Just How Good Are Trees?
for human health & wellness

Kathleen Wolf, Ph.D.
Research Social Scientist

University of Washington (Seattle)
School of Environmental and Forest Sciences
USFS Pacific NW Research Station

ISA Southern Chapter + Utility Arborist Association
75th Annual Conference & Trade Show
February 2017
outline

- NUCFAC action plan – research needs
- human health & wellness focus
- economic values
- mental health & function
primary action plan
research supplement

value of research to U&CF growth
Research Needs Framework

A  Understand Ecosystem/Ecological Services
B  Promote Human and Community Health
C  Planting, Inventory, and Analysis for Forest and Environmental Health
D  Prepare for Pests, Threats, Climate and Associated Changes and Risks
E  Enable Civic Stewardship and Improved Local Governance
F  Integrate Knowledge Networks and Data for Urban Socio-Ecological Systems
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.\(^3\)\(^4\)
- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.\(^3\)\(^4\)
- 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.\(^3\)\(^4\)
Outside Our Doors
The benefits of cities where people and nature thrive.

design:

co-author

co-author & printing:

The Nature Conservancy
What is the Economic Value?

*human health response to trees & nearby nature*
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!
Nearby nature experiences are important across the entire life cycle, from cradle to grave.

INFANTS

BIRTH WEIGHT

OVERALL HEALTH AND WELL-BEING

ECONOMIC IMPACT VALUE: INCREASED PHYSICAL ACTIVITY, REDUCED ADEQUACY OF EMERGENCY DEPARTMENT VISITS, HOSPITALIZATIONS AND MEDICAL-SCHOOL SAVINGS, AND REDUCED RISK OF ADULT SKIN CONDITIONS.

IMMUNE FUNCTION

FAMILY DYNAMICS

ECONOMIC IMPACT VALUE: IMPROVED FAMILY DYNAMICS, PERHAPS REDUCING MENTAL HEALTH TREATMENT AND COUNSELING SERVICES.

FUTURE FINANCIAL SUCCESS

ECONOMIC IMPACT VALUE: INCREASED INCOME AFTER HIGH SCHOOL GRADUATION AND LIFETIME INCOME.

ADHD

CARDIOVASCULAR DISEASE

ECONOMIC IMPACT VALUE: REDUCED RISK OF MENTAL DISEASES AND DEPRESSION.

DEPRESSION AND STRESS

ECONOMIC IMPACT VALUE: REDUCED RISK OF MENTAL DISEASES AND DEPRESSION.

MOBILITY & QUALITY OF LIFE

HYPERTENSION

COGNITIVE DISORDERS

ECONOMIC IMPACT VALUE: REDUCED RISK OF CRIME FOR VICTIMS AND PROTECTORS.

CRIME & SAFETY

ECONOMIC IMPACT VALUE: INCREASED SAVINGS ON MEDICAL SERVICES, NOT COUNTING THE VALUE OF HOME CARE.

About one in five older adults experience mental and cognitive disorders, with age being the greatest risk factor. In 2015, about 11% of people aged 65 or older were affected with Alzheimer’s disease. Those with dementia have three times as many hospital stays per year as other others. Encounters with nature improve symptoms related to cognitive disorders, such as agitation, depression, and reduced mobility.

contribution analysts:
Dr. Stephen Grado & Marcus Measells, MSU; Dr. Alicia Robbins, Weyerhaueser
Publications


* Research and publications were funded in part by the U.S.D.A. Forest Service, National Urban and Community Forestry program, as recommended by the National Urban and Community Forestry Advisory Council (NUCFAC). Also the USFS Pacific Northwest Research Station.
Analysis Process

- scale of individual to community
- screen for benefits
- green condition
  - urban forestry, parks, gardens, etc.
- market & non-market
- valuation strategy
## Values Summary

Millions of U.S. Dollars (2012)

<table>
<thead>
<tr>
<th>Benefit (geographic scope)</th>
<th>Minimum ($)</th>
<th>Maximum ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Newborn Health (U.S.)</td>
<td>5.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Attention Deficit Hyperactivity Disorder (U.S.)</td>
<td>383.5</td>
<td>1,917.7</td>
</tr>
<tr>
<td>Schools (U.S.)</td>
<td>20.4</td>
<td>1,262.9</td>
</tr>
<tr>
<td>Crime (U.S.)</td>
<td>340.6</td>
<td>899.4</td>
</tr>
<tr>
<td>Cardiovascular Disease (U.K., U.S.)</td>
<td>1,220.0</td>
<td>1,220.0</td>
</tr>
<tr>
<td>Alzheimer's Disease (U.S.)</td>
<td>724.6</td>
<td>1,449.2</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
<td><strong>2,694.4</strong></td>
<td><strong>6,754.5</strong></td>
</tr>
</tbody>
</table>

Evidence-based ‘Story’

Experiences of Nearby Nature

Improve

Mental Health & Function
Classroom Views & Stress

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).
ADHD Treatments
Change in % Population
2001 - 2010

America’s State of Mind, Medco Health Solutions, Inc
ADHD Meds
% of Americans Ages 20-44
2001 - 2010

America’s State of Mind, Medco Health Solutions, Inc
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*
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 Design Elements

• being away
• ‘soft’ fascination
• extent
• compatibility
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
A PLACE TO MEND HEARTS & HEAL MINDS

STROLLS FOR WELL-BEING

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.
% of U.S. Population Using Mental Health Medications

2001 vs 2010

America’s State of Mind, Medco Health Solutions, Inc
Prevalence of Adult Antidepressant Use
2001 vs 2010

America’s State of Mind, Medco Health Solutions, Inc
Physical Activity & Depression Reduction

• Review of 13 high quality studies
  • exercise recommended for mild to moderate depression
  • people who are willing & motivated
  • associated meditation and mindfulness are important

Physical Exercise Intervention in Depressive Disorders.
Scandinavian Journal of Medicine & Science in Sports
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
CDC moderate activity recommendations

parks, active living, active transit
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)

Berman et al. 2012. Journal of Affective Disorders

cognitive and affective improvements after walking in a nature setting
Effects of nature window view on recovery from surgery *(Roger Ulrich, 1984)*

- Shorter stays
- Less pain
- Fewer minor complications
- Better emotional well-being
Massachusetts General Hospital

credit: Frank Oudeman
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)
Summary

• NUCFAC action plan – research needs
• human health & wellness
• economic values
• evidence based ‘story’
  improved mental health & function