Ecosystem services in the city? the case for expanded definitions and values

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Urban Ecosystems?

ecological function vs. eco lands spanning public & private lands
Ecosystem Services

<table>
<thead>
<tr>
<th>ECOSYSTEM SERVICES</th>
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<tbody>
<tr>
<td><strong>Provisioning Services</strong></td>
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<tr>
<td>Food (crops, livestock, wild foods, etc.)</td>
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<td>Fiber (timber, cotton hemp/silk, wood fuel)</td>
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<td>Genetic resources</td>
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<td>Biochemicals, natural medicines, pharmaceuticals</td>
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<td>Fresh water</td>
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<td><strong>Supporting Services</strong></td>
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<td>Nutrient cycling</td>
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<td>Soil formation</td>
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<td>Primary production</td>
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<td><strong>Regulating Services</strong></td>
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<td>Air quality regulation</td>
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<td>Climate regulation (global, regional, and local)</td>
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<td>Water regulation</td>
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<td>Erosion regulation</td>
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<td>Water purification and waste treatment</td>
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<td>Disease regulation</td>
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<td>Pest regulation</td>
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<td>Pollination</td>
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<td>Natural hazard regulation</td>
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<td><strong>Cultural Services</strong></td>
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<td>Aesthetic values</td>
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<td>Spiritual and religious values</td>
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<tr>
<td>Recreation and ecotourism</td>
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Urban Greening, City Trees & Green Infrastructure

environmental benefits
health and well-being
multi-tasking & co-benefits
Urban Forest Canopy Cover by Land Use

Seattle data :: distribution probably similar to many PNW cities
modules:
Eco
Streets
Hydro
Vue

tools provided by USDA Forest Service

photo credits: Seattle i-Tree Training by Al Zelaya
Stormwater Management

Pierce County WA, Chambers Creek Properties
Pierce County WA, Chambers Creek Properties - 4 year growth
stormwater management

Parks & People Foundation, Baltimore
high land values
reduced public funds
community needs
new parks??

SO . . . . . .
multi-tasking nature
creating co-benefits
Tanner Springs Park
Portland OR
linked to active living network
neighborhood social cohesion

environmental education & social learning
Urban Greening, Trees & Nearby Nature

scientific evidence
health & well being benefits
life course concept
‘cradle to grave’
seminar reading
research review
urban ecosystems for human habitat
Health & Well Being
Cultural Ecosystem Services
Urban Forests and Newborns
the natural environment may affect pregnancy outcomes . . .

10% increase in tree-canopy cover within 50m of a house
= lower number of low weight births (1.42 per 1000 births)

Donovan et al., Health & Place, 2011
School & Learning
Green High School Campuses

- cafeteria & classroom window views with greater quantities of trees and shrubs
- positively associated with:
  - standardized test scores,
  - graduation rates
  - %s of students planning to attend a four-year college
  - fewer occurrences of criminal behavior

Matsuoka. 2010. Landscape & Urban Planning
EAB Tree Loss & Public Health

1990 to 2007, 1,296 counties in 15 states infected areas vs. no bugs
15,000 more deaths from cardiovascular disease
6,000 more deaths from lower respiratory disease
controlled for demographic, human mortality, and forest health data at the county level

Toledo, Ohio in 2006, pre EAB
2009, EAB in neighborhood

photos: Dan Herms, Ohio State University
Shinrin-yoku  Forest Bathing

- extended forest walks
  - reduced ‘fight or flight’ nervous system activity
  - lower cortisol – a stress indicator
  - increased immune function
  - lower pulse rate & blood pressure
Physical Activity & Depression Reduction

- Review of 13 high quality studies
  - exercise recommended for mild to moderate depression
  - people who are willing & motivated
  - associated meditation and mindfulness are important

parks, recreation, active transit
make room for pedestrians
hospital healing gardens: patients; family and friends; professional staff

health care $$ savings
Effects of nature window view on recovery from surgery (Roger Ulrich, 1984)

- Shorter stays
- Less pain
- Fewer minor complications
- Better emotional well-being

Effects of nature window view on recovery from surgery by Roger Ulrich (1984) suggest positive outcomes, including shorter stays, less pain, fewer minor complications, and better emotional well-being.
What is the Evidence?

urban greening & city trees
environment
public health
economics
Research Reviews

Green Cities: Good Health

Metro nature - including trees, parks, gardens, and natural areas - enhance quality of life in cities and towns. The experience of nature improves human health and well-being in many ways. Nearly 40 years of scientific studies tell us how. Here’s the research...

RESEARCH THEMES

- Livable Cities
- Place Attachment & Meaning
- Community Building
- Community Economics
- Social Ties
- Crime & Fear
- Reduced Risk
- Wellness & Physiology
- Active Living
- Healing & Therapy
- Mental Health & Functioning

www.greenhealth.washington.edu
Research Review and Summaries

Sponsors:
University of Washington
USDA Forest Service, U&CF Program
NGO partners

thanks to
U of WA
students:
Katrina Flora
Mary Ann Rozance
Sarah Krueger
Local Economics

Trees in cities are not grown and managed for products that can be bought and sold on markets, but they do provide many intangible services and functions! This article serves two purposes. First, it introduces valuation methods that are used to convert intangible benefits to dollar sums. Then, it shows how nonmarket valuations can support local decision-making.

Fast Facts

- The presence of larger trees in yards and as street trees can add from 3% to 15% to home values throughout neighborhoods.
- Averaging the market effect of street trees on all house values across Portland, Oregon yields a total value of $1.35 billion, potentially increasing annual property tax revenues $15.3 million.
- A study found 7% higher rental rates for commercial offices having high quality landscapes.
- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.
- Shoppers indicate that they will travel greater distance and a longer time to visit a district having high quality trees, and spend more time there once they arrive.
Urban Green :: Human Health & Well Being

> 2,800 articles

% distribution
Eco-Health Relational Browser
Environmental Protection Agency

www.epa.gov/research/healthscience/browser/
**Urban Ecosystems**

- Air Filtration
- Engagement with Nature
- Water Regulation

**Description**

An urban ecosystem is a dynamic system that contains both built and natural elements on a regional scale. In an urban ecosystem, human, plant, and animal communities are situated within an urban environment. Urban ecosystems can mimic the function of natural ecosystems and thus provide their own important ecosystem services that contribute to human well-being in those urban areas. Various green environments such as shade trees, urban green spaces and urban forests can exist within a single urban region. The services provided by urban ecosystems include filtering water runoff, providing areas for physical activity and recreation such as hiking and bird watching, and mitigating the Urban Heat Island effect by providing heat absorption for housing.
Click a topic bubble or choose a topic from the dropdown list above. Hover over linkages (+) to view relationship between elements.

- Urban Ecosystems
- Forests
- Wetlands
- ADHD
- Aggression
- Anxiety
- Arthritis
- Asthma
- Birth Outcomes

Details

Description:
An urban ecosystem is a human-dominated landscape that includes an urban core, natural green spaces, and an urban forest. Urban ecosystems provide essential ecosystem services that contribute to improved health outcomes. These outcomes include reduced ADHD, aggression, anxiety, arthritis, and asthma.

Birth Outcomes:
Urban ecosystems can positively influence birth outcomes. For instance, an urban ecosystem with dense vegetation and natural areas can provide a healthier environment for mothers, leading to better birth outcomes. Urban forests and green spaces can also mitigate the Urban Heat Island effect by replacing heat-absorbing impervious surfaces and increasing shading from shade trees.


Restorative Nature
Beyond the City?
evidence about the importance of ‘nearby nature’
Urban Greening & Health Evidence Framework
Traditional Collaborators in Urban Forestry/Ecosystems?

potential new partners?
Policy and Programs . . . .

• what are the ‘hot button’ issues of other disciplines?
• bring the best available science to the dialog about urban forestry & urban greening
• events and publications that connect to ‘culture’ of new target audiences
• connect relationships to research
Atlanta Regional Council
elder care and services summit

September 2013
record attendance
service agencies
food programs
care facilities
medical community
Human Dimensions of Urban Forestry and Urban Greening

featuring research on peoples' perceptions and behaviors regarding nature in cities

Nature and Consumer Environments
Research about how the urban forest influences business district visitors.

Trees and Transportation
Studies on the value of having quality landscapes in urban roadsides.

Civic Ecology
Studies of human behaviors and benefits when people are active in the environment.

Policy and Planning
Integrating urban greening science with community change.

Urban Forestry and Human Benefits
More resources, studies and links...

www.naturewithin.info