Be Green, Be Well!
Surprising Evidence about Health and the Natural Environment

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University of Washington
College of the Environment

Park Pride’s 12th Annual Parks & Greenspace Conference
Atlanta Botanical Garden
March 2013
urban parks & tree benefits
Stormwater Management

Pierce County WA, Chambers Creek Properties
Pierce County WA, Chambers Creek Properties - 4 year growth
Reducing Stormwater Runoff

Image courtesy of the Center for Urban Forest Research
Urban Heat Island Effect

studies by NASA & EPA

urban trees = mitigation
Hilton Head, SC
Hilton Head, South Carolina
Million Tree campaigns
big ideas = political support
e.g. New York
Los Angeles
Miami
environmental benefits
human health & well-being
economic benefits
Evidence about the importance of ‘nearby nature’
Finding that study . . . . . .
Research Reviews

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
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.
Datasheet for each theme

- research highlights
- one page briefing
- print & share

Local Economics

Influences of Trees and Vegetation on Property Values & Retail

Knowing the monetary value of things is important in our society. What is not counted does not count in public decision making. City trees are not grown and managed for products that can be bought and sold on markets, but they do provide many valuable services and benefits. Parks, gardens and green spaces also provide intangible, but measurable values. Economists and other social scientists have devised reliable nonmarket valuation methods to represent natural assets in the decision-making calculus of communities.

Research Highlights:

- While development costs can be greater for parcels where trees are conserved (5%-9% in one study), builders can recover extra cost of preserving trees through higher prices and faster sales for homes on wooded lots.
  (Smith and Williams, 1994, NAECA) and Riskin, Robinson, Sallis and Anderson, 1992, Journal of Arboriculture)
- The presence of larger trees in yards and as street trees can add from 3% to 15% to home values throughout neighborhoods. (WALL 2007, Atlantic News)
- Averaging the market effect of street trees on all home values across Portland, OR (population 599,000) yielded a total value of $1.35 billion, potentially increasing annual property tax revenue $1.5-3 million. (Krop and Holyoak, 2010, Landscape and Urban Planning)
- Homes that are adjacent to naturalistic parks and open spaces are valued at 8-20% higher than comparable properties, with the positive price effect declining to about 1% in urban areas. (Conquest, 2004, ULI Report 203)
- A study found 7% higher rental rates for commercial offices having high quality landscapes. (Larsen and Wallace, 2003, Journal of Arboriculture)
- Shoppers claim that they will spend 9% to 12% more for goods and services in areas business districts having high-quality tree canopy. (Wall 2005, Journal of Forestry)
- 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. (WALL 2001, Journal of Forestry, Wall 2002, Journal of Arboriculture)

More information at: www.greenhealth.washington.edu

Additional social science about green effects on the economic benefits of communities can be found at the City of Green: Good Health web site (including research sources & citations).

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Urban Green :: Human Health & Well Being

> 2,400 articles

% distribution

- Safe Streets
- Crime & Fear
- Work & Learning
- Nature & Land Uses
- Healing & Therapy
- Place Attachment & Meaning
- Culture & Equity
- Wellness & Physiology
- Mental Health & Function
- Community Building
- Reduced Risk
- Livable Cities
- Lifecycle & Gender
- Community Economics
- Active Living
Research Review and Summaries

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NGO partners

thanks to U of WA students:
Katrina Flora
Mary Ann Rozance
Eco-Health Relational Brower
Environmental Protection Agency

www.epa.gov/research/healthscience/browser/
Eco-Health Relationship Browser

You are here: EPA Home » Research » Health Research » Eco-Health Relationship Browser

- Open the Relation Browser in a new window
- Copy of all the Relation Browser data (XML)
- Copy of all the Relation Browser data (PDF) (50 pp, 470K, About PDF)

Bibliography

Eco-Health Relationship Browser: Public Health Linkages to Ecosystem Services

Urban Ecosystems

Click a topic bubble or choose a topic from the dropdown list above. Hover over linkages (+) to view relationship between elements.

Urban Ecosystems

Air Filtration

Engagement with Nature

Water Regulation

Details

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 hunting and bird watching, and mitigating the Urban Heat Island effect by increasing heat-absorbing vegetation.
Urban Ecosystems

- Air Filtration
- Water Regulation
- Water Filtration
- Promotion of Physical Activity
- Engagement with Nature
- Heat Mitigation

Click a topic bubble or choose a topic from the dropdown list above. Hover over linkages (+) to view relationship between elements.

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

Details:

Description:
An urban ecosystem is any natural or man-made element within an urban area that provides a habitat for plants and animals. These ecosystems can include green spaces, parks, wildlife habitats, and natural areas that are integral to the health of the urban environment. Urban ecosystems can have a significant positive impact on health outcomes, as they provide a range of ecosystem services that can benefit human health. For example, urban forests can help to reduce the urban heat island effect, improving air quality and providing shade and cooling for urban residents. Urban green spaces can also promote physical activity and recreation, such as hiking, bird watching, and other outdoor activities.

Environmental Benefits:
- Filtering and purifying air
- Regulating water flow
- Providing habitat for wildlife
- Improving air quality
- Reducing noise pollution
- Enhancing visual appeal

Health Benefits:
- Improved mental health
- Reduced stress levels
- Increased physical activity
- Improved immune function
- Reduced blood pressure

Citations of Key Studies:
Guidotti. 2010: Hancock. 2002
Eco–Health Relationship Browser Bibliography

To show or hide an entry's abstract, click on the citation. Click blue citations to link to website source.

A


community health & economics
trees, landscape & parks
market response & reduced costs
1. Community Economics

% distribution
Side Bar: Forest Econ 101
Economic Value of Urban Green Challenges!

**Forest Products Industry**
- = market goods
- excludable
- identifiable ownership
- expenses-revenues-profits

**Trees/Green in Cities**
- = public goods
- non-excludable
- multiple “owners”
- expenses-returns?-profits?
Yard & Street Trees

<table>
<thead>
<tr>
<th>Value</th>
<th>Increase</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value</td>
<td>2%</td>
<td>mature yard trees (greater than 9-inch dbh)</td>
</tr>
<tr>
<td>Value</td>
<td>3%</td>
<td>larger street trees (up to 100’ away)</td>
</tr>
<tr>
<td>Value</td>
<td>3-5%</td>
<td>trees in front yard landscaping</td>
</tr>
<tr>
<td>Value</td>
<td>6-9%</td>
<td>good tree cover in a neighborhood</td>
</tr>
<tr>
<td>Value</td>
<td>10-15%</td>
<td>mature trees in high-income neighborhoods</td>
</tr>
</tbody>
</table>
## Tree Retention In Development

<table>
<thead>
<tr>
<th>Value</th>
<th>Increase</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tree Retention In Development</td>
<td>18%</td>
<td>building lots with substantial mature tree cover</td>
</tr>
<tr>
<td></td>
<td>22%</td>
<td>tree-covered undeveloped acreage</td>
</tr>
<tr>
<td></td>
<td>19-35%</td>
<td>lots bordering suburban wooded preserves</td>
</tr>
<tr>
<td></td>
<td>37%</td>
<td>open land that is two-thirds wooded</td>
</tr>
</tbody>
</table>
## Parks & Open Space proximate principle

<table>
<thead>
<tr>
<th>Value</th>
<th>Increase</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>10%</td>
<td>inner city home located within 1/4 mile of a park</td>
</tr>
<tr>
<td></td>
<td>17%</td>
<td>home near cleaned-up vacant lot</td>
</tr>
<tr>
<td></td>
<td>20%</td>
<td>home adjacent to or fronting a passive park area</td>
</tr>
<tr>
<td></td>
<td>32%</td>
<td>residential development adjacent to greenbelts</td>
</tr>
</tbody>
</table>
Local Government Benefits

*Civic Investment – Public Goods*  
*like schools, emergency response, roads*

- street trees average positive effect on house values
- added up across Portland, Oregon
- yields a total value of $1.35 billion
- potentially increasing annual property tax revenues $15.3 million

Donovan & Butry. 2010  
*Landscape and Urban Planning*
Trees & Crime Reduction

- trees in the public right of way are associated with lower crime rates
  - smaller, view-obstructing trees are associated with increased crime
  - larger trees are associated with reduced crime

Donovan & Prestemon. 2012. Environment and Behavior
Green & Crime Reduction

- vacant lot greening in Philadelphia (4 sections)
  - consistent reductions in gun assaults across 4 sections
  - consistent reductions in vandalism in 1 section

human health & well-being
workplace performance
2. Mental Health & Function

% distribution
Attention Restoration Theory
Rachel & Stephen Kaplan U of MI
Workplace Nature Views

- **Well-being**
  - desk workers without view of nature reported 23% more ailments in prior 6 months

- **Job Satisfaction**
  - less frustrated and more patient
  - higher overall job satisfaction and enthusiasm

ART Design Elements

- being away
- ‘soft’ fascination
- extent
- compatibility
the better office cubicle!

bottom line = $$ benefits of trees & nature
human health & well-being

hospitals, therapy & healing
3. Healing & Therapy

% distribution
hospital healing gardens:
patients; family and friends; professional staff

health care $$ savings
healing gardens
soothing
distracting
calm focus
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

human health & well-being

kids & youth
4. Lifecycle & Gender

![Bar chart showing distribution of lifecycle and gender categories.]

- Safe Streets
- Crime & Fear
- Work & Learning
- Nature & Land Uses
- Healing & Therapy
- Place Attachment & Meaning
- Culture & Equity
- Wellness & Physiology
- Mental Health & Function
- Community Building
- Reduced Risk
- Livable Cities
- Lifecycle & Gender
- Community Economics
- Active Living

% distribution
Nature & Psych Development
children’s play & imagination
Nature Deficits
Richard Louv
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
College students with more natural views from their dorm windows
  - scored higher on tests of capacity to direct attention
  - rated themselves as able to function more effectively

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
first phase - reading circle
nature recovery & schools

Parks & People Foundation, Baltimore
school asphalt recovery

Parks & People Foundation, Baltimore

planning skills & efficacy
city parks, trees & greenspace
human health & well-being
closing comments
Restorative Nature
Beyond the City
Evidence about the importance of ‘nearby nature’
Summary

- 40 years of research in social sciences, public health & human dimensions
- Urban nature is profoundly important for human habitat – a wealth of public goods
- More than beauty, aesthetics, and ‘pretty’
- Direct and indirect economic values for
  - Homeowners
  - Neighborhoods
  - Local government
Abraham Maslow
Hierarchy of Needs
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