Valuation of Metro Nature: Targeting Public Health Costs

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Metro Nature ::
Value Expressions

preference
place
sacred
health & wellness
economics
Preference – green vs built

Source: www.good.is
Metro Nature ::
Value Expressions

preference
place
sacred
health & wellness
economics
Bainbridge Island, WA
everyday activity
spaces for social interactions & community connections
## Place & Personal Connections

Lewicka, 2011; Manzo, 2003, *J Env Psych*

<table>
<thead>
<tr>
<th>Construct</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>place attachment</td>
<td>personal identification with a location or landscape on an emotional level as an individual or as a member of a community</td>
</tr>
<tr>
<td>place identity</td>
<td>attachment in terms of emotional or symbolic meanings that are assigned by an individual</td>
</tr>
<tr>
<td>place meaning</td>
<td>relationship to place based on cognitions and emotions, as a person associates significance, purpose, symbolic role, or value</td>
</tr>
<tr>
<td>place dependence</td>
<td>attachment based on function, value depends on its ability to satisfy needs or behavioral goals</td>
</tr>
</tbody>
</table>

*topophilia*, Tuan
stewardship & place attachment
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WHO Health Definition

A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (1946)

Role of city trees and metro nature?
Physical & social determinants
Public perceptions
Determinants of Health

Green Cities: Good Health
www.greenhealth.washington.edu

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

Thanks!
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Katrina Flora
Mary Ann Rozance
Sarah Krueger

research reviews & summaries
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.
Green Cities: Good Health > 3,500 article database
Step 1: Evidence screening

% distribution of entire database
Metro Nature & Health Evidence Framework

Synthesis of 40 years of peer-reviewed literature

Metro Nature ::
Value Expressions

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Elements of Economic Valuation

Step 1: Screen Benefits Research

• What are the benefits?
• Who experiences nature and gets benefits?
• What is the green condition or situation that provides benefits?
• Scale of value question (i.e., community, province/state, nation)
• What are the costs/income gained/lost associated with these benefits?
metro nature & health benefits across the life cycle
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;
Hystad et al., Env Health Perspectives 2014
Alzheimer’s Disease & Dementia
Provide wander gardens & horticulture therapy

- 10.5% reduction in amount of medications used in dementia facility
- 30% fewer falls, accompanied by a reduction in fall severity

Detweiler et al. 2009. *American Journal of Alzheimer’s Disease and Other Dementias*
Valuation Strategies

Step 2: Benefits Transfer and Value

• factor income
• avoided or replacement cost
• burden of illness
• hedonic pricing
• stated preference/contingent valuation
• revealed preference (e.g., travel cost)
• quality adjusted life years
• benefit/cost
<table>
<thead>
<tr>
<th>Increase</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>inner city home located within 1/4 mile of a park</td>
</tr>
<tr>
<td>17%</td>
<td>home near cleaned-up vacant lot</td>
</tr>
<tr>
<td>20%</td>
<td>home adjacent to or fronting a passive park area</td>
</tr>
<tr>
<td>32%</td>
<td>residential development adjacent to greenbelts</td>
</tr>
</tbody>
</table>

multiple studies: Green Cities: Good Health > Local Economics
## Valuation Sources

### Step 3: Benefits Focus for Valuation

<table>
<thead>
<tr>
<th>Benefit</th>
<th>Metro Nature</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn Birth Weight</td>
<td>increased tree canopy cover near mothers' homes</td>
<td>fewer small for gestational age babies</td>
</tr>
<tr>
<td>Attention Deficit Hyperactivity Disorder</td>
<td>greener play areas vs built outdoor or indoor settings</td>
<td>reduced symptoms potentially reducing medication</td>
</tr>
<tr>
<td>School Performance</td>
<td>green views from classrooms and cafeteria</td>
<td>reduced dropout rate average annual income</td>
</tr>
<tr>
<td>Crime Reduction</td>
<td>trees and lawn in outdoor common areas</td>
<td>reduced violent and non-violent incidence and costs</td>
</tr>
<tr>
<td>Cardiovascular Disease</td>
<td>presence of residential tree canopy</td>
<td>reduced incidence or severity of cardiovascular disease</td>
</tr>
<tr>
<td>Alzheimer's Disease</td>
<td>wander garden in care facility</td>
<td>reduced medications for patients</td>
</tr>
</tbody>
</table>
### Potential Annual Cost Savings and Increased Income Associated with Human Health and Well-being Benefits Derived from Metro Nature

<table>
<thead>
<tr>
<th>Benefit (geographic scope)</th>
<th>Minimum ($)</th>
<th>Maximum ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn Health (U.S.)</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td><strong>Attention Deficit Hyperactivity Disorder (U.S.)</strong></td>
<td>383.5</td>
<td>1,917.7</td>
</tr>
<tr>
<td>Schools (U.S.)</td>
<td>20.4</td>
<td>1,262.9</td>
</tr>
<tr>
<td>Crime (U.S.)</td>
<td>340.6</td>
<td>899.4</td>
</tr>
<tr>
<td>Cardiovascular Disease (U.K., U.S.)</td>
<td>1,220.0</td>
<td>1,220.0</td>
</tr>
<tr>
<td>Alzheimer’s Disease (U.S.)</td>
<td>724.6</td>
<td>1,449.2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>2,694.4</strong></td>
<td><strong>6,754.5</strong></td>
</tr>
</tbody>
</table>

Millions of U.S. Dollars (2012)

ADHD and nature contact

- 17 children aged 7-12 with diagnosed ADHD
- 20-minute guided walks
  - Park
  - Neighborhood
  - Downtown
- Pre-walk puzzles
- Post-walk cognitive test

Faber Taylor & Kuo. 2009. *Journal of Attention Disorders*
ADHD and nature contact

- 96 children aged 7-12 diagnosed ADD or ADHD
- Parents gave postactivity attentional functioning ratings (PAAF) – 4 measures:
  - Can’t stay focused on unappealing tasks (homework or chores)
  - Can’t complete tasks
  - Can’t listen and follow directions
  - Easily distracted

Faber Taylor. 2001. *Environment & Behavior*
Change in % Population on ADHD Treatments
2001 - 2010

America’s State of Mind, Medco Health Solutions, Inc
America’s State of Mind, Medco Health Solutions, Inc
Valuation Application

- burden of illness, avoided cost
- 5.24 M children ages 3-17 diagnosed ADHD, 66.3% taking meds
- 20 min green ‘dose’ ~ peak effect of methylphenidate (Ritalin +)
- annual meds cost of $14,576 per individual
- 5-25% avoided costs range
- $384 M to $1.9 B annual U.S, 2012 USD

Forest Economics
Economic Value of Metro Nature
Methods Challenges

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

Trees/Green in Cities
= public goods
non-excludable
multiple “owners”
expenses-returns?
-profits?
Summary

• Diverse values for nature in cities
• Human health & well-being benefits
  (Research portal: Green Cities: Good Health)
• Benefits subset = annual U.S. value
• Benefits transfer valuations:
  methods, effects & sizes, net benefit/cost
• Policy & outreach utility?
Human Dimensions of
Urban Forestry and
Urban Greening

What's New?

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 . . .

Projects Director
Kathleen L. Wolf, Ph.D.