City Trees, Forests & Human Health
what does science tell us?

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Meeting: Trees & Design Action Group
20 September 2016
English Garden Landscapes

Blenheim Palace Park – Capability Brown

thanks!

to U of WA
English Garden Landscapes

horticultural introductions
English Garden Landscapes

horticultural emphasis with urbanization
English Garden Landscapes

Butchart Gardens – Victoria B.C., Canada
international destinations
importance of nearby nature & trees
evidence about human wellness & ‘nearby nature’
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
canopy of a city = human health benefits
study of Sacramento, CA
canopy data x state health survey
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.\textsuperscript{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.\textsuperscript{9}
- A study found 7% higher rental rates for commercial offices having high quality landscapes.\textsuperscript{14}
- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.\textsuperscript{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.\textsuperscript{34}
Outside Our Doors: the benefits of cities where people and nature thrive

The Nature Conservancy

February 2016
strength of evidence; causal mechanisms?

causal mechanisms? immune function?

urban forestry and urban greening
‘metro nature’

human health & wellness
highlights of 40 years of research?
urban nature & health benefits across the life cycle
Urban Forests and Newborns
the urban natural environment and 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; similar studies in Lithuania, Vancouver B.C., Munich, Tel Aviv Israel, Spain
Change in % Population on ADHD Treatments 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
School & Learning
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).

attention scores

stress scores
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

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 - Mindfulness

contemplation – restoration – stress reduction
constant busyness

attempted multi-tasking

‘out of balance’

Anna and Elena Balbusso, NY Times
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
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
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

- extended forest walks
  - reduced ‘fight or flight’ response
  - lower cortisol – a stress indicator
  - increased immune function
  - lower pulse rate & blood pressure

Tsunetsugu, Park, Miyazaki. 2010. Environmental Health and Preventive Medicine
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
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*
Conclusions

- Nearby nature in cities & towns is essential!
- Supports disease prevention & health promotion for people of all ages
- Evidence?
  
  Green Cities: Good Health web site
- Benefits across human life cycle
- Many more studies underway . . . . .
Lifecycle :: disease & illness

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

Disability Adjusted Life Year

Data courtesy of WHO
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...

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www.naturewithin.info