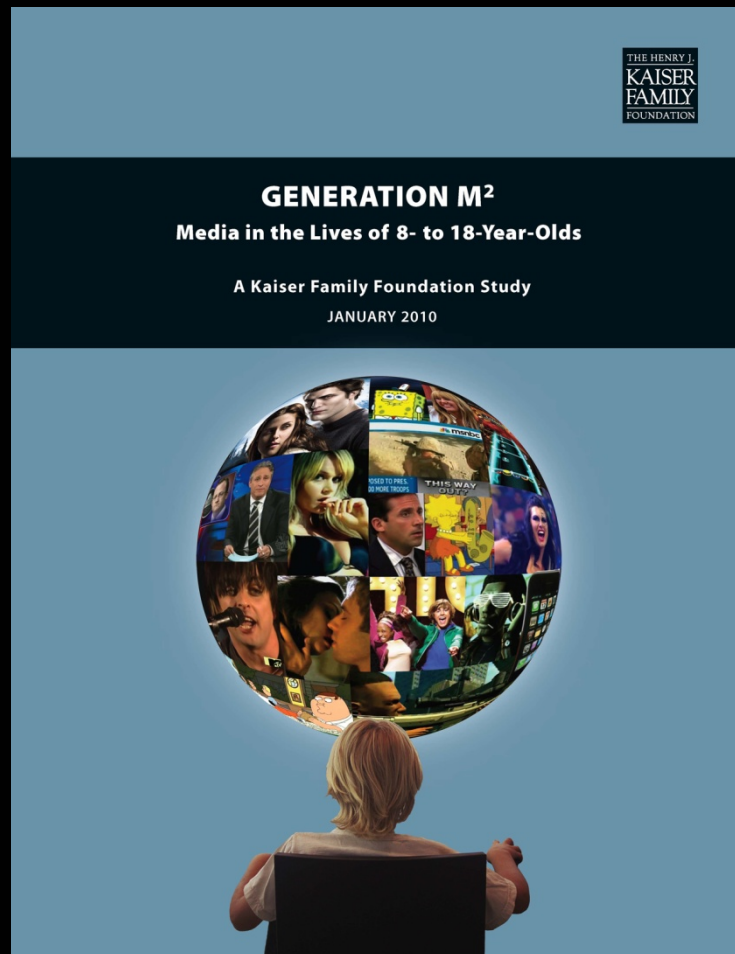
RICHARD LOUV

"I like to play indoors better,
'cause that's where all the
electrical outlets are"

--San Diego fourth-grader



The Trends Are Not Encouraging



Media Use Over Time

Among all 8- to 18-year-olds, average amount of time spent with each medium in a typical day:

	2009	2004	1999
TV content	4:29 ^a	3:51 ^b	3:47 ^b
Music/audio	2:31 ^a	1:44 ^b	1:48 ^b
Computer	1:29 ^a	1:02 ^b	:27 ^c
Video games	1:13 ^a	:49 ^b	:26 ^c
Print	:38 ^a	:43 ^{ab}	:43 ^b
Movies	:25 ^a	:25 ^{ab}	:18 ^b
TOTAL MEDIA EXPOSURE	10:45 ^a	8:33 ^b	7:29 ^c
Multitasking proportion	29% ^a	26% ^a	16% ^b
TOTAL MEDIA USE	7:38 ^a	6:21 ^b	6:19 ^b

Notes: See Methodology section for a definition of terms, explanation of notations, and discussion of statistical significance. See Appendix B for a summary of key changes in question wording and structure over time. **Total media exposure** is the sum of time spent with all media. **Multitasking proportion** is the proportion of media time that is spent using more than one medium concurrently. **Total media use** is the actual number of hours out of the day that are spent using media, taking multitasking into account. See Methodology section for a more detailed discussion. In this table, statistical significance should be read across rows.

Ability to Name?



Ability to Name?



0%

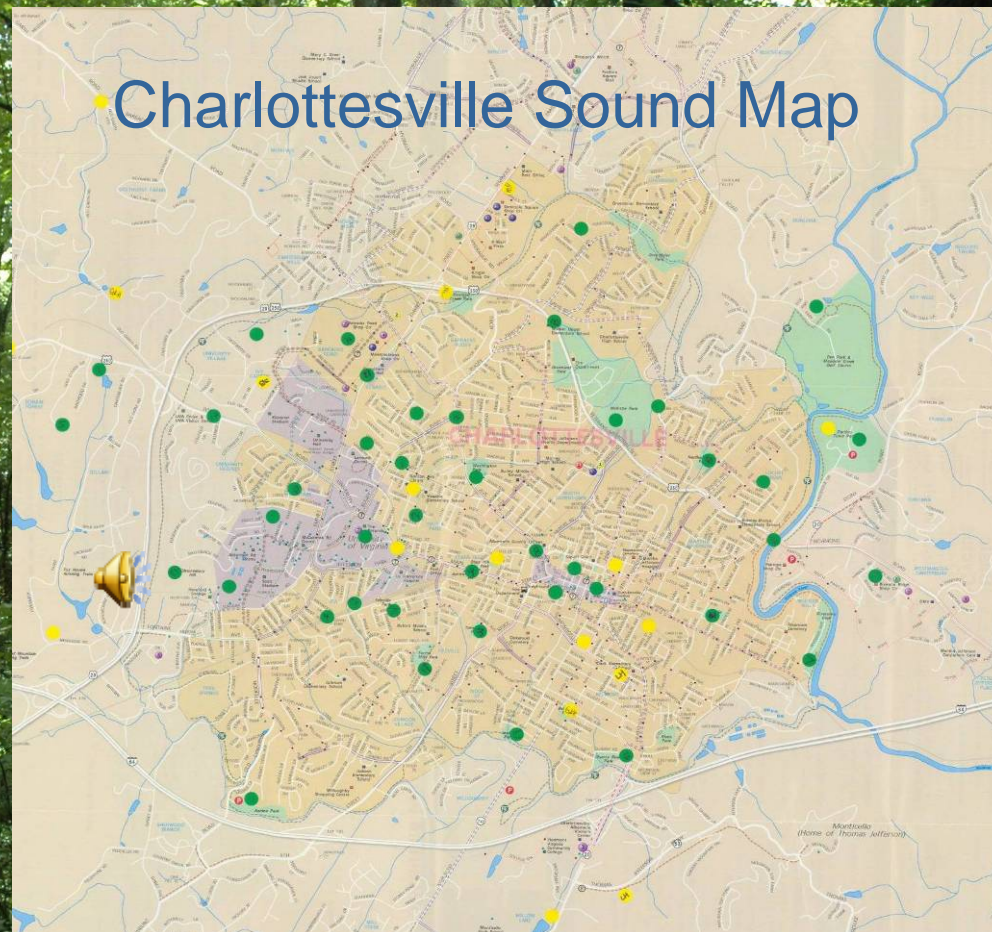


0%



100%

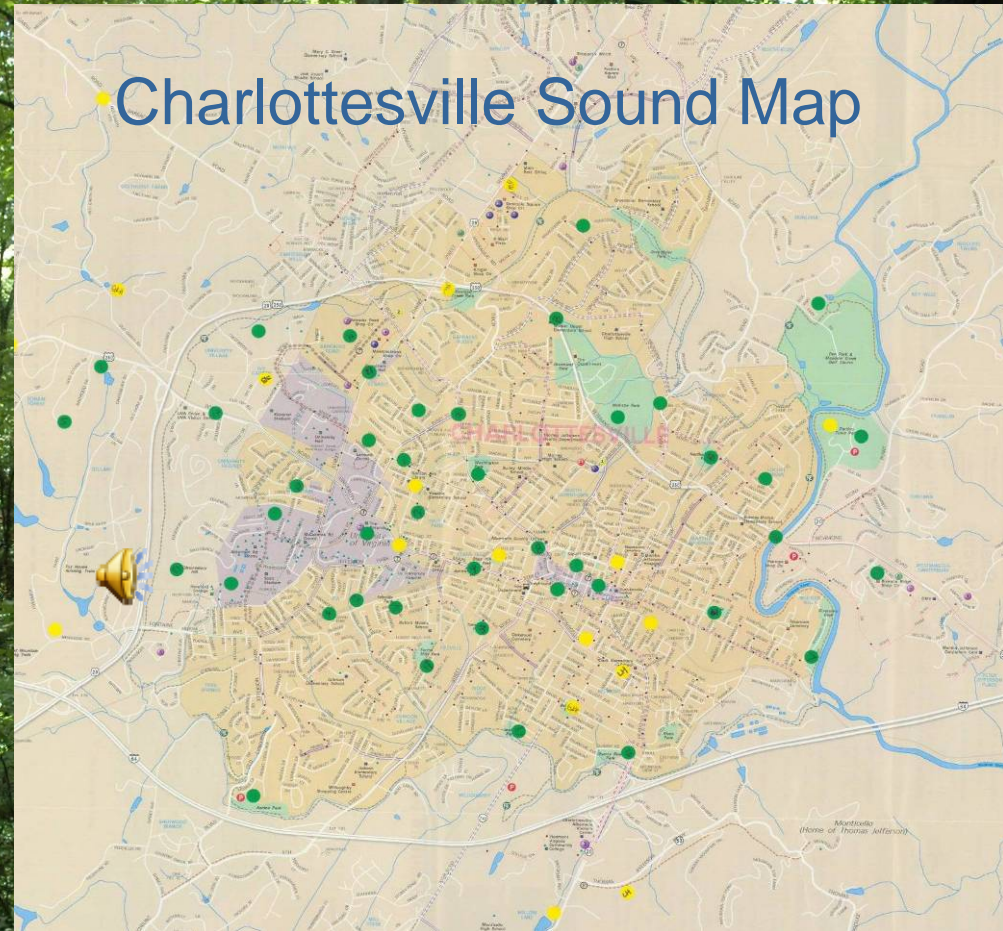
Charlottesville Sound Map



***Soundscapes as Biophilic
Dimensions of Place***



Eastern Screech Owl



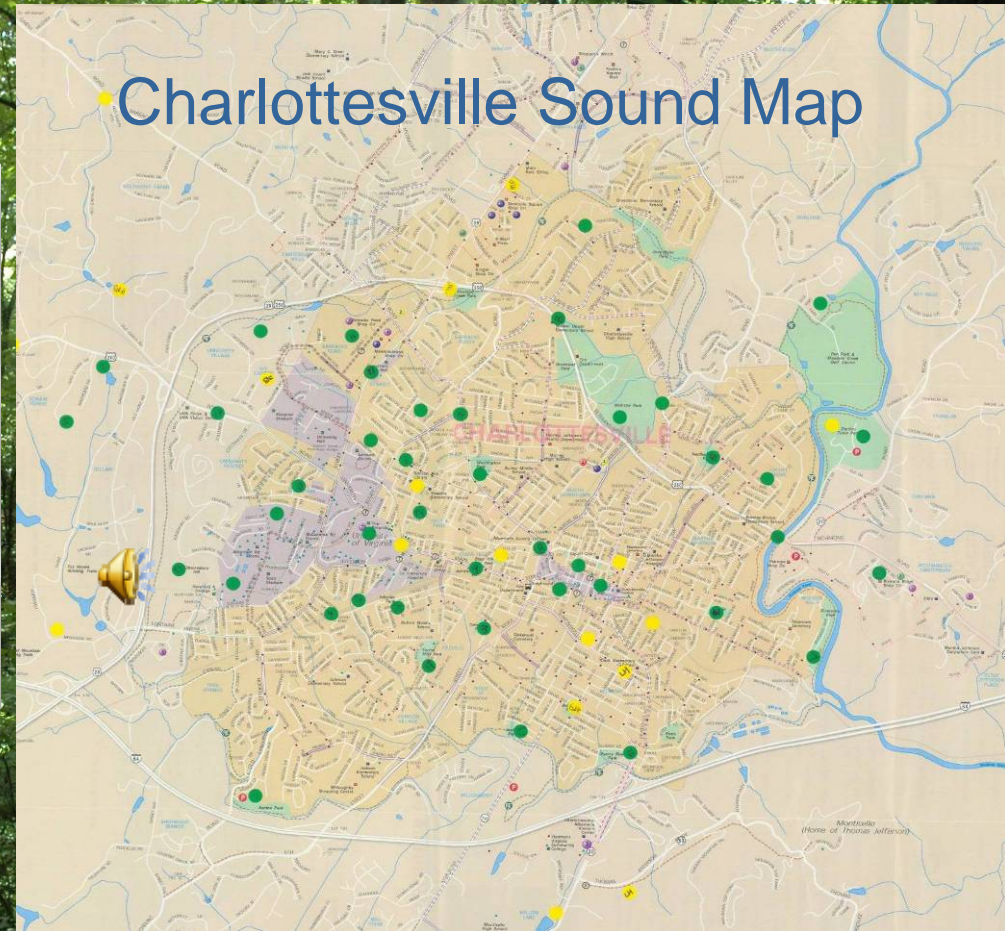
Soundscapes as Biophilic Dimensions of Place



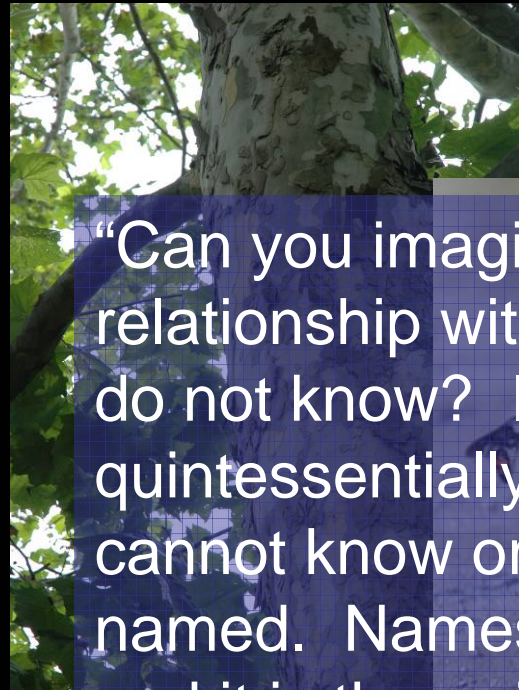
Australian Raven (nominate race), Kangaroo Island, South Australia, March 2006

© Arthur Grosset

Australian Raven



Soundscapes as Biophilic Dimensions of Place



“Can you imagine a satisfactory love relationship with someone whose name you do not know? I can’t. It is perhaps the quintessentially human characteristic that we cannot know or love what we have not named. Names are passwords to our hearts, and it is there, in the end, that we will find the room for a whole world.” —Paul Gruchow



FOREWORD BY E. O. WILSON

BIOPHILIC CITIES

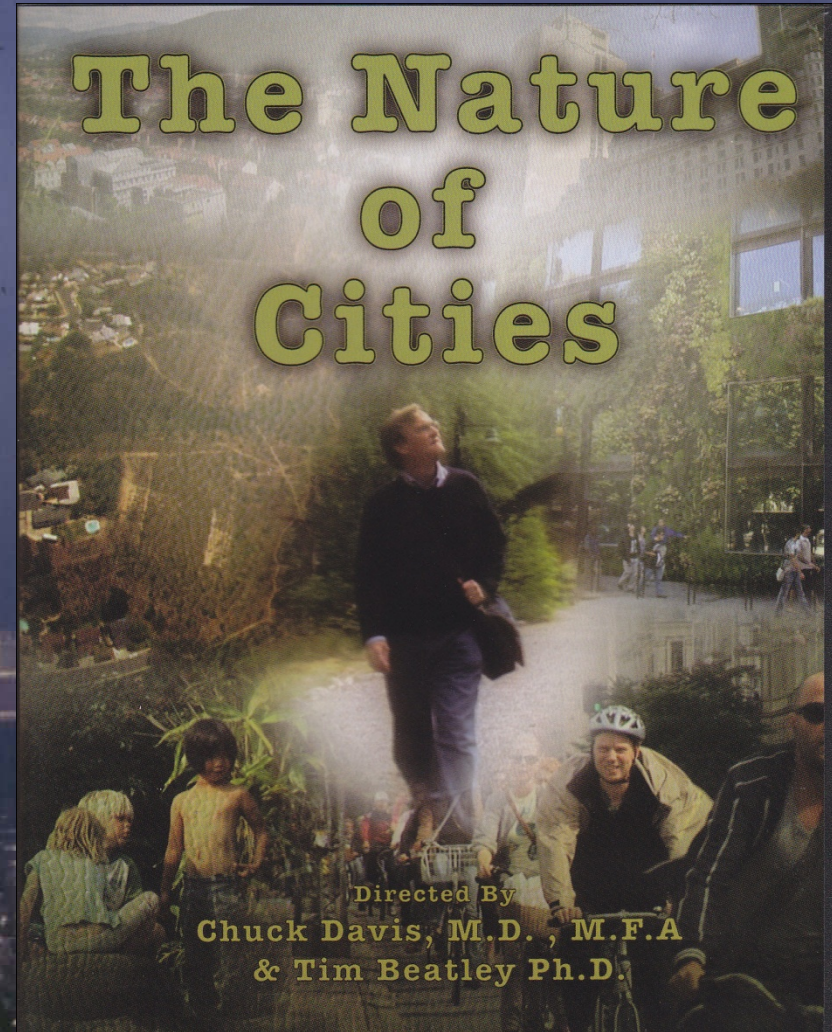
INTEGRATING NATURE
INTO URBAN DESIGN AND PLANNING



TIMOTHY BEATLEY



The Nature of Cities



Directed By
Chuck Davis, M.D., M.F.A.
& Tim Beatley Ph.D.

What is a Biophilic City?

An Outdoor/Outside Oriented City

Nature Education and Nature Nudging

Diverse and Multi-layered Contact with Local Nature (e.g. including sound, smell, other sensory experiences)

Functional/Spatial Hierarchy: Connected Systems of Nature and Green Infrastructure

Importance Given to Protecting and Restoring Nature

Green Neighborhoods: Every Neighborhood Has Ample Access to Outdoor Nature

Fosters Connections to Local Landscapes, History, Culture, Unique Aspects of Place

Building Natural Social Capital



Biophilic Cities Metrics

Box 3.1 Indicators of a Biophilic City

Biophilic Conditions and Infrastructure

Percentage of population within 100 meters of a park or greenspace

Example: PlaNYC's target of a park or greenspace for all residents within walk by 2030. Evidence suggests that parks and greenspaces within 1 mile are more commonly visited; perhaps a sensible target is to provide at least one greenspace within 100 meters for all residents.

Existence of a connected, integrated ecological network; green urbanism for the region

Example: Helsinki, Finland's regional, connected greenspace network. Central Park provides an unbroken green wedge from old-growth forest at the edge of the city center to the city center.

Percentage of city land area in wild or semi-wild nature

Example: Cities must provide more than formal parks, grass median strip landscaping; there must be areas where residents can see and experience wild or semi-wild nature—forests, wetlands, meadows, and native vegetation. In Perth, Australia, the two largest parks—Bold Park and King's Park—are in native bushland. Nagoya, Japan has set aside 10 percent of its land for parks. A target of 10 percent seems a reasonable and minimal target for a city.

Percentage forest cover in the city (in some regions this will be less appropriate)

Example: American Forests recommends a target of 40 percent forest cover over an entire metropolitan area; higher in outer areas, lower in city centers. São Paulo, Brazil, which struggles to protect Atlantic forests, has 20 percent of its jurisdiction in dense forest.

Extent and number of green urban features (e.g., green rooftops, green walls)

Example: One green rooftop or other urban green feature per 1,000 square feet of minimum one per urban block. Chicago, for example, now has more than 1,000 green rooftops.

Miles per capita of walking trails

Example: Anchorage, Alaska has a whopping 250 miles of trails, and with a population of about 280,000, that converts to about 1 mile of trail per 1,000 people, a relatively high level; these trails are multiseasonal and offer considerable views of the city's borders.

Number of community gardens and garden plots (absolute and per capita); percentage of city area in community garden area

Example: Seattle's P-Patch community program has established the goal of one community garden per 2,500 city residents.

Biophilic Activities

Percentage of population that is active in nature or in one of such organizations active in the city

Example: Many urban residents are active in gardening clubs, and other organizations that promote indoor and outdoor activities. One potential target is a quarter of a city's population to be active in such organizations.

Percentage of population engaged in nature or in one of such organizations (Urban Bushcare), as well as absolute number

Example: Brisbane, Australia has 124 active volunteers in Urban Bushcare and some 2,500 active volunteers in other organizations. In 1 million, this represents only a .002 percent of the population to see 1–5 percent of a city's population.

Percentage of time residents spend outside

Example: Currently most Americans spend about 15–20 percent of their time outdoors. An initial target of 15–20 percent depending on the climate and time of day.

Percentage of residents who actively garden (gardens)

Example: Recent surveys indicate that about 10 percent of Vancouver, British Columbia grow vegetables in their backyards. Extent of recess and outdoor playtime in schools

Example: Finland's school system promotes outdoor learning during the school day.

Biophilic Attitudes and Knowledge

Percentage of population that can recognize local native bird species

Example: At least one-third of a city's population should be able to recognize a common native bird species, say, a crow.

Extent to which residents are curious about nature or in one of such organizations (a proxy such as a survey question or community garden)

Example: Residents of a city should be able to answer a survey question about local and state governments have access to information about the area's nature, as well as the extent of knowledge. For instance, the Florida Backyard Wildlife Extension Service, asks questions in a survey form: "Can you comfortably

(Yes/No) If yes, about how many species?" and "On average, how many minutes per week do you spend watching butterflies, other insects, and spiders in your yard?" (See duval.ifas.ufl.edu/pdf/lawn_and_garden/Wild_Life_Habitat_Application.pdf). Academic studies and university researchers have also collected similar information about knowledge of local nature that might also provide useful models. For instance, in an especially interesting study of bird knowledge in Wellington, New Zealand, Parker (2009) asked households to identify six local bird species (through photographs presented in a questionnaire); see also Archer and Beale (2004).

Biophilic Institutions and Governance

Adoption of a local biodiversity action plan or strategy

Example: Many cities around the world have prepared biodiversity action plans, for instance, Dublin, Ireland and Capetown, South Africa.

Existence of local biophilic support organizations, for example, existence of an active natural history museum or botanical garden

Example: U.S. cities such as Cleveland, Ohio have both an active local botanical garden and a natural history museum. A reasonable target is to ensure that cities have municipal organizations and capabilities equivalent to these two forms of biophilic engagement and education.

Priority given to environmental education

Example: Many urban schools have outdoor classrooms and educational efforts that tie learning in traditional areas (science and math) to hands-on activities that involve learning about nature. One reasonable target is that at least half of a city's public schools operate such initiatives.

Percent of local budget devoted to nature conservation, recreation, education, and related activities

Example: While there are few comparative studies, a reasonable target is that a minimum of 5 percent of a city's budget should be devoted to nature conservation, education, and restoration.

Adoption of green building and planning codes, grant programs, density bonuses, greenspace initiatives, and dark-sky lighting standards

Example: Many American cities, such as Seattle and Portland, have municipal code provisions that either mandate or encourage green features and biophilic design. A city's planning code should include a combination of incentives (e.g., density bonuses) and requirements (e.g., greenspace factor) to encourage green urban features.

Number of city-supported biophilic pilot projects and initiatives

Example: Many cities, such as Chicago, have seen great value in piloting new green design ideas and concepts and providing technical and financial support. A city should have under way at least five biophilic pilot projects or initiatives.

Biophilic Urban Design Elements Across Scales

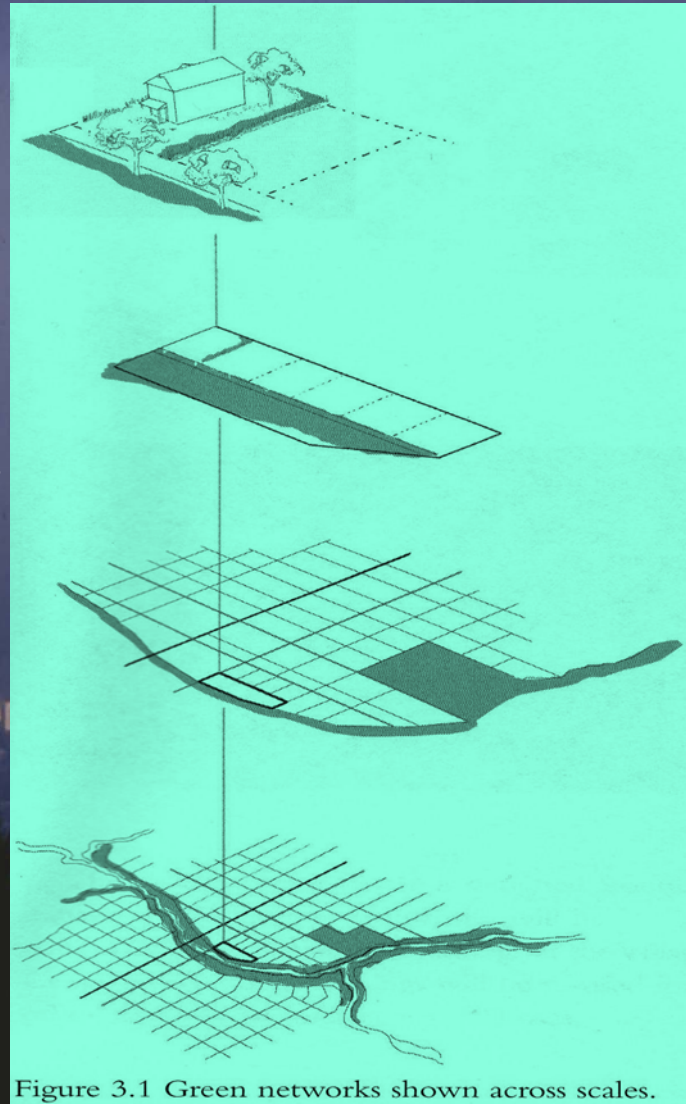


Figure 3.1 Green networks shown across scales.

Source: Modified from
Girling and Kellett

Building/Site

- Green rooftops
- Sky gardens and green atria
- Rooftop garden
- Green walls
- Daylit interior spaces

Block

- Green courtyards
- Native species yards and spaces

Street

- Green streets
- Urban trees
- LID vegetated swales and skinny streets
- Edible landscaping

Neighborhood

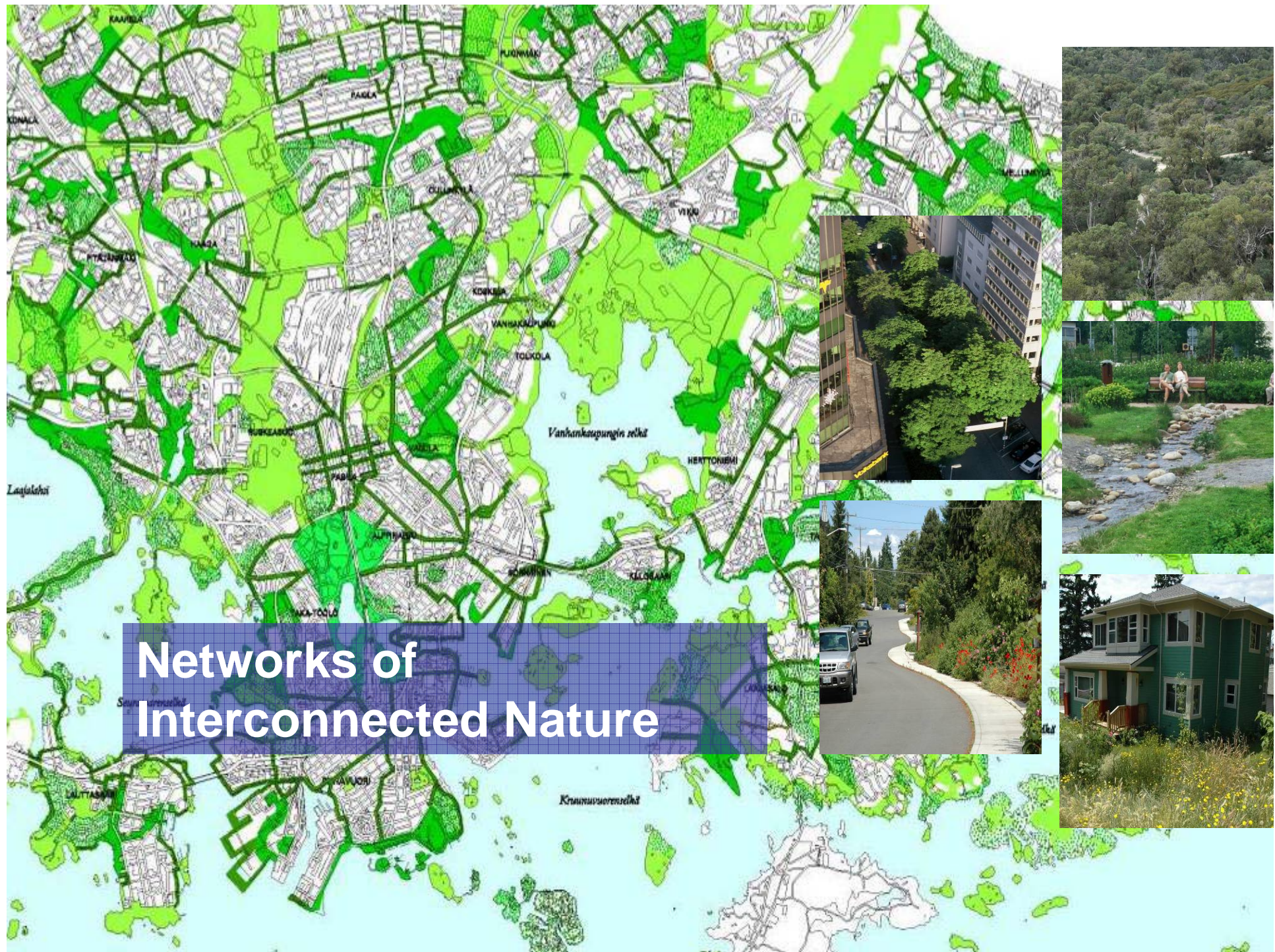
- Stream daylighting
- Urban forests
- Ecology parks
- Community gardens
- Neighborhood parks/pocket parks

Community

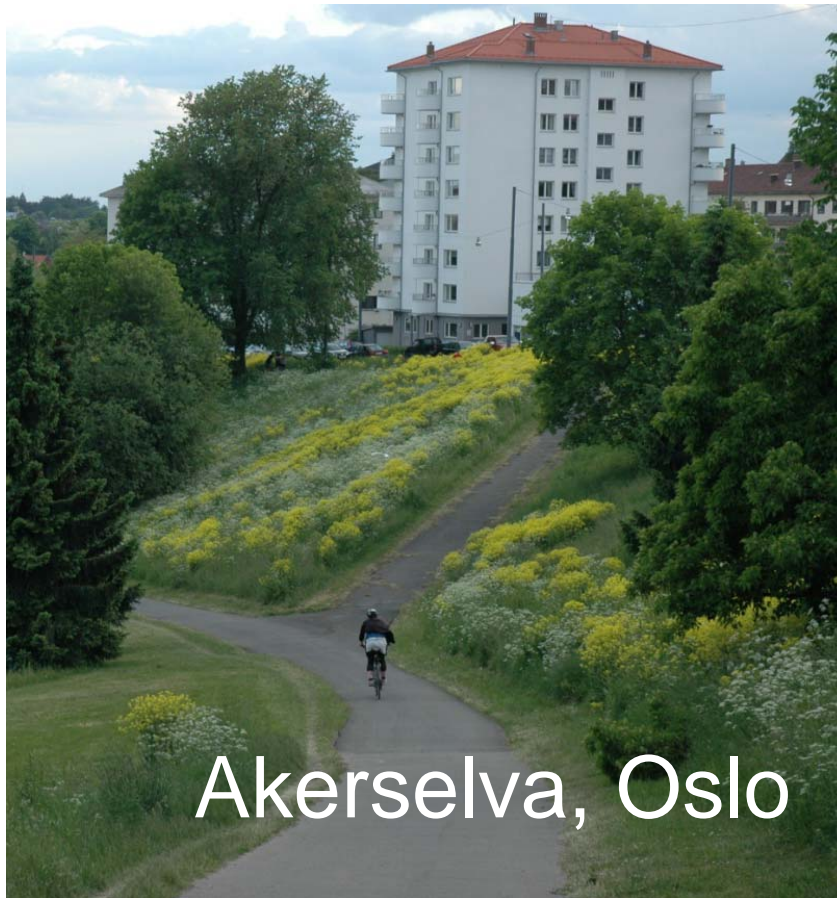
- Urban creeks and riparian areas
- Urban ecological networks
- Green schools
- City tree canopy
- Community forest/community orchards

Region

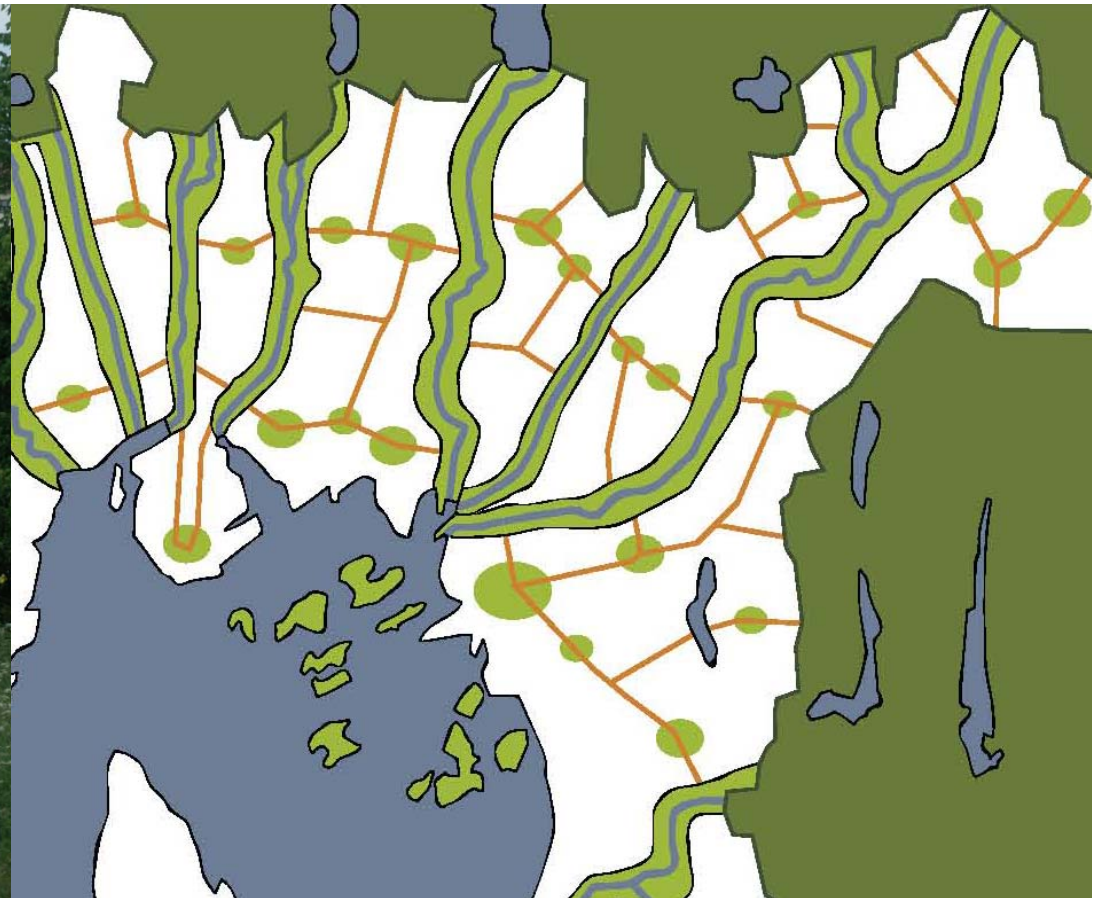
- River systems/floodplains
- Regional forest ecosystems
- Regional greenspace



Networks of Interconnected Nature



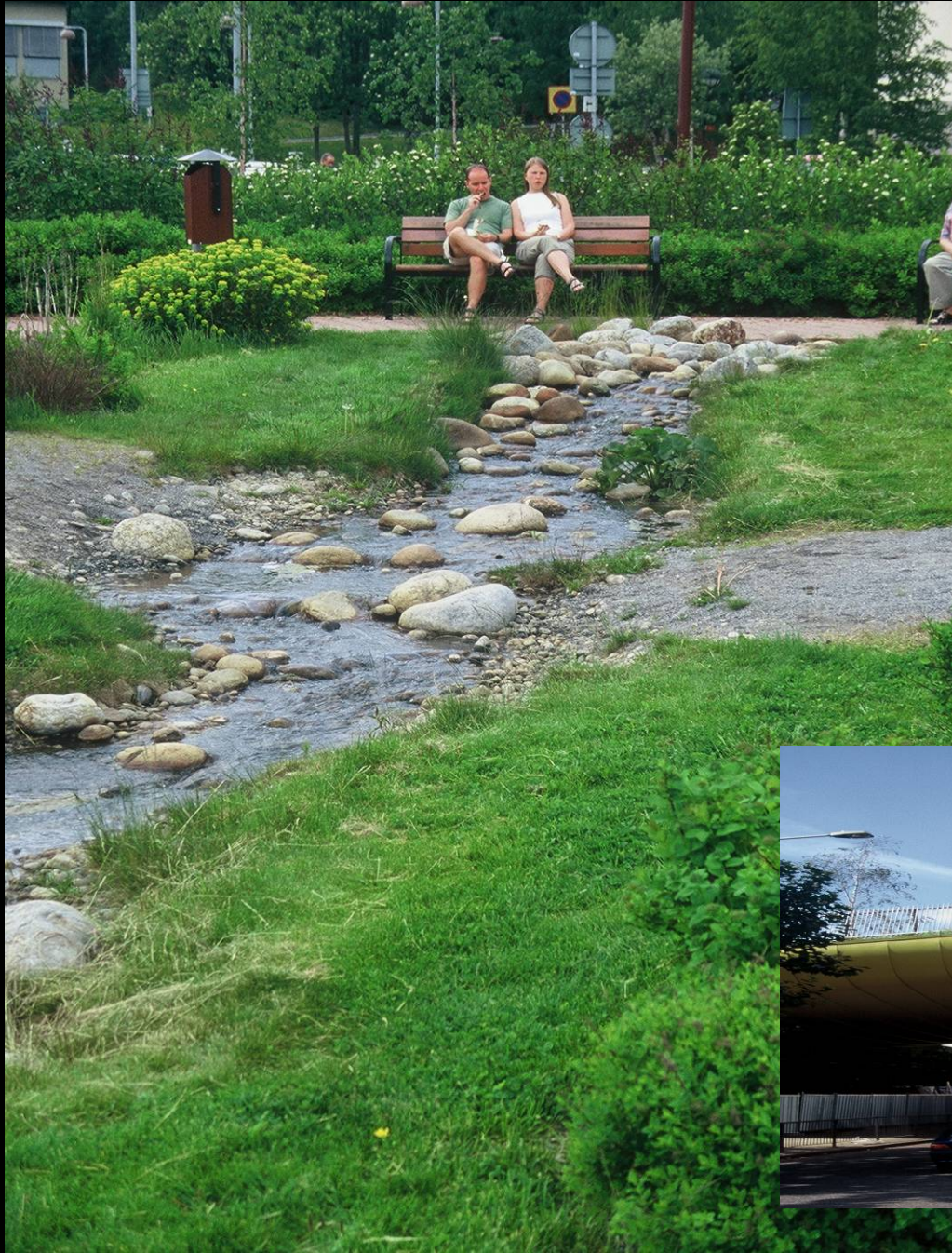
Akerselva, Oslo





Biophilic Box Score?

Two-thirds of the City in protected forests;
94% of the city's residents live within 300 meters
of a green area;
365 km of hiking and walking trails in the city;
81% of the city's population had visited the forests
around the city during the previous year;
85% of the city's children get to school either by
walking, bicycling or by public transit;





Seattle Street Edge Alternatives



The High Line, New York City

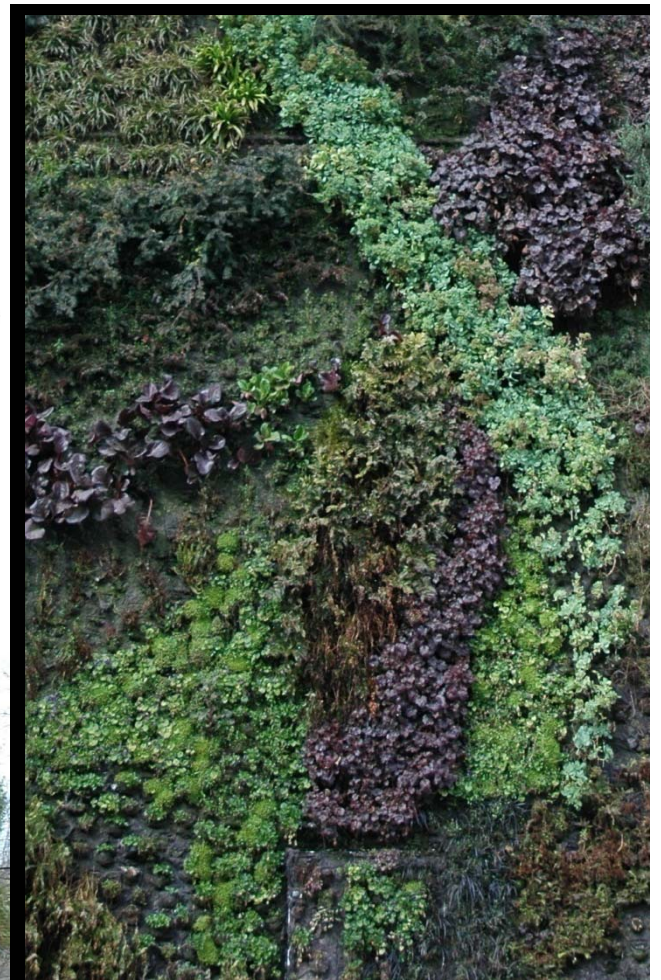
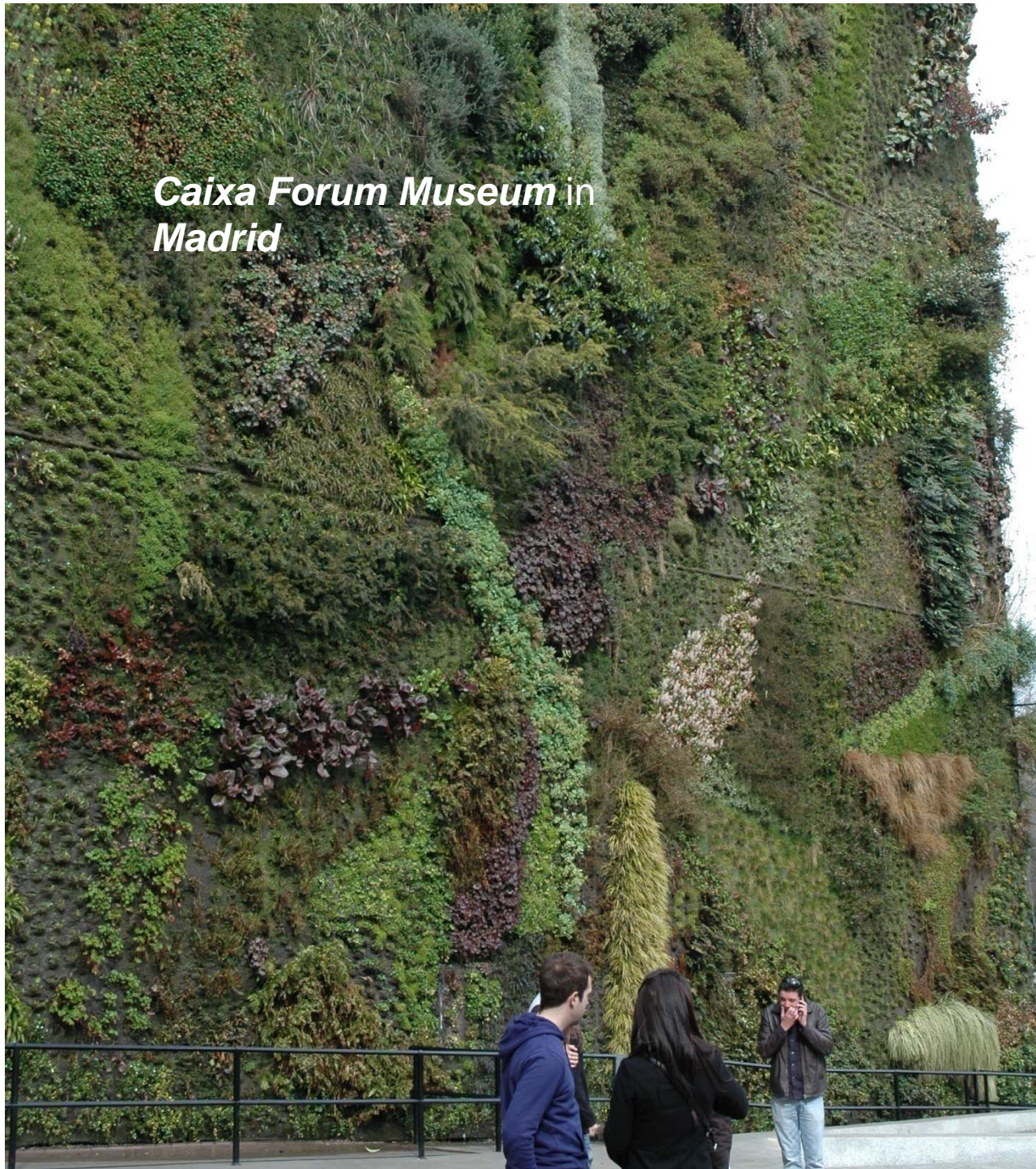






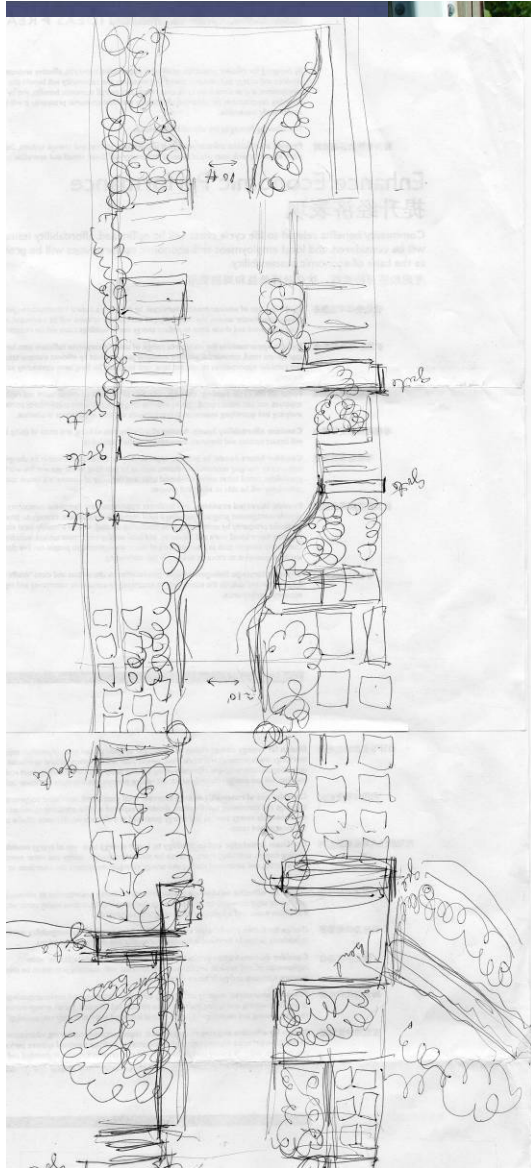


*Caixa Forum Museum in
Madrid*



Montreal Rooftop Gardens Project

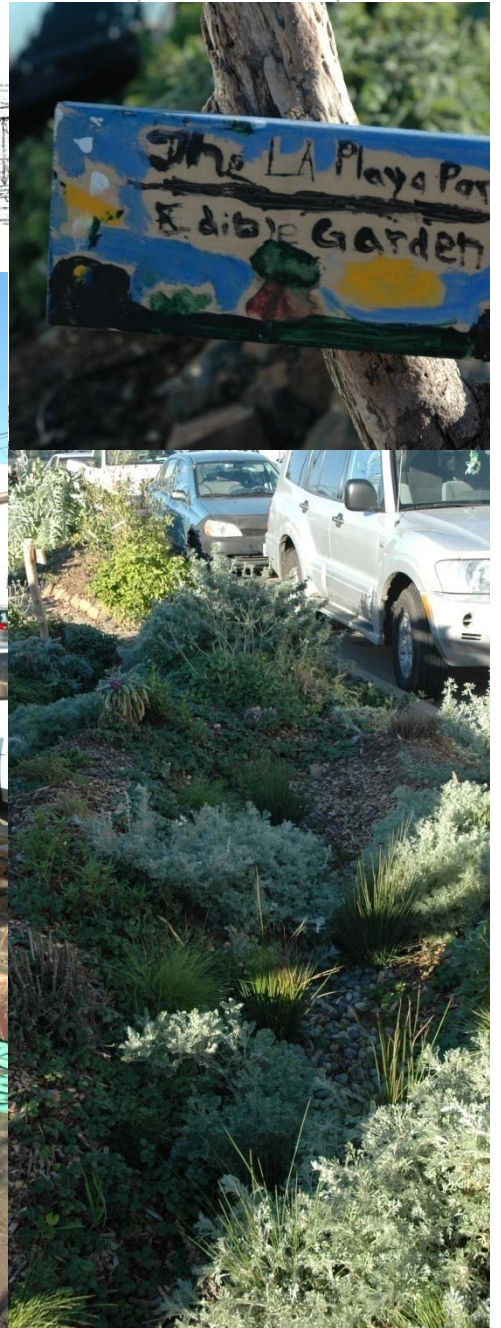
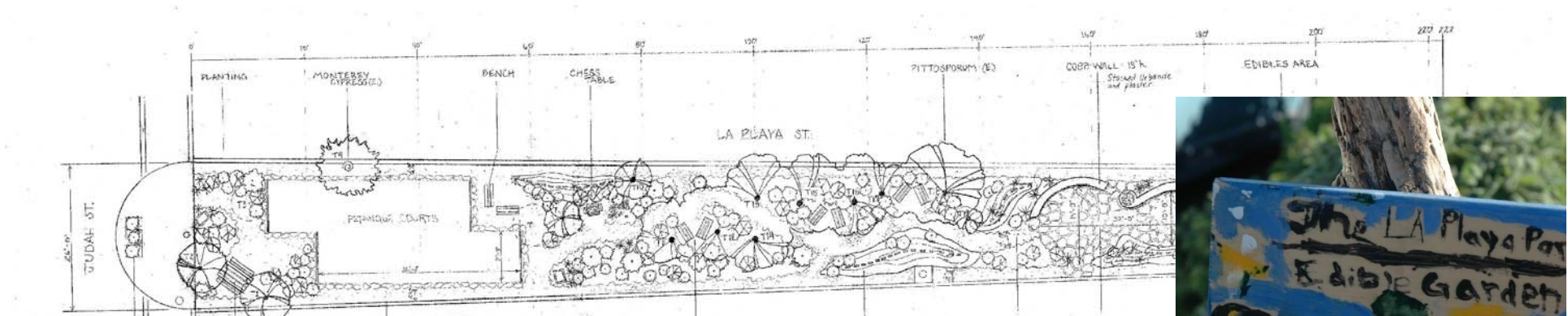




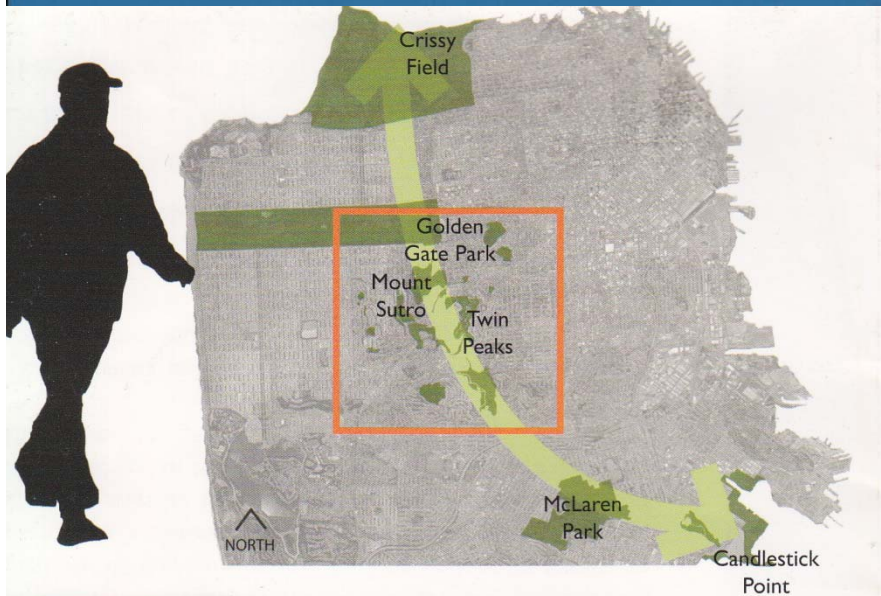
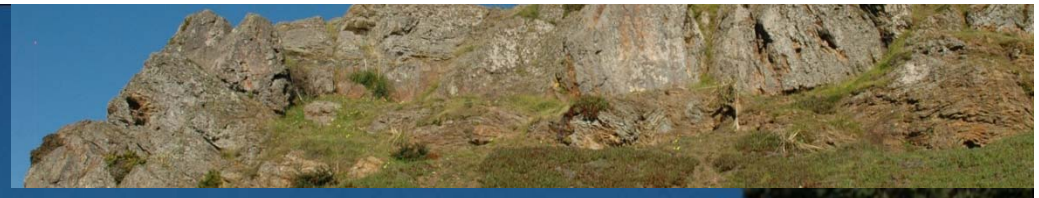
Mole Hill, Vancouver

Jane Martin
Founder, *PLANT*Sf*
(Permeable Landscapes As
Neighborhood Treasures)

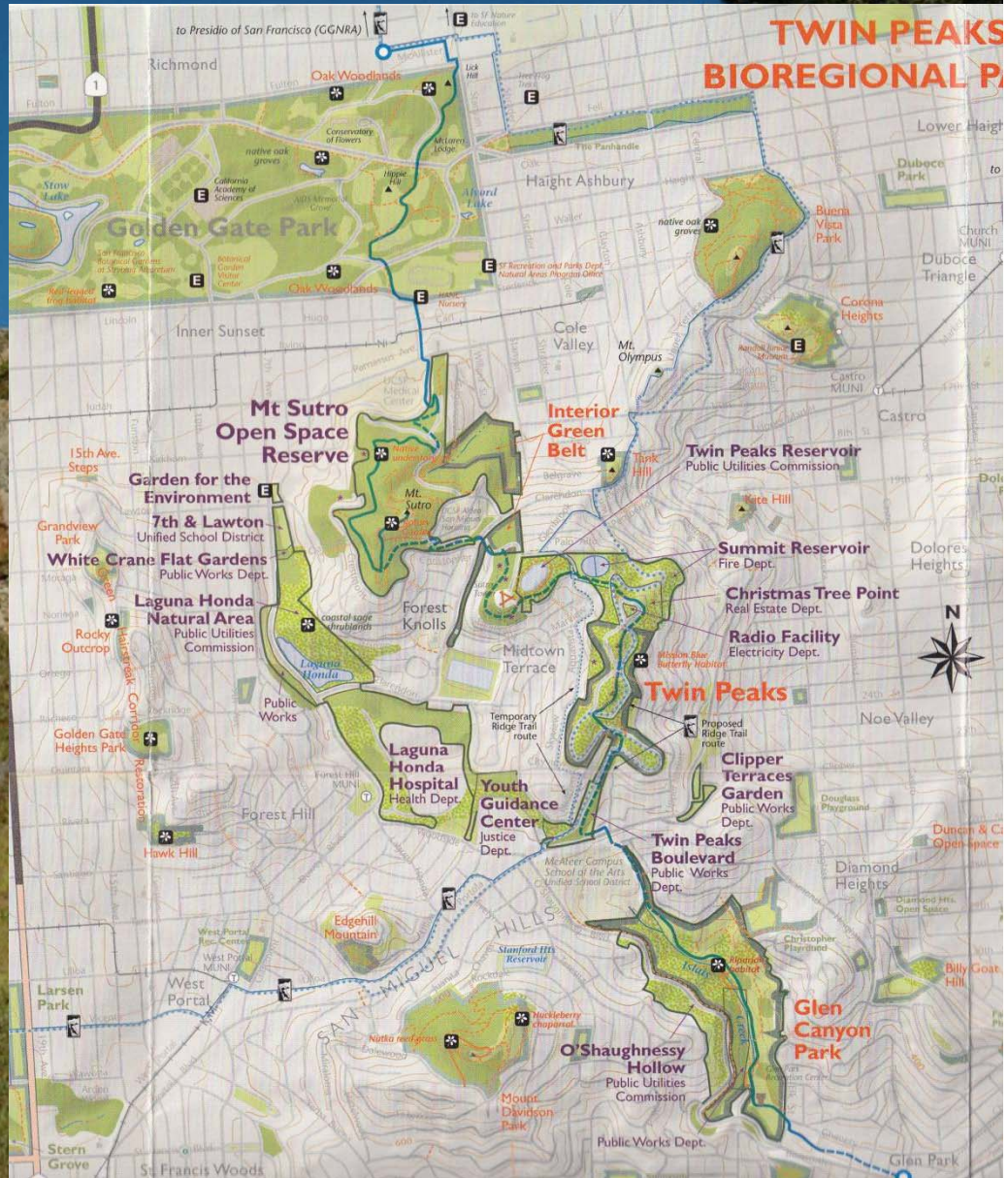








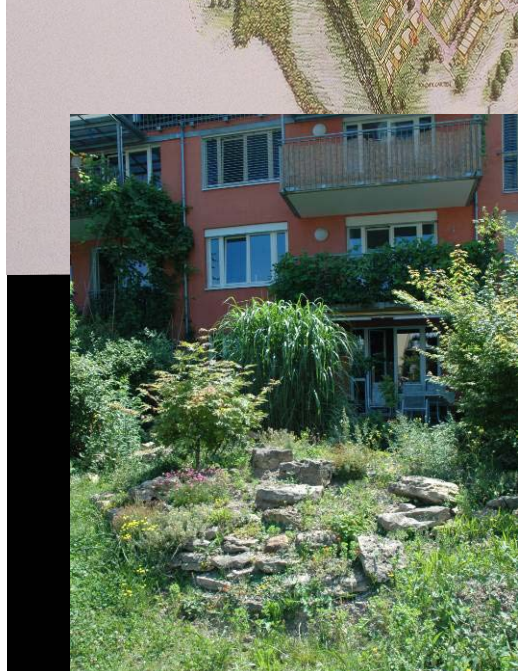
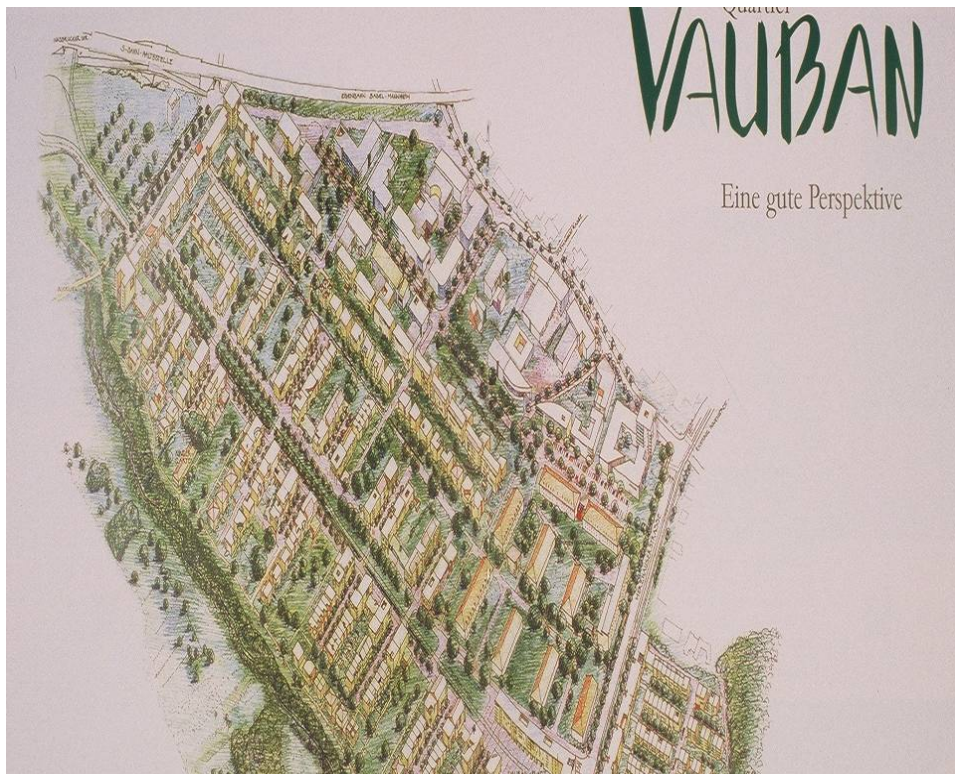
IMAGINE taking a hike from Crissy Field to Candlestick Point on a trail that traverses California grasslands, natural lakes, native oak woodlands, and lush riparian forests. Imagine during a single hike, counting hundreds of native plant, bird, mammal, reptile, and amphibian species, so that you felt like you were in a rainforest, not right in the geographic heart of a densely populated worldclass city.



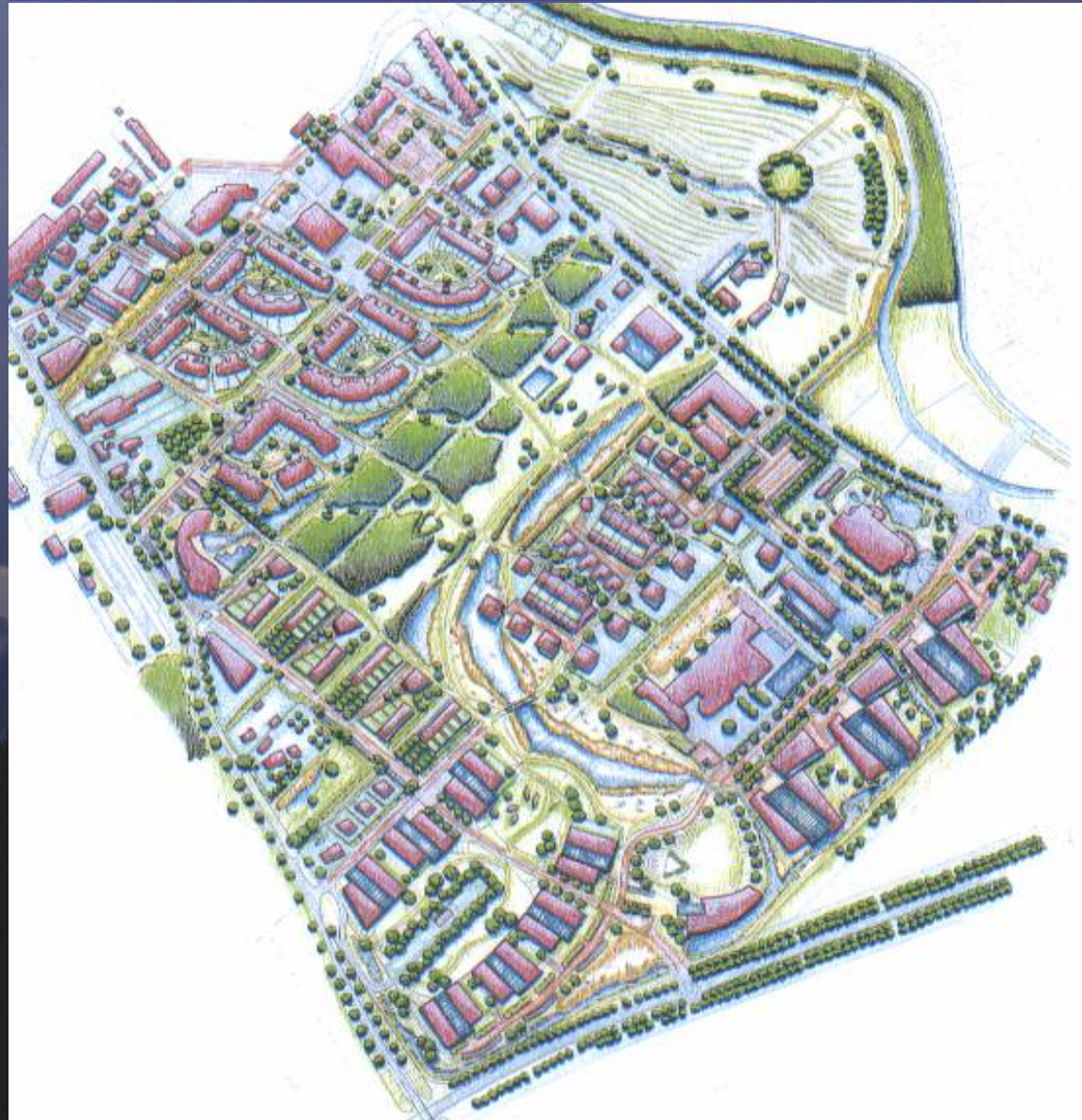
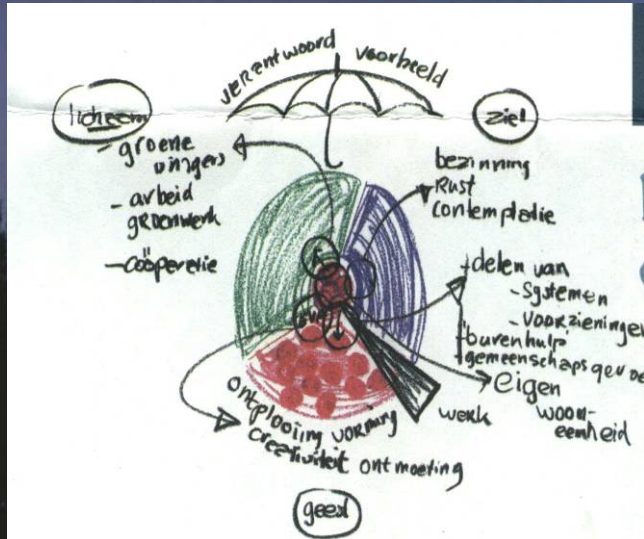


Västra Hamnen, Malmö

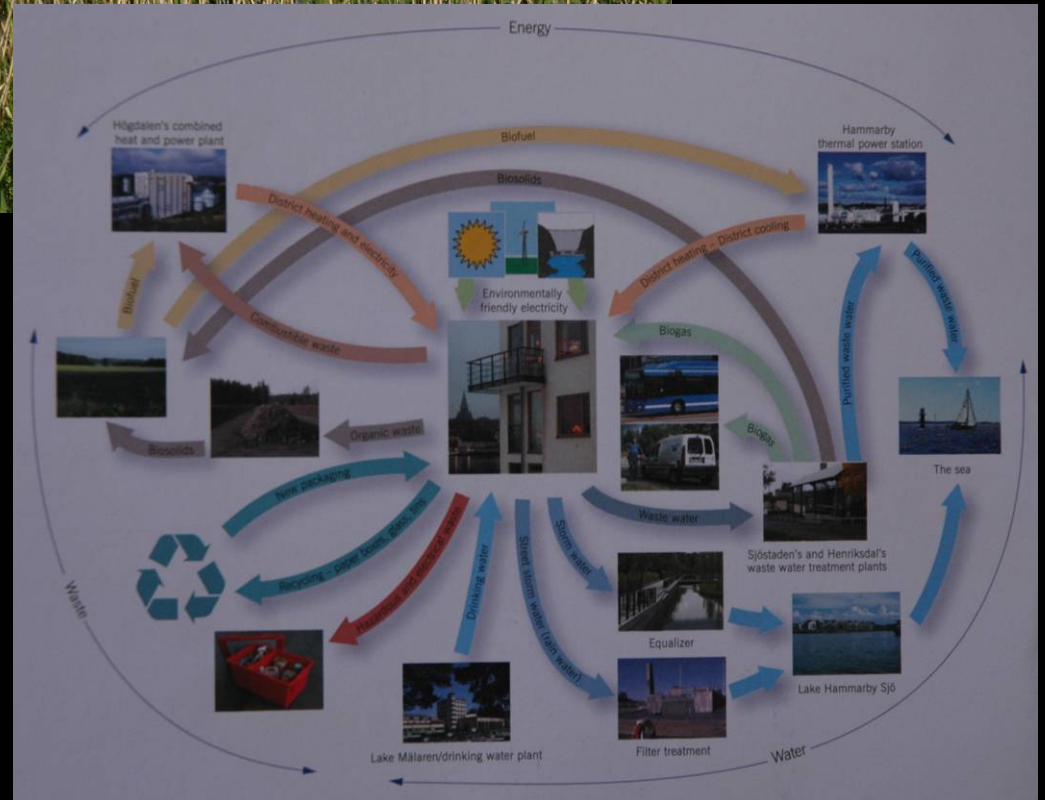


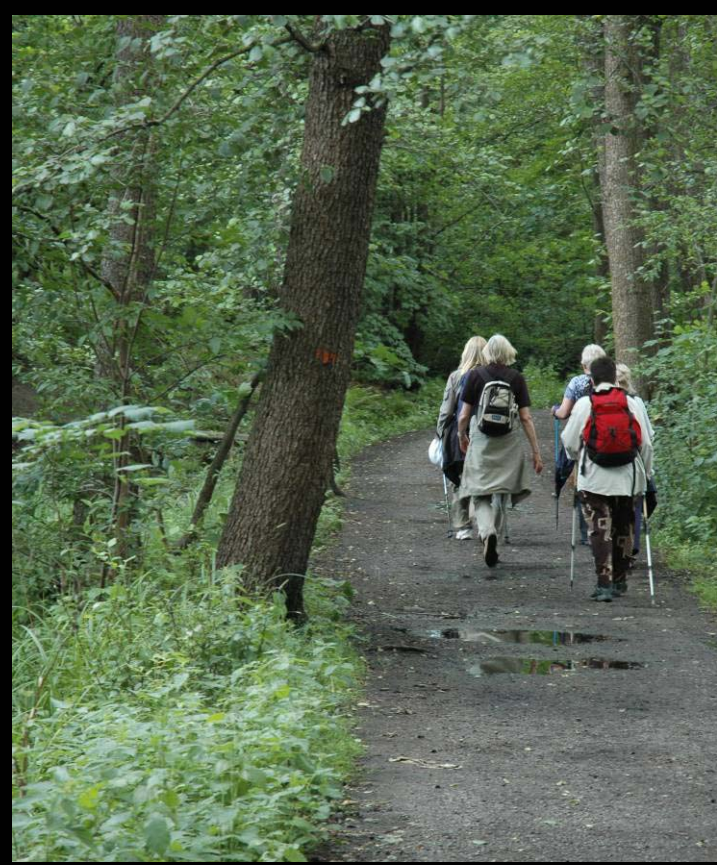


Eva-Lanxmeer, Netherlands



Hammarby Sjöstad, Stockholm



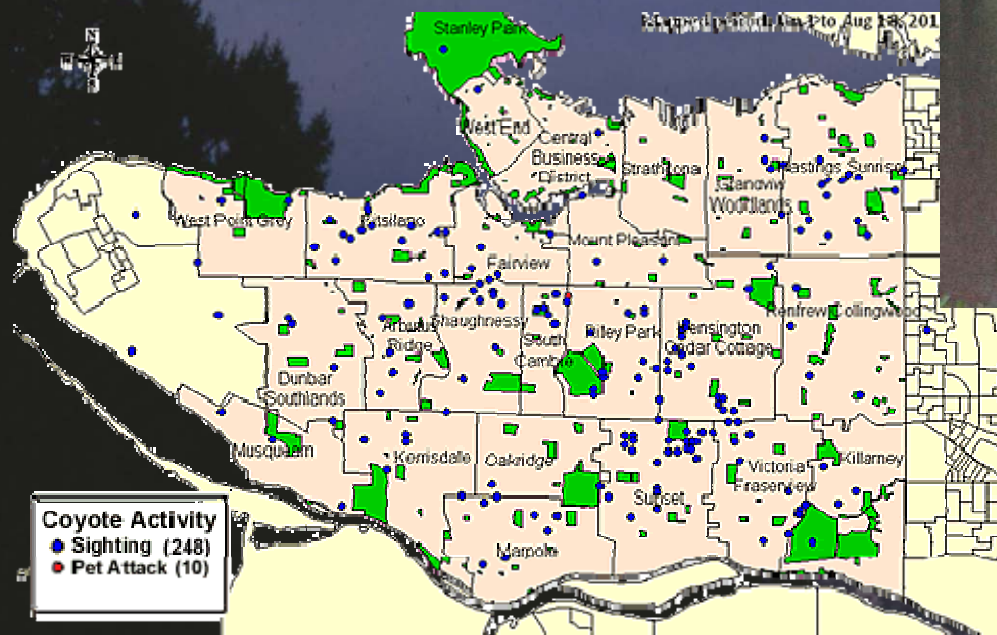


Planning Zoöpolis

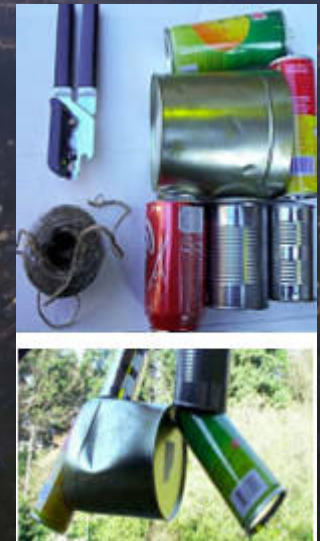


“To allow for the emergence of an ethic, practice and politics of caring for animals and nature, we need to renaturalize cities and invite animals back in—and in the process re-enchant the city.” —Jennifer Wolch

Density + Nature?

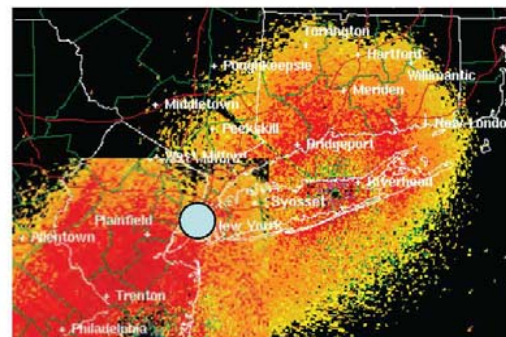
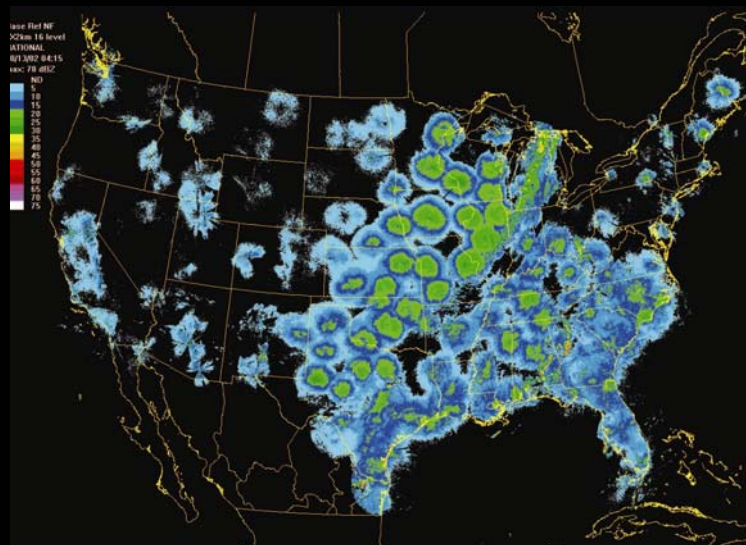


The Can Clanger!

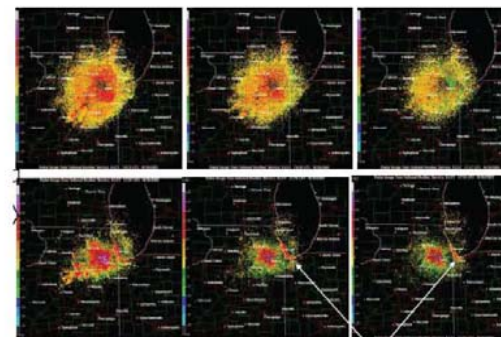




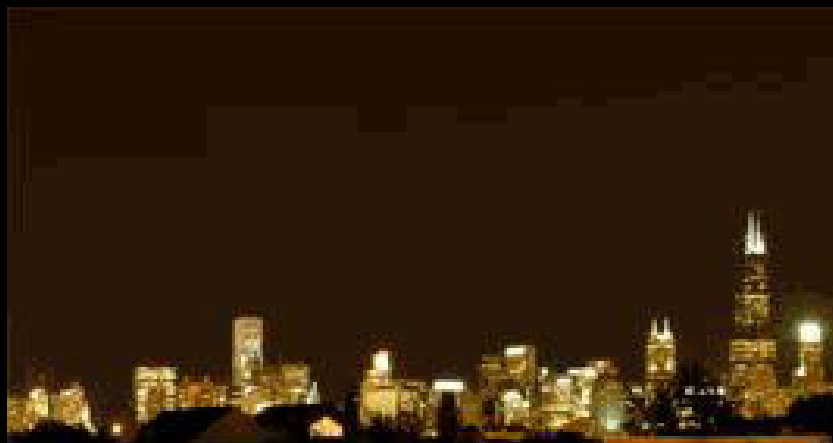
Golden Crowned Kinglet



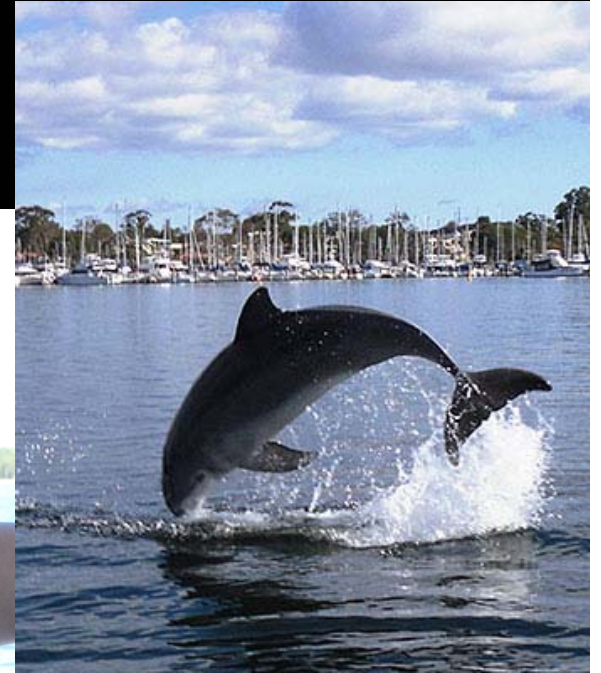
Time-lapsed radar images reveal the tremendous size and density of the migratory flocks that descend upon North American metropolitan areas during migration seasons frequently spanning hundreds of miles in width.⁶



Time-lapse images of the Chicago region depict a three-hour period, during which a cluster of migrating birds—initially as wide as the state of Illinois—descends upon the southwestern shoreline of Lake Michigan. As seen in the image of at the bottom right, the greatest density of congregating birds—shown in red—corresponds to the City of Chicago's glassy, skyward business district.



Dolphin Watch--Perth



Surprise and Delight!



Nurturing Citizen Science and Nature Mentors

Parabotanists





Helena
Klangemo
Nature Guides,
Stockholm





Biophilic Cities

Tim Beatley, beatley@virginia.edu