outdoor space = beauty . . . . and . . . .
Outdoor Spaces and Employee Well-Being
how nature improves human health and wellness

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Human Health & Wellness

benefits to costs

facilities management
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
Evidence-based ‘Story’

Health across the Human Life Cyle

‘Cradle to Grave’
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
Green High School Campuses

- Cafeteria & classroom window views with greater quantities of trees and shrubs
- Positively associated with:
  - Standardized test scores,
  - Graduation rates
  - %s of students planning to attend a four-year college
  - Fewer occurrences of criminal behavior

Matsuoka. 2010. Landscape & Urban Planning
CDC moderate activity recommendations

parks, active living, active transit
Walking Programs

children
elders
families
Green Streets for Walkability

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

Aspinall et al. 2013. The Urban Brain: Analysing Outdoor Physical Activity with Mobile EEG. British Journal of Sports Medicine
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)

- walking
- relaxing
- workers
- retirees
- networked system
- 52 bases in Japan
Effects of nature window view on recovery from surgery (Roger Ulrich, 1984)

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

health care $$ savings
patient preference & return

Ulfelder Healing Garden,
Massachusetts General Hospital

Scripps Encinitas Hospital
Hospital Staff – Respite and Support
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](http://www.rph.org/eden.html)
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

Thanks!
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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. 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.
Outside Our Doors
The benefits of cities where people and nature thrive.

Kathleen L. Wolf, Ph.D.

design: milepost

author:

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

**INFANTS**

**BIRTH WEIGHT**
- **POTENTIAL ECONOMIC VALUE:** $5.69M SAVINGS ON ANNUAL HEALTH CARE COSTS.
- Birth weight influences long-term childhood health and development, and has been linked to some adult diseases.

**IMMUNE FUNCTION**
- Strenuous immune systems lead to reduced illness and chronic disease across a lifetime.
- We are most vulnerable in the early months of our lives, when the body and mind are growing and developing at an astonishing rate. The 'hypoxia' hypothesis suggests that early contact with outdoor environments stimulates the development of a healthy immune response.

**FAMILY DYNAMICS**
- **POTENTIAL ECONOMIC VALUE:** IMPROVED FAMILY DYNAMICS, PERHAPS REDUCING MENTAL HEALTH TREATMENT AND COUNSELING SERVICES.
- Infant's parents and siblings adjust their lives after a baby arrives, and the changes can bring on stress and anxiety. Nature activities and well-being reduce stress and improve interactions between parents and within the household.

**CHILDREN & TEENS**

**OVERALL HEALTH AND WELL-BEING**
- **ECONOMIC IMPACT:** INCREASED PHYSICAL ACTIVITY, REDUCED ASTHMA OR LEADING CAUSE OF EMERGENCY DEPARTMENT VISITS, HOSPITALIZATIONS AND MISSED SCHOOL DAYS, AND REDUCED RISK OF ADULT SKIN CONDITIONS.

**ADHD**
- **POTENTIAL ECONOMIC VALUE:** $5.8M SAVINGS ON MEDICATION SAVINGS PER YEAR.
- Children ages 5 to 7 are treated for Attention Deficit Hyperactivity Disorder (ADHD) in the U.S. Nature exposure in a potential alternative treatment, studies show that activity within nature or green spaces, such as play or just 20 minutes of walking, can reduce symptoms.

**FUTURE FINANCIAL SUCCESS**
- **POTENTIAL ECONOMIC VALUE:** $7.1B INCREASE IN HIGH SCHOOL GRADUATES' LIFETIME ANNUAL INCOME.
- School performance affects both short-term self-esteem and long-term success. Planning green views from classrooms and common spaces in schools can improve students' capacity to direct attention and feel less anxioust. Green high school campus landscapes are linked to higher graduation rates.

**ADULTS**

**DEPRESSION AND STRESS**
- **ECONOMIC IMPACT:** REDUCED FRUSTRATION, MENTAL DISTRESS AND DEPRESSION DISORDERS, AND IMPROVED BODY IMAGE, SELF-Esteem AND LIFE SATISFACTION.
- Busy, highly scheduled lifestyles take their toll. Nature experiences reduce stress. Nearly 1 in 5 adult experiences major depression each year in the U.S., and mental, behavioral, and neuropsychiatric disorders are leading causes of disability. Nature experiences support personal and social well-being, mental health, and life function. Improved mental health and function reduce disease treatment costs, and improve workplace productivity.

**CARDIOVASCULAR DISEASE**
- **POTENTIAL ECONOMIC VALUE:** $5.3-5.9M SAVINGS ON TREATMENT COSTS ANNUALLY.
- Cardiovascular Disease is the leading cause of premature deaths in the U.S. People show slightly reduced risk of CVD if their neighborhoods have greater nature coverage (particularly tree canopy), however it is worth noting the majority of studies have focused on trees.

**CRIME & SAFETY**
- **POTENTIAL ECONOMIC VALUE:** BRUISE IN-REDUCED COSTS OF CRIME FOR VICTIMS AND PROPERY OWNERS PER YEAR.
- Personal safety and security are important conditions for quality of life. The presence of nature in neighborhoods - community gardens, forest canopy, and landscaped vacant lots - is associated with reduced personal and property crime.

**OLDER ADULTS**

**MOBILITY & QUALITY OF LIFE**
- **POTENTIAL ECONOMIC VALUE:** $7.1-7.9M SAVINGS ON HEALTH CARE COSTS FROM FALLS PER YEAR.
- One in three older adults falls each year, giving rise to fatal and nonfatal injuries. Residents' falls within older care facilities are particularly expensive medical situations. Being out in nature maintains personal mobility, leading to reduced falls and reduced need for medications. Further, those who are socially isolated are more likely to be unhealthy, engaging and nature walking activities that promote social involvement and support positive lifestyles and quality of life.

**HYPERTENSION**
- **POTENTIAL ECONOMIC VALUE:** $13.2-16M SAVINGS ON MEDICATION COSTS YEARLY.
- Hypertension, or high blood pressure, is one of the five most common chronic conditions impacting older adults. Views of nature, particularly forests and 'green burial' (cassette walks in natural forest settings) decreases diastolic rates.

**COGNITIVE DISORDERS**
- **POTENTIAL ECONOMIC VALUE:** $13.2-16M SAVINGS ON MEDICAL SERVICES, NOT COUNTING THE VALUE OF HOME CAREGIVER SERVICES.
- About one in five older adults experience mental and cognitive disorders, with age being the greatest risk factor. In 2016, about 11% of people aged 65 or older were affected with Alzheimer's disease. Those with dementia have three times as many hospital days per year as other elders. Encounters with nature improves symptoms related to cognitive disorders, such as agitation, depression, and reduced mobility.

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**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!
Employees, Clients, Users

Nature for Wellness and Productivity?
Classroom Views & Stress

Classroom Views & Stress

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
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

Biophilic Design
Terrapin Bright Green
integrated nature & architecture

credit: Progressive Times
Walking Meetings

creativity, energy, communication, health
Mind Full, or Mindful?
constant busyness

attempted multi-tasking

‘out of balance’

Anna and Elena Balbusso, NY Times
Nature and Mindfulness

focus
soft fascination
undirected attention

Attention Restoration Theory, Kapan & Kaplan

credit: Michael Hellgren
Mindfulness/Meditation Training

- meta analysis; clinical/non situations
- focus on moment-to-moment experience and mental awareness

Results

- more veridical perception (reality check)
- reduce negative affect
- improve vitality and coping
- medical symptoms & sensory pain

Mindfulness/Meditation Training

- healthy workplace employees
- 8 week mindfulness training

Results

- brain electrical activity – positive affect
- brain activation – reduced stress event response
- more antibodies after influenza vaccine = better immune function

Davidson et al. 2003. Alterations in Brain and Immune Function Produced by Mindfulness Meditation. Psychosomatic Medicine
Nature and Creativity

http://www.jimkukral.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
Summary: $$ values of outdoor spaces

- environmental, social & health research findings
- intangible, indirect savings
- co-design for co-benefits
- improved employee, client & user well-being
stormwater retention
Thornton Creek Water Quality Channel (Seattle, SvR Design)
1 hectare, treats runoff from 275 hectares (1 hectare = 2.47 acres)
economic & health co-benefits
Tanner Springs Park
Portland OR
linked to active living network
neighborhood social cohesion

environmental education & social learning
the Chenoggye freeway in Seoul
~ 1970-2005
Cheonoggyecheon Stream Restoration

8.4 km, $900 M
between 2003 and 2011

- nearby property values increased 103% (despite deep recession)
- $2 billion was invested in nearby properties development
Summary: benefits of outdoor spaces

- environmental, social & health research findings
- intangible, indirect savings
- co-design for co-benefits
- improved employee, client & user well-being
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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