Nearby Nature for Community Health & Economics
A Science & Program Review

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Outline

1. Health & Nature: the evidence
2. Key Studies
3. Economics
4. Nature & Health Programs
### What causes the most deaths?

<table>
<thead>
<tr>
<th>2005 ranking</th>
<th>2016 ranking</th>
<th>% change 2005-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Ischemic heart disease</td>
<td>1. Ischemic heart disease</td>
<td>50.8%</td>
</tr>
<tr>
<td>2. Diabetes</td>
<td>2. Diabetes</td>
<td>45.6%</td>
</tr>
<tr>
<td>3. Chronic kidney disease</td>
<td>3. Chronic kidney disease</td>
<td>55.8%</td>
</tr>
<tr>
<td>4. Alzheimer disease</td>
<td>4. Alzheimer disease</td>
<td>57.9%</td>
</tr>
<tr>
<td>5. Cerebrovascular disease</td>
<td>5. Cerebrovascular disease</td>
<td>25.5%</td>
</tr>
<tr>
<td>6. COPD</td>
<td>6. COPD</td>
<td>36.9%</td>
</tr>
<tr>
<td>7. Road injuries</td>
<td>7. Interpersonal violence</td>
<td>51.4%</td>
</tr>
<tr>
<td>8. Lower respiratory infect</td>
<td>8. Road injuries</td>
<td>5.0%</td>
</tr>
<tr>
<td>9. Cirrhosis hepatitis C</td>
<td>9. Lower respiratory infect</td>
<td>4.0%</td>
</tr>
<tr>
<td>10. Interpersonal violence</td>
<td>10. Cirrhosis hepatitis C</td>
<td>31.7%</td>
</tr>
</tbody>
</table>
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
Green Cities: Good Health
www.greenhealth.washington.edu

Sponsors:
USDA Forest Service,
University of Washington
NGO partners

Thanks!
to U of WA students:
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Mary Ann Rozance
Sarah Krueger

Research Reviews & Summaries
Everyday Greening & Parks

NEARBY NATURE INCLUDES A VARIETY OF SPACES AND PLACES

URBAN FOREST CANOPY

BIOPHILIC DESIGN

PARKS AND GARDENS

GREEN STORMWATER INFRASTRUCTURE
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.\(^14\)
- 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.\(^34\)
Outside Our Doors
The benefits of cities where people and nature thrive.

design: milepost

co-author: UAS

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 Design at Texas A&M University, published the results of a pioneering study that looked at the recovery rates of post-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 elucidating 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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1 Introduction
2 Defining Nature and Health Research
3 Pollution and Physical Health
4 Active Living
5 Features that Promote Physical Activity
6 Mental Health
7 Stress Reduction
8 Health, Cohesion, and Resilience
9 Social Equity and Access to Nature
10 Conclusion
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Urban Nature for Human Health and Well-Being
Green Cities: Good Health
database of >4,500 peer reviewed publications
Outline

1. Health & Nature: the evidence
2. Key Studies
3. Economics
4. Nature & Health Programs
Science Review

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

Barnay et al., 2017, International Journal of Women’s Health, 14 studies
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!
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*
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
Classroom Views & Stress

Li & Sullivan. 
Landscape & Urban Planning, 2016
Classroom Views & Stress
high school student response

Fig. 2. Attention scores at the end of class activity and break (Means and SE).

Fig. 3. Physiological stress at the end of class activity and break (Mean and SE).

attention scores

stress scores
Attention Restoration Theory
Rachel & Stephen Kaplan, U of MI
directed attention
fatigue . . . .
Workplace Nature & Attention Recovery

Well-being
- desk workers without view of nature reported 23% more ailments in prior 6 months

Job Satisfaction
- less frustrated and more patient
- higher overall job satisfaction and enthusiasm

ART elements

focus
soft fascination
being away

Attention Restoration Theory, Kapan & Kaplan

credit: Michael Hellgren
Nature and Creativity

http://www.jimkukral.com/
role of nature in creativity development

http://daycare.sulekha.com
Give Your Ideas Some Legs

creative test – analogy generation
conditions: sit inside, treadmill walk, walk outside, wheelchair outside

walking outside produced most novel & highest quality analogies – walking opens up free flow of ideas

Oppezzo & Schwartz. 2014. Journal of Experimental Psychology
Nature & Creative Professionals

focused interviews, Denmark
makes us more curious
supports flexible thinking
recharges directed-attention

aids 2 phases of the creative process:
Preparation phase and Incubation phase
sensory dimensions: space & serene

Plambech & Konijnendijk van den Bosch. 2015.
Urban Forestry & Urban Greening
Walkability & Mental Health

evidence of lower frustration and higher meditation when moving into the greener streets

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
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
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4. Nature & Health Programs
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 values than others. Here are some preliminary valuations—estimated for the entire U.S. on an annual basis.

**INFANTS**

- **Birth Weight**
  - Infants who spend time in green spaces have a lower risk of being born preterm or with low birth weight. 
  - Infants born in areas with more green space have better overall health outcomes.

**CHILDREN & TEENS**

- **Overall Health and Well-being**
  - Exposure to nature during childhood may reduce the risk of developing chronic diseases later in life.
  - Children who play outdoors for longer periods have better mental health outcomes.

**ADULTS**

- **Depression and Stress**
  - Nature exposure reduces feelings of depression and anxiety.

**OLDER ADULTS**

- **Mobility & Quality of Life**
  - Regular nature exposure improves mobility and quality of life.

### Contributing Analysts

Dr. Stephen Grado & Marcus Measells, MSU; Dr. Alicia Robbins, Weyerhaeuser
Systems Thinking

- Air Quality
- Stormwater
- Waste Water
- Solid Waste
- Cultural Heritage
- Biota
- Exercise & Fitness
- Active Mobility
- Noise
- Exergy & Fitness
- BMP's
- Community Identity
- Social Capital
- Connectivity
- Public Art
- Carbon
- Allergens
- Heat Island
- Solid Waste
- Waste Water
- Connectivity
- Cultural Heritage

Credit: American Planning Association
stormwater retention
Thornton Creek Water Quality Channel (Seattle, SvR Design)
1 hectare, treats runoff from 275 hectares (1 hectare = 2.47 acres)
Tanner Springs Park
Portland OR
linked to active living network
neighborhood social cohesion

environmental education & social learning
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Story: Human Health Benefits Across the Life Cycle
The Children & Nature Network is a leading organization in the movement to connect all children, their families, and their communities to nature through innovative ideas, evidence-based resources and tools, broad-based collaboration, and support of grassroots leadership. C&NN works with NAAEE on programmatic initiatives related to early childhood education the No Child Left Inside Act and its associated parts.
Fiddleheads Forest School
Washington Park Arboretum (Seattle)
cognitive
social &
physical
learning
Type 2 diabetes: #1 cause of death in Mexico

% overweight adults: U.S., Mexico, global

Data Source: World Health Organization
Design Credit: Brittany Mayes/NPR
CDC moderate activity recommendations

parks, active living, active transit
Shinrin yoku (forest bathing)

- extensive research
- restorative experiences
- workers retirees
- networked system, 52 bases in Japan
Walking Programs

children
elders
families
Walking Meetings

creativity, energy, communication, health
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: ________________________

Medical Center
Parks Prescription

1. Get a prescription for ParksRx from your healthcare provider.
2. Visit www.REACHforbetterhealth.com
3. Pick your park
4. Exercise in the park and share outcomes with your healthcare provider.

PARKS Rx
Your Prescription For Better Health

This information is provided for educational purposes and is not to be considered medical advice.

www.REACHforbetterhealth.com/ParksRx
Made possible with funding from the Centers for Disease Control and Prevention.
Mindfulness

Mind Full, or Mindful?
constant busyness

attempted multi-tasking

‘out of balance’

Anna and Elena Balbusso, NY Times
Experience the restorative powers of nature and join us for Strolls for Well-Being, a free 10-week program offered at Bloedel Reserve. If not already a member, participants are given a temporary membership to

**DAY-USE STROLLS:**

Since introducing the Strolls for Well-Being program in 2014, hundreds of people have benefited from the healing effects of nature.
Prison Inmates :: nature videos
solitary confinement, video room/exercise option

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

Sustainability in Prisons

- offenders
- facilities
- materials for ecological restoration

sustainabilityinprisons.org
Summary:
Knowledge & Program

- nearly 40 years of research
- critical mass of evidence – action!
- greening and health programming
- integrating parks greening goals with broader urban systems needs
Everyday Greening & Parks

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BIOPHILIC DESIGN

PARKS AND GARDENS

GREEN STORMWATER INFRASTRUCTURE

IMAGE BY MIG / SVR
:: Sites to Systems ::
spatial linkages
the city becomes
a park

TKF Foundation
Nature Sacred
initiative
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...

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

Projects Director
Kathleen L. Wolf, Ph.D.

Sponsors
Questions or Comments?

image credit: Robert Churchill via Getty Images