Benefits of Trees & Nature in Cities
how plants pay us back

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Trees Columbus (Georgia)
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in the background
trees & forests provide many community benefits!
WHO Health Definition

A state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (1946)
Finding that study . . . . . .
Green Cities: Good Health
www.greenhealth.washington.edu

Sponsors:
USDA Forest Service,
(U&CF Program + Pacific NW Research)
University of Washington
NGO partners

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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.\(^1\),\(^2\) 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.\(^9\)

- A study found 7% higher rental rates for commercial offices having high quality landscapes.\(^3\),\(^4\)

- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.\(^3\),\(^4\)

- 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.\(^3\),\(^4\)
Green Cities: Good Health
database of >4,500 peer reviewed publications
examples from the studies

Health across the Human Life Cycle
‘Cradle to Grave’
Urban Forests and Newborns

the natural environment affects 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*
Hygiene Hypothesis

- presence of soil bacteria in body, *Mycobacterium vaccae* = increased serotonin
- boost immune function
- may alleviate depression (dirt or Prozac?)

Lowry et al. 2007. Neuroscience
Eat Dirt!
CDC moderate activity recommendations

parks, active living, active transit
Parks Prescription

Rx for Health

Date: ____________________________

Dr: ____________________________

Name: __________________________

I recommend:

☐ Walking  ☐ Other: ____________

_________________________ minutes a day

_________________________ days per week

* Health Canada suggests moderate activity of 30 minutes per day 5 days a week

Benefits of daily activity

• Improve overall physical and mental health
• Maintain a healthy weight
• Reduce the risk of diabetes and other chronic conditions
• Lower cholesterol levels
• Manage stress and anxiety

Signature: ______________________

doctors
of bc
Walking Programs

children

elders

families
Improving Depression

20 adults with major depression walk in a park setting and a built setting

- 50-minute walks one week apart
- Before-after testing:
  - Mood: Positive and Negative Affect (PANAS)
  - Cognition: Backward Digit Span (BDS)

Cognitive and affective improvements after walking in a nature setting

Berman et al. 2012. Journal of Affective Disorders
Shinrin yoku (forest bathing)

- extensive research
- restorative experiences
- workers retirees
- networked system, 52 bases in Japan
Sacramento Study :: LIDAR x CHIS data
7,900 adults, 250 m buffer, covariates

more tree cover
= better overall health
= better social cohesion

Ulmer et al. 2016. *Health & Place*. Multiple health benefits of urban tree canopy: The mounting evidence for a green prescription
Effects of nature window view on recovery from surgery (Roger Ulrich, 1984)

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

www.rph.org/eden.html
economic values?

* reduced disease incidence
* reduced medications costs
* healthier children – less disease later
* less costs to care-givers

KATHLEEN L. WOLF, PH.D.

design: milepost

author: Department of Agriculture

printing: The Nature Conservancy
Nearby nature experiences are important across the entire life cycle, from cradle to grave.

Research about nature benefits and economic value is fairly new. Some of the quantified health benefits of nature in cities are easier to convert to economic value than others. Here are some preliminary valuations—estimated for the entire U.S. on an annual basis.

INFANTS

Birth weight influences long-term childhood health and development, and has been linked to some chronic diseases. Low birth weight is associated with both short- and long-term health care costs, such as longer hospital stays and increased illness. Pregnant women that have more trees, and green space near their homes generally have babies with healthier birth weights.

IMMUNE FUNCTION

Simple exposure can lead to reduced illness and chronic disease across a lifetime. Natural immune system leads to reduced illness and chronic disease across a lifetime. We are more vulnerable in the early months of our lives, when the body and mind are growing and developing at an astonishing rate. The "nature hypothesis" suggests that early contact with nature nurtures the development of a healthy immune response.

FAMILY DYNAMICS

An infant's parents and siblings can have a positive influence on the child's development. The "nature hypothesis" suggests that early contact with nature nurtures the development of a healthy immune response.

ADJUSTMENT

Over all health and well-being.

OVERALL HEALTH AND WELL-BEING

Economic indicators:
Increased physical activity, reduced asthma (leading cause of emergency department visits, hospitalizations, and missed school days), and reduced risk of adult skin conditions.

Depression and stress.

CARDIOVASCULAR DISEASE

Potential economic value:
$1.5-3.2B annual savings, based on a 1-3% reduction in historic expenditures.

Cognitive disorders.

Potential economic value:
$2B-3.2B annual savings on medical services, not counting the value of home care/assistive services.

Crime & Safety

Potential economic value:
$1B-2B annual reduction in costs of crime for victims and property owners.

Mobility & Quality of Life

Potential economic value:
$1B-2B annual savings on health care costs from falls per year.

Contributing analysts:
Dr. Stephen Grado & Marcus Measells, MSU; Dr. Alicia Robbins, Weyerhaeuser
annual value of $11.7 billion U.S. (2015 dollars)

- cradle to grave human life cycle
- varied expressions of urban greening (metro nature)
- evidence based human health and wellness benefits
- just beginning the analysis!
stormwater management

urban forest canopy

green stormwater infrastructure
the canopy of a city :: benefits & values
Eco (UFORE)  
Streets (STRATUM)  
Hydro  
Vue  

tools provided by USDA  
Forest Service
Reducing Stormwater Runoff

Image courtesy of the Center for Urban Forest Research
stormwater retention
Tanner Springs Park
Portland OR
linked to active living network
neighborhood
social cohesion

environmental
education &
social learning
economic values?

co-design for co-benefits

reduced infrastructure costs

reduced health costs
Trees & Retail Environments Research

Trees & Shopper Environments Research

- Research Questions -
  - trees and visual quality?
  - trees and consumer behavior?
  - trees and product pricing?

- Methods -
  - mail out/in surveys
  - national or local sample
  - residents/nearby city residents

partners: U of Washington, NGOs, business organizations
funded by USDA Forest Service
Image Categories (sorted by ratings)

Scale: 1 = not at all, 5 = like very much, 26 images

Pocket Parks
mean 3.72 (highest)

Full Canopy
mean 3.63
Enclosed Sidewalk
3.32

Intermittent Trees
2.78
No Trees
mean 1.65 (lowest)
(high - 3.72)
1. Place Perceptions
   - Place Character
   - Interaction with Merchants
   - Quality of Products

2. Patronage Behavior
   - travel time, travel distance
   - duration & frequency of visits
   - willingness to pay for parking

3. Product Pricing
   - higher willingness to pay for all types of goods
   - higher in districts with trees – 9-12%
retail & place marketing

“Companies stage an experience when they engage customers in a memorable way.”
Trees as Place-Makers
Summary:
values of trees & nearby nature

• environmental, social & health research findings
• intangible, indirect savings
• co-design for co-benefits
• expanding partnerships and collaboration for conservation
Human Dimensions of Urban Forestry and Urban Greening

- Featuring research on peoples' perceptions and behaviors regarding nature in cities

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...

Green Cities: Good Health
human health & well-being research

Projects Director
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