Urban Nature and Human Health: What Do We Know? Why Is It Important in the Global South?

Kathleen Wolf, Ph.D.
Research Social Scientist

University of Washington (Seattle)
School of Environmental and Forest Sciences
College of the Environment

Sustainable Cities Speaker Series
USDA Forest Service, International Programs
11 April 2019
What are the Health Benefits?

urban forest
green space or metro nature
research & evidence
Health Definition

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

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

Thanks!
to U of WA students:
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.\textsuperscript{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.\textsuperscript{9}
- 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.\textsuperscript{9}
- A study found 7% higher rental rates for commercial offices having high quality landscapes.\textsuperscript{34}
- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.\textsuperscript{34}
- 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.\textsuperscript{34}
Green Cities: Good Health
database of >4,200 peer reviewed publications
Outside Our Doors
The benefits of cities where people and nature thrive.

design: milepost

co-author: US Forest Service

co-author & printing: The Nature Conservancy
Introduction

Writers, philosophers, and naturalists have praised the benefits of nature for human health, happiness, and well-being for centuries, but only relatively recently have researchers begun studying and quantifying the complex relationship between human health and nature.

In 1984, Roger Ulrich, professor and director of the Center for Health Systems and Design at Texas A&M University, published the results of a pioneering study that looked at the recovery rates of gall bladder surgery patients in relation to the views from their rooms in a Texas hospital. Some of the patients looked out over a garden and grove of trees, while others had a view of a brick wall. Ulrich found that patients with a natural view spent fewer days in the hospital and used fewer pain medications (Ulrich 1984).

Ulrich's study helped open the door to a new field of inquiry focused on illuminating the ways that nature influences our physical, mental, and social lives. More than three decades later, a broad and diverse body of scientific literature describes the human health value of nature, confirming that trees, parks, gardens, and other natural settings are as essential to livable and sustainable cities as the other critical systems that keep their residents moving and working.

Findings from the current literature indicate the wide range of effects.
Trees, Nature & Human Health

Nearby nature includes a variety of spaces and places:

- Urban Forest Canopy
- Biophilic Design
- Parks and Gardens
- Green Stormwater Infrastructure
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
Healthy Microbiome

- control obesity & asthma
- boost immune function
- improve mental health

need contact with ‘Old Friends”

put aside the Hygiene Hypothesis
~10 to 100 trillion microbes in healthy gastrointestinal (GI) tract

intestinal microbiome development

Arrieta et al. 2014. Frontiers in Immunology
Trees & Physical Activity

• school children in cities grades 6 to 8
• relationship of tree cover to outside-of-school physical activity
• **5% increase in treed area cover = 5% increase in free-time physical activity**

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

photo credits: Dan Herms, Ohio State U
Sacramento Study :: LIDAR x CHIS data
7,900 adults, 250 m buffer, covariates

more tree cover = better overall health = better social cohesion

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)

Berman et al. 2012. *Journal of Affective Disorders*

Cognitive and affective improvements after walking in a nature setting
City Trees & Human Health

newborn & infant health
increased physical activity for kids
overall adult health
social cohesion
respiratory & cardiovascular health
reduced depression
Story: Human Health Benefits Across the Life Cycle
Green Infrastructure

systems solutions
ecology that works
co-design for co-benefits
Grey Infrastructure

Drain, direct, dispatch

Green Infrastructure

Slow, spread, soak

Source: Low Impact Development: A Design Manual for Urban Areas, 2010
How can we transform the roof?

retention
filtration
storage
infiltration
treatment
filtration
storage
infiltration
biodiversity
evapotranspiration
How can we transform the walls?
How can we transform the ground?
Green Stormwater Infrastructure :: Hermosillo, Mexico (6 inch rainfall)
Sanitary City

efficient and hygienic
supply & removal
of materials and services
natural systems disconnect
Industrial Age – city squalor

Filthy Cities!
Baltimore: Public Works Museum
Images taken in the Community of Claverito, Iquitos, Peru

credit: Leann Andrews, University of Washington
# Urban Green Space Access

<table>
<thead>
<tr>
<th>Global North</th>
<th>Global South</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-SES and White people have:</td>
<td>High-SES and White people have:</td>
</tr>
<tr>
<td>• access to a higher quantity of UGSs than low-SES and racial-ethnic minority people,</td>
<td>• access to a higher quantity of UGSs than low-SES and racial-ethnic minority people,</td>
</tr>
<tr>
<td>• and higher quality,</td>
<td>• quality inequities less consistent,</td>
</tr>
<tr>
<td>• but that no clear differences exist regarding who lives closer to UGS.</td>
<td>• also advantaged regarding who living closer to UGS,</td>
</tr>
<tr>
<td></td>
<td>• UGS inequities were consistent across African, Asian, and Latin American cities.</td>
</tr>
</tbody>
</table>
Sustainable City

green & grey infrastructure
benefits access
‘just green enough’
emerging concerns
stormwater retention
Thornton Creek Water Quality Channel (Seattle, SvR Design)
1 hectare, treats runoff from 275 hectares (1 hectare = 2.47 acres)
Cascading Benefits
Designing Green Stormwater Infrastructure for Human Wellness

co-author:

The Nature Conservancy

co-author & printing:
Historic 4th Ward Park - Master Plan
August 2009
Clear Creek Basin, 2 acre stormwater detention lake, 17 acres of greenspace & parks amenities
the Chenoggye freeway
Seoul, South Korea
~ 1970-2005
Cheonoggyecheon Stream Restoration
8.4 km, $900 M
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.