Nature Heals!
what we know about trees, people and health

Kathleen Wolf, Ph.D.
Research Social Scientist

University of Washington (Seattle)
College of the Environment

Barcham Trees Seminar
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in the background
trees & forests provide so many benefits!
importance of nearby nature
measure the canopy of a city
Eco (UFORE)
Streets (STRATUM)
Hydro
Vue
tools provided by USDA
Forest Service

STRUCTURE
FUNCTION

VALUE

MANAGEMENT

photo credits: Seattle i-Tree Training by Al Zelaya
Ascending the Giants

Portland, Oregon

Old-growth Ecology Tour

The third aspect of the Old Growth Eco Tour is a vertical exploration in an ancient grove of towering Douglas-fir, Grand Fir and Western Red Cedar. Here, the ATG team will assist your 40 foot ascent toward the top of an old growth tree with PhD Ornithologist, Dr. David Anderson, for a captivating view over the nation’s largest and wildest city park, Forest Park. Dr. Anderson will be your personal guide explaining the ecological functionality of this forest and the forest/urban forest interface.

Explore and experience the true northwest in an actual Oregon old-growth forest grove in a real and unique manner that is guaranteed to be safe and unforgettable.
City Trees & Urban Greening

essential for human health & wellness

addressing society’s health care challenges
Shift in Public Health Policy

environments support health more than individual choice possible in the city & towns
WHO health definition

a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity (1946)

science & evidence re: environment role of ‘metro nature’?
not a panacea, but important!
Determinants of Health

- General socio-economic, cultural and environmental conditions
  - Work environment
  - Education
  - Agriculture and food production
- Social and community networks
- Individual lifestyle factors
  - Age, sex & hereditary factors
- Living and working conditions
- Unemployment
- Water sanitation
- Health care services
- Housing
nature benefits :: not only beyond the city!
evidence about human wellness & ‘nearby nature’
City Trees & Nature for Better Health

What do we know?

scientific evidence – 40 years! many health & well being benefits!
health across the human life cycle or life course
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
- may alleviate depression
- dirt or Prozac?

Lowry et al. 2007. Neuroscience
Change in % Population on ADHD Treatments
2001 - 2010
% of Americans Ages 20-44 on ADHD Meds
2001 - 2010

America’s State of Mind, Medco Health Solutions, Inc
ADHD Prescriptions – England, 2000-12

cost £52 million per year +

source: NHS
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*
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*
School & Learning
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
Classroom Views & Stress
Classroom Views & Stress
high school student response

attention scores

stress scores
another trail of thought . . .
City Trees & Nature for Better Health

This is what we know!

scientific evidence – 40 years!
many health & well being benefits
life course concept
‘cradle to grave’
Green Cities: Good Health
www.greenhealth.washington.edu

Sponsors:
USDA Forest Service, U&CF Program
University of Washington
NGO partners

thanks!
to U of WA students:
Katrina Flora
Mary Ann Rozance
Sarah Krueger

research review & 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.
Metro Nature :: Human Health & Well Being

> 3,800 peer-reviewed publications in database

% distribution of entire database
strength of evidence; causal mechanisms?

back on track
Neighborhood & Community

- neighborhood satisfaction
- social cohesion, more interactions with neighbors
- street trees - reduced time on market for property sales

Donovan and Butry. 2010. *Landscape and Urban Planning*
Trees & Crime Reduction

- trees in the public right of way are associated with lower crime rates
- smaller, view obstructing trees are associated with increased crime
- larger trees are associated with reduced crime

Donovan & Prestemon. 2012. Environment and Behavior
10% increase in tree canopy
~ 12% decrease in crime

green stormwater infrastructure

Philadelphia reduction in narcotics arrests (18–27 %) for green not gray vs. 65% increase across city

Kondo et al. 2015. Journal of Public Health
Green & Crime Reduction

- vacant lot greening
- Philadelphia, 4 sections
- consistent reductions in gun assaults across 4 sections
- consistent reductions in vandalism in 1 section

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

photos: Dan Herms, Ohio State University
Mental Health & Function

contemplation – restoration – stress reduction
Attention Restoration Theory
Rachel & Stephen Kaplan, U of MI
Workplace Nature Views

● 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

the better office cubicle!

bottom line = $$ benefits of trees & nature
Biophilic Design :: buildings

integrated nature & architecture

credit: Progressive Times
Mindfulness

Mind Full, or Mindful?
constant busyness

attempted multi-tasking

‘out of balance’

Anna and Elena Balbusso, NY Times
Mindfulness/Meditation Training

- meta analysis; clinical/non situations
- focus on moment-to-moment experience and mental awareness
- 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
- brain electrical activity – positive affect
- brain activation – reduce 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 Mindfulness

focus
soft fascination
undirected attention

Attention Restoration Theory

Rachel & Stephen Kaplan

credit: Michael Hellgren
Green Streets for Walkability

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

Aspinall et al. 2015. The Urban Brain: Analysing Outdoor Physical Activity with Mobile EEG. British Journal of Sports 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 in Denmark

nature:
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
role of nature in creativity development

http://daycare.sulekha.com
Prevalence of Adult Antidepressant Use 2010

America’s State of Mind, Medco Health Solutions, Inc
Psychiatric Drug Prescriptions
England, 1998-2010

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

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...
combatting obesity
U.S. moderate activity recommendations
30 minutes per day x 3 days per week
Shinrin-yoku  Forest Bathing

- extended forest walks
- reduced ‘fight or flight’ nervous system activity
- lower cortisol – a stress indicator
- increased immune function
- lower pulse rate & blood pressure
Lifecycle :: disease & illness

Cumulative U.S. DALYs for the Leading Disease/Disorder Categories by Age (2010)

- Mental and Behavioral Disorders
- Cardiovascular and Circulatory Diseases
- Neoplasms
- Musculoskeletal Disorders
- Diabetes, Urogenital, Blood, and Endocrine Disorders
- Chronic Respiratory Diseases
- Other Non-communicable Diseases
- Neurological Disorders

Disability Adjusted Life Year

Data courtesy of WHO
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
 Legacy Good Samaritan Medical Center
 Stenzel Healing Garden 1997
 Rehabilitation Institute of Oregon
Oregon Burn Center Garden
Hospital Staff – Respite and Support
Nature: A stress coping resource for employees 24-7

image credit: Teresia Hazen
Elders: mobility & social connections
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*
Conclusions

• Nearby nature in cities & towns
• Supports better health for people of all ages
• Evidence?
  Green Cities: Good Health web site
• Benefits across human life cycle
• Many more studies underway . . . .
www.naturewithin.info
after lunch . . .

Science Translated!
evidence-based applications

• design & place making
• programs
• policies
Science Translated!
evidence-based applications

- consider nature benefit – mental or physical health, social cohesion
- design & place making
- programs
- policies

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 evidence-based applications

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i-Tree

Eco (UFORE)
Streets (STRATUM)
Hydro
Vue

tools provided by USDA
Forest Service

photo credits: Seattle i-Tree Training by Al Zelaya
Reducing Stormwater Runoff

green infrastructure

Image courtesy of the Center for Urban Forest Research
Thornton Creek Water Quality Channel (Seattle, SvR Design)
1 hectare, treats runoff from 275 hectares (1 hectare = 2.47 acres)
linked to active living network
Attention Restoration Theory

Design Elements

- being away
- ‘soft’ fascination
- extent
- compatibility
Science Translated! evidence-based applications

- design & place making
- programs
- policies
Fiddleheads Forest School
Washington Park Arboretum (Seattle)

cognitive
social &
physical
learning
Walking Programs

children
elders
families
Science Translated!

evidence-based applications

• design & place making
• programs
• policies
Beacon Food Forest (Seattle)
mimic woodland ecosystem – edible gardening

- arboretum
- berry patch
- nut grove
- community garden
- gathering plaza
- children’s area
- living gateway

complexity - productivity
Shinrin yoku (forest bathing)

- walking
- relaxing
- workers
- retirees
- networked system
- 52 bases in Japan
Walking Meetings
creativity, energy, communication, health
Science Translated!
evidence-based applications

- design & place making
- programs
- professions
green infrastructure :: co-benefits
Parks Prescription

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: ______________________

Doctors of BC
Parks Prescription

1. Get a prescription for ParksRx from your healthcare provider.
2. Visit www.REACHforbetterhealth.com
   2. Enter your zip code
   3. Click
3. Pick your park
4. Exercise in the park and share outcomes with your healthcare provider.
Veterans Outdoor Therapy

Les Winkeler/The Southern Illinoisan

World-Herald News Service

Hope for the Warriors

Outward Bound
urban forest restoration
urban forest plantings

American Forests

parks
public gardens
street trees
neighborhood

Tree People, Los Angeles
food forests
community gardens

Keep Oakland Beautiful

local food
food security
child education
nutrition
food donations

The Heights Community Garden, Dayton OH
Conclusions

• nearby nature benefits – mental & physical health, social cohesion
• human lifecycle
• design & place making
• programs
• policies
• professions
nearby nature :: trees & health services
Conclusions

• Nearby nature in cities & towns
• Supports better health for people of all ages
• Evidence? Green Cities: Good Health web site
• Benefits across human life cycle
• Many more studies underway . . . .