Co-Design for Human Health Co-Benefits: Expanding GSI Strategies

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Outline

green infrastructure solutions
nature in cities & human health
  (mental health & wellness)
economic benefits
design examples
Green Infrastructure

systems solutions
ecology that works
co-design for co-benefits
stormwater management
Stormwater Management

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
green infrastructure & reduced crime

Philadelphia

reduction in narcotics arrests (18–27 %) for green not gray

vs. 65% increase across city

Kondo et al. 2015.
Journal of Public Health
nature in cities for human health

quality of life
livable places
disease prevention
health promotion
WHO Health Definition

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

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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.

design: milepost

co-author

co-author & printing: The Nature Conservancy
Evidence-based ‘Story’

what are the ‘stories’

*Mental Health & Wellness for all People*

nearby nature & health evidence

> 40 years of research

> 3,500 publications
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
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*
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
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

CDC moderate activity recommendations

parks, active living, active transit
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*
green spatial linkages: the city becomes a park

TKF Foundation :: Nature Sacred initiative
constant busyness

attempted multi-tasking

‘out of balance’

Anna and Elena Balbusso, NY Times
Mind Full, or Mindful?
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

Nature and Mindfulness

focus
soft fascination
undirected attention

Attention Restoration Theory, Kapan & Kaplan

credit: Michael Hellgren
Outline

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  (mental health & wellness)
economic valuation
design examples
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**

**POTENTIAL ECONOMIC VALUE:**

$58,000 SAVINGS ON ANNUAL HEALTH CARE COSTS.

Birth weight is associated with both short- and long-term health care costs, such as longer hospital stays and increased illness. Pregnant women that have more tree canopy and green space near their homes generally have babies with healthier birth weights.

**IMMUNE FUNCTION**

Stronger immune function leads to reduced illness and chronic disease across a lifetime.

We must recognize the early months of our lives, when the body and mind are growing and developing at an astonishing rate. The "opportunity hypothesis" suggests that early contact with outdoor environments stimulates the development of a healthy immune response.

**FAMILY DYNAMICS**

Improved family dynamics, perhaps reducing mental health treatment and counseling services.

An infant's parents and siblings adjust their lives after a baby arrives, and the changes can bring on stress and anxiety. Nature visits and walk help reduce these conditions and improves interactions between people within the household.

Note: All economic values are in 2018 U.S. dollars, and are potential annual savings across the entire U.S.

**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.

Adverse conditions in a child's surroundings can cause both immediate and ongoing health impacts. Nature is a positive influence, playing in nature helps children develop learning, social, and physical skills that improve both health and life achievement. Green spaces close to the children's homes and green spaces, give them space for moderate to vigorous activity, and abuse from too much inactivity.

**ADHD**

**POTENTIAL ECONOMIC VALUE:**

$10,000 SAVINGS ON MEDICATION SAVINGS PER YEAR.

Millions of children ages 2-17 years old 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 walking, can reduce symptoms.

**CARDIOVASCULAR DISEASE**

**POTENTIAL ECONOMIC VALUE:**

$15,000 SAVINGS ON TREATMENT COSTS ANNUALLY.

Cardiovascular disease is the leading cause of premature death 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 men.

**CRIME & SAFETY**

**POTENTIAL ECONOMIC VALUE:**

$10,000 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 2018, about 11% of people aged 65 or older were affiliated with Alzheimer's disease. Those with dementia have three times as many hospital stays per year as other elders. Experiences with nature improves symptoms related to cognitive disorders, such as agitation, depression, and reduced mobility.

**ADULTS**

**DEPRESSION AND STRESS**

**ECONOMIC IMPACT:**

Reduced frustration, mental distress and improved self-esteem and life satisfaction.


**MOBILITY & QUALITY OF LIFE**

**POTENTIAL ECONOMIC VALUE:**

$11,000 SAVINGS ON HEALTH CARE COSTS FROM FALLS PER YEAR.

One in three older adults falls each year, giving rise to fatal and nonfatal injuries. Residential falls within older care facilities are particularly common and frequent and often result in hospitalizations. Falling is a significant risk factor for mortality, morbidity, and hospitalization. Falls are a leading cause of death, disability, and injury. Falls reduce quality of life and independent living, leading to increased costs in hospitalizations and long-term care.

**COGNITIVE DISORDERS**

**POTENTIAL ECONOMIC VALUE:**

$10,000 SAVINGS ON MEDICAL SERVICES, NOT COUNTING THE VALUE OF HOME CAREGIVER SERVICES.

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
- birth weight, graduation rates, reduced crime, cardiovascular disease, elder chronic disease
- various nature settings in cities
- just beginning the analysis!
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green infrastructure solutions
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(mental health & wellness)
economic valuation
design examples
Stormwater Report, online April 2014 (search health)
place making: vertical + horizontal surfaces
design concept

bring people in!
design concept

enable biodiversity & soft fascination
Summary

inter-dependent city systems
green infrastructure solutions
nature in cities & human health
economic benefits
expanding design goals
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.

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