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
Improving Air Quality

Image courtesy of the Center for Urban Forest Research
Reducing Stormwater Runoff

Image courtesy of the Center for Urban Forest Research
co-benefit opportunities
Co-Benefits of the Urban Forest with a mental health focus

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The Seattle Urban Forest Symposium
The University of Washington & Plant Amnesty
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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
Environment = Toxin, Risk

Love Canal, Cuyahoga River, OH

Niagra Falls
Beyond Toxicity
Human Health and the Natural Environment

Howard Frumkin, MD, DrPH, FACP, FACOEM

Abstract:
Research and teaching in environmental health have centered on the hazardous effects of various environmental exposures, such as toxic chemicals, radiation, and biological and physical agents. However, some kinds of environmental exposures may have positive health effects. According to E.O. Wilson’s “biophilia” hypothesis, humans are innately attracted to other living organisms. Later authors have expanded this concept to suggest that humans have an innate bond with nature more generally. This implies that certain kinds of contact with the natural world may benefit health. Evidence supporting this hypothesis is presented from four aspects of the natural world: animals, plants, landscapes, and wilderness. Finally, the implications of this hypothesis for a broader agenda for environmental health, encompassing not only toxic outcomes but also salutary ones, are discussed. This agenda implies research on a range of potentially healthful environmental exposures, collaboration among professionals in a range of disciplines from public health to landscape architecture to city planning, and interventions based on research outcomes.

Medical Subject Headings (MeSH): animals, ecology, environmental health, nature, plants, trees

American Journal of Preventive Medicine, 2001
in the background
trees & metro
nature for human health & well-being
Green Cities: Good Health
www.greenhealth.washington.edu

Sponsors:
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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.\(^1\),\(^2\) 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.\(^{34}\)
Mental Health treatment & therapy
% 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
2010

America’s State of Mind, Medco Health Solutions, Inc
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
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

Berman et al. 2012. *Journal of Affective Disorders*
Change in % Population on ADHD Treatments
2001 - 2010

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

America’s State of Mind, Medco Health Solutions, Inc
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*
Mental Health & Function just doing better!
‘nearby nature’ experiences
passive encounters for benefit
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: patients; family and friends; professional staff

health care $$ savings
Hospital Staff – Respite and Support
Nature: A stress coping resource for employees 24-7

thanks to Teresia Hazen
for slides
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

ART Design Elements

- being away
- ‘soft’ fascination
- extent
- compatibility
the better office cubicle!

bottom line = $$ benefits of trees & nature
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
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 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
Mindfulness

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
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 Sacred ::
TKF Foundation
bench journals

> 10 years
> 100 gardens
> 10,000 journal entries
mindfulness ::
journal
analysis

Tidball et al. 2012

Preliminary Analysis of Nature Sacred “Book & Bench” journal entries

by Cornell University’s Civic Ecology Lab
Summary

• evidence of human health? Green Cities: Good Health

• ~ 40 years of research, > 3K peer-reviewed publications

• mental health & function

• ADHD, attention restoration theory, creativity, mindfulness
Human Dimensions of Urban Forestry and Urban Greening

featuring research on peoples' perceptions and behaviors regarding nature in cities

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.

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

Urban Forestry and Human Benefits
More resources, studies and links...

Projects Director
Kathleen L. Wolf, Ph.D.