Nature and Health in Communities: A Review of Best Available Science

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Understanding Urban and Community Forests
An Extension Webinar Series
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Outline

1. Health & Nature: the evidence

2. Key Studies

3. Goals & Metrics
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
Prison Inmates :: nature videos
solitary confinement, video room/exercise option

- felt significantly calmer, less irritable, more empathetic
- committed 26% fewer violent infractions

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

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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. 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
database of >4,500 peer reviewed publications
Outside Our Doors
The benefits of cities where people and nature thrive.

The Nature Conservancy
Washington

design: milepost

co-author:

co-author & printing:
The Nature Conservancy

Kathleen L. Wolf, Ph.D.

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**

**PHYSICAL/EMOTIONAL VALUE:**

Increased birth weight is associated with both short- and long-term health benefits. Infants with higher birth weight tend to have a lower risk of certain chronic diseases, including diabetes, heart disease, and asthma. Furthermore, higher birth weight is often associated with better cognitive outcomes in early childhood.

**OVERALL HEALTH AND WELL-BEING**

**PHYSICAL/EMOTIONAL VALUE:**

Infants who have regular outdoor interactions tend to have lower levels of stress hormones, which can have long-term positive effects on their physical and emotional well-being.

**IMMUNE FUNCTION**

**PHYSICAL/EMOTIONAL VALUE:**

Exposure to natural environments can strengthen the immune system, reducing the risk of infections and allergies.

**FAMILY DYNAMICS**

**PHYSICAL/EMOTIONAL VALUE:**

Outdoor experiences can improve parent-child interactions, encouraging communication and problem-solving skills.

**FINANCIAL SUCCESS**

**PHYSICAL/EMOTIONAL VALUE:**

Early exposure to nature can lead to better financial outcomes later in life, as children who have regular outdoor experiences tend to perform better in school and have higher earning potential.

**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**

**PHYSICAL/EMOTIONAL VALUE:**

Outdoor activities, such as hiking and playing, can improve physical fitness and mental well-being in children. Regular nature exposure can also reduce the likelihood of developing mental health issues like depression and anxiety.

**DEPRESSION AND STRESS**

**PHYSICAL/EMOTIONAL VALUE:**

Children who have regular access to nature tend to have lower levels of stress and depression, which can improve their overall mental health.

**CARDIOVASCULAR DISEASE**

**PHYSICAL/EMOTIONAL VALUE:**

Exposure to natural environments has been linked to lower blood pressure and reduced risk of developing cardiovascular diseases.

**CRIME & SAFETY**

**PHYSICAL/EMOTIONAL VALUE:**

Nature exposure can improve safety and well-being in children, reducing the risk of injuries and aggressive behavior.

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

**ADULTS**

**DEPRESSION AND STRESS**

**PHYSICAL/EMOTIONAL VALUE:**

Adults who spend time in nature tend to experience lower levels of stress and anxiety, which can improve their overall mental health.

**MOBILITY & QUALITY OF LIFE**

**PHYSICAL/EMOTIONAL VALUE:**

Regular nature exposure can improve mobility and overall quality of life, reducing the need for medication and improving physical and emotional well-being.

**HYPTERTENSION**

**PHYSICAL/EMOTIONAL VALUE:**

Nature exposure can help reduce blood pressure and improve cardiovascular health.

**COGNITIVE DISORDERS**

**PHYSICAL/EMOTIONAL VALUE:**

Exposure to natural environments can improve cognitive function and reduce the risk of developing cognitive disorders like Alzheimer's.

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

**OLDER ADULTS**

**MOBILITY & QUALITY OF LIFE**

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Contributing analysts:

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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 1934, 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.

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Outline

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2. Key Studies
3. Goals & Metrics
Science Review

nearby nature & health evidence
~ 40 years
> 5,000 publications

what are the ‘stories’?
Pyramid with layers labeled 'Data', 'Information', 'Knowledge', and 'Wisdom', with arrows labeled 'meaning' and 'value'.
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
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
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
The Green Heart Project: Studying the impact of trees and green space on cardiovascular health

Wednesday, March 14, 2018 / 1:00 - 2:15pm ET

Louisville Kentucky’s urban laboratory is embarking on a study of how environmental differences within the city’s neighborhoods give rise to health disparities, and how local social networks and personal environments created by lifestyle choices bear upon individual health and well-being. This study will specifically examine the impact that urban forests and green spaces have on cardiovascular disease (CVD) risk. While previous studies have shown that exposure to air pollutants like those found in urban areas increases CVD risk and mortality, the impact of the urban forest and overall green spaces on CVD has not been directly assessed. This presentation will discuss the pragmatic, interventional trial known as The Green Heart Project, designed to test the hypothesis that exposure to neighborhood greenery diminishes CVD risk by decreasing the levels of local air pollution.
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

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

www.rph.org/eden.html
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1. Health & Nature: the evidence
2. Key Studies
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Trees, Income & Health

▲ income ▲ health care ▲ health

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
• critical mass of evidence – now what?
• greening or health programming
• integrating urban forest goals with broader urban systems needs
Human Dimensions of Urban Forestry and Urban Greening

- Nature and Consumer Environments
- Trees and Transportation
- Civic Ecology
- Policy and Planning
- Urban Forestry and Human Benefits

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human health & well-being research

Projects Director
Kathleen L. Wolf, Ph.D.

What's New?

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