Trees & Health in Communities: Introducing Best Available Science

Kathleen Wolf, Ph.D.
Research Social Scientist

University of Washington (Seattle)
School of Environmental and Forest Sciences
US Forest Service, Pacific NW Research Station

International Day of Forests
Corazon Latino
21 March 2018
WHO 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

Determinants of Health
Social Determinants

Individual lifestyle factors
Living and working conditions
Unemployment
Water sanitation
Health care services
Housing
Education
Agriculture and food production
Work environment
General socio-economic, cultural and environmental conditions
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.\(^1,2\) 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.\(^34\)

- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.\(^34\)

- 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.\(^34\)
Important Places & Experience

Nearby nature includes a variety of spaces and places:

- Urban Forest Canopy
- Biophilic Design
- Parks and Gardens
- Green Stormwater Infrastructure
All People, All Communities

credit UCLA, Urban Nature Laboratory

credit City Nature Challenge

credit The Conservation Volunteers
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.
design: milepost

author: [US Forest Service logo]

printing: The Nature Conservancy

also in Spanish! and Arabic!
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

INCREASED PHYSICAL ACTIVITY, REDUCED ADULT MORTALITY RATES, REDUCED EMERGENCY ROOM VISITS, HOSPITALIZATIONS, AND REDUCED SCHOOL DAYS, AND REDUCED RISK OF ADULT SKIN CONDITIONS.

IMMUNE FUNCTION

IMPROVED IMMUNE RESPONSE, POSSIBLE REDUCTION IN IMMUNE SYSTEM DISEASES, AND REDUCED RISK OF AUTOIMMUNE DISEASES.

FAMILY DYNAMICS

IMPROVED FAMILY DYNAMICS, PERHAPS REDUCING MENTAL HEALTH AND TREATMENT COSTS.

Note: All economic values are in 2012 U.S. dollars and are potential annual savings across the entire U.S.

CHILDREN & TEENS

OVERALL HEALTH AND WELL-BEING

INCREASED PHYSICAL ACTIVITY, REDUCED ADULT MORTALITY RATES, REDUCED EMERGENCY ROOM VISITS, HOSPITALIZATIONS, AND REDUCED SCHOOL DAYS, AND REDUCED RISK OF ADULT SKIN CONDITIONS.

DEPRESSION AND STRESS

REDUCED FRUSTRATION, MENTAL DISTRESS, AND DEPRESSION RATES, AND IMPROVED BODY IMAGE, SELF-ESTEEM, AND LIFE SATISFACTION.

CARDIOVASCULAR DISEASE

REDUCED RISK OF CVD DUE TO INCREASED PHYSICAL ACTIVITY.

CRIME & SAFETY

REDUCED COSTS OF CRIME VICTIMS AND PROPERTY OWNERS DUE TO INCREASED PHYSICAL ACTIVITY.

ADULTS

POTENTIAL ECONOMIC VALUE:

$1.2-2.5B SAVINGS ON HEALTH CARE COSTS."
Science Review

nearby nature & health evidence
~ 40 years
> 4,500 publications

what are the ‘stories’?
Story: Human 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
Gathright et al. 2006. Urban Forestry & Urban Greening
physically disabled & tree climbing!
recreational tree climbing – youth therapy
Sacramento Study :: LIDAR x CHIS data
7,900 adults, 250 m buffer, covariates

more tree cover
= better overall health
= better social cohesion

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
Improving Depression

20 adults with major depression walk in a park setting and an urban 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
Shinrin yoku (forest bathing)

- extensive research
- restorative experiences
- workers retirees
- networked system, 52 bases in Japan
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*
Nature Contact and Human Health: A Research Agenda

Howard Frumkin,1 Gregory N. Bratman,2,3,8 Sara Jo Breslow,3 Bobby Cochran,5 Peter H. Kahn Jr,6,8 Joshua J. Lawler,3,4 Phillip S. Levin,4,7 Pooja S. Tandon,1,3,9 Usha Varanasi,10,11 Kathleen L. Wolf,4,12 and Spencer A. Wood3,4,13

Author Affiliations

PDF Version (974 KB)

ABSTRACT

BACKGROUND: At a time of increasing disconnectedness from nature, scientific interest in the potential health benefits of nature contact has grown. Research in recent decades has yielded substantial evidence, but large gaps remain in our understanding.
11 more trees in a city block
decreased cardio-metabolic conditions =
increase in annual personal income of $20,000, or
moving to a neighborhood with $20,000 higher median income

Kardan, et al. 2015. Scientific Reports 5, 11610
Canopy Cover & Stress

images of canopy cover varied 0-60%

Vegetation & Mental Health

• vegetation cover and afternoon bird abundances
• lower prevalence of depression, anxiety, and stress:

  depression, more than 20% cover,
  anxiety, more than 30% cover,
  stress, more than 20% cover

Trees & Physical Activity

• grades 6 to 8, urban residents, 2009/10 Canada Health Behaviour in School-Aged Children survey
• proportion of neighborhood land covered by trees associated with physical activity outcome
• 5% increase in treed area cover - 5% increase in relative odds of increasing free-time physical activity outside of school hours

Summary:
Knowledge to Practice

- nearly 40 years of research, cradle to grave benefits!
- critical mass of evidence – now what?
- greening or health programming
- integrating urban forest goals with broader community needs
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...

Projects Director
Kathleen L. Wolf, Ph.D.