City Trees & Human Health:
A Review of Evidence & Key Findings

Kathleen Wolf, Ph.D.
Research Social Scientist

University of Washington (Seattle)
School of Environmental and Forest Sciences
US Forest Service, Pacific NW Research Station

Canadian Institute of Forestry
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trees
in the
background

public awareness
& appreciation?

Outline

1. Health & Nature: the evidence

2. Key Studies

3. Goals & Metrics

WHO Health Definition

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

Dahlgren and Whitehead 1991

Social Determinants

Prison Inmates :: nature videos

solitary confinement, video room/exercise option

- felt significantly calmer, less irritable, more empathetic
- committed 26% fewer violent infractions

Nadkarni et al. 2017. Impacts of nature imagery on people in severely nature-deprived environments. *Frontiers in Ecology and the Environment.*

Green Cities: Good Health

www.greenhealth.washington.edu

Sponsors:

USDA Forest Service,
(U&CF Program + Pacific NW Research)

University of Washington

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

Research Reviews & Summaries

Community Building
Local Economics
Place Attachment & Meaning
Crime & Fear
Safe Streets
Active Living
Reduced Risk
Wellness & Physiology
Healing & Therapy
Mental Health & Function
Work & Learning
Culture & Equity
Lifecycle & Gender

Local Economics

RSS Feed Print

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.

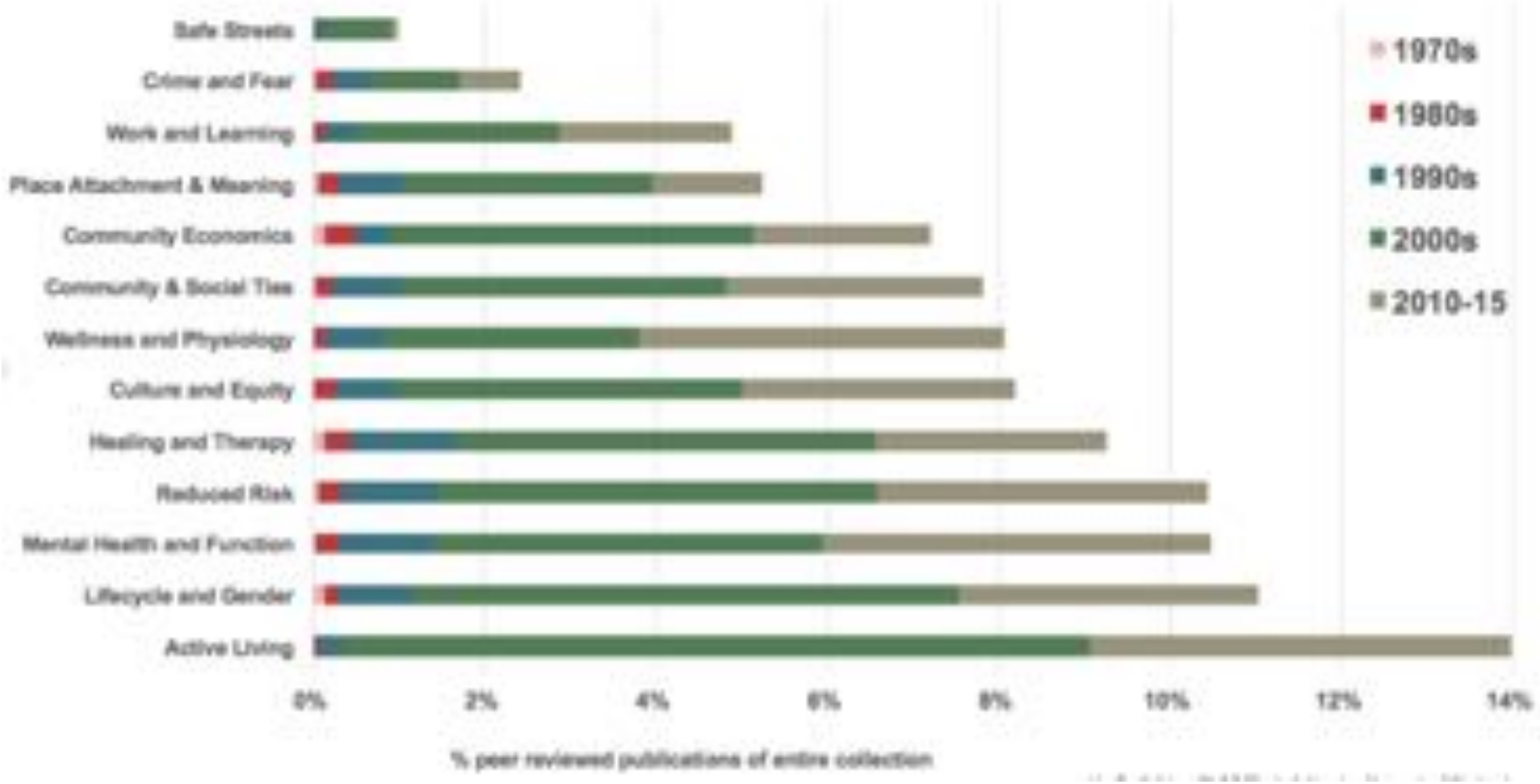
street trees boost market value of houses, providing tax revenue for communities

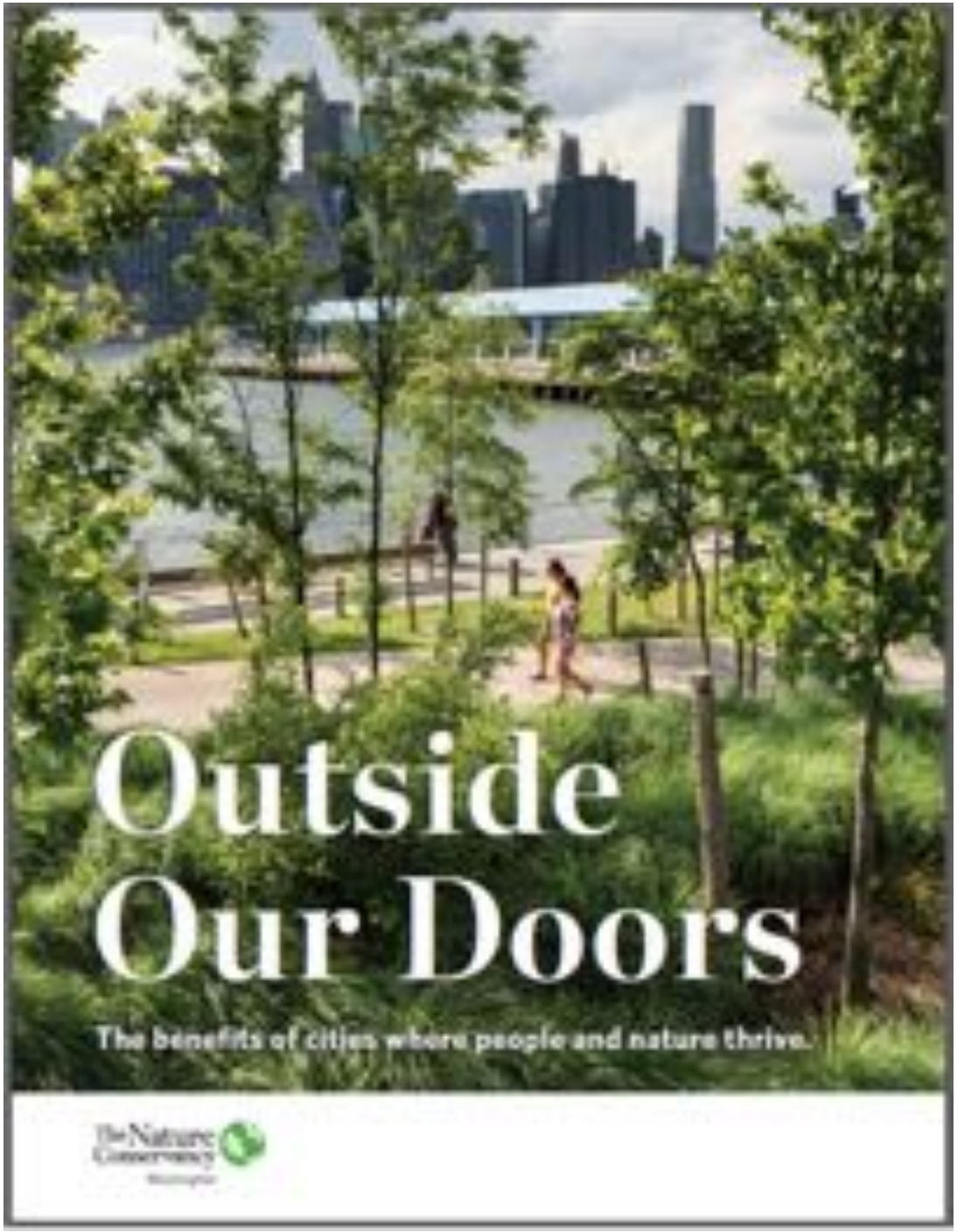
Fast Facts

- 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]

Green Cities: Good Health

database of >4,500 peer reviewed publications





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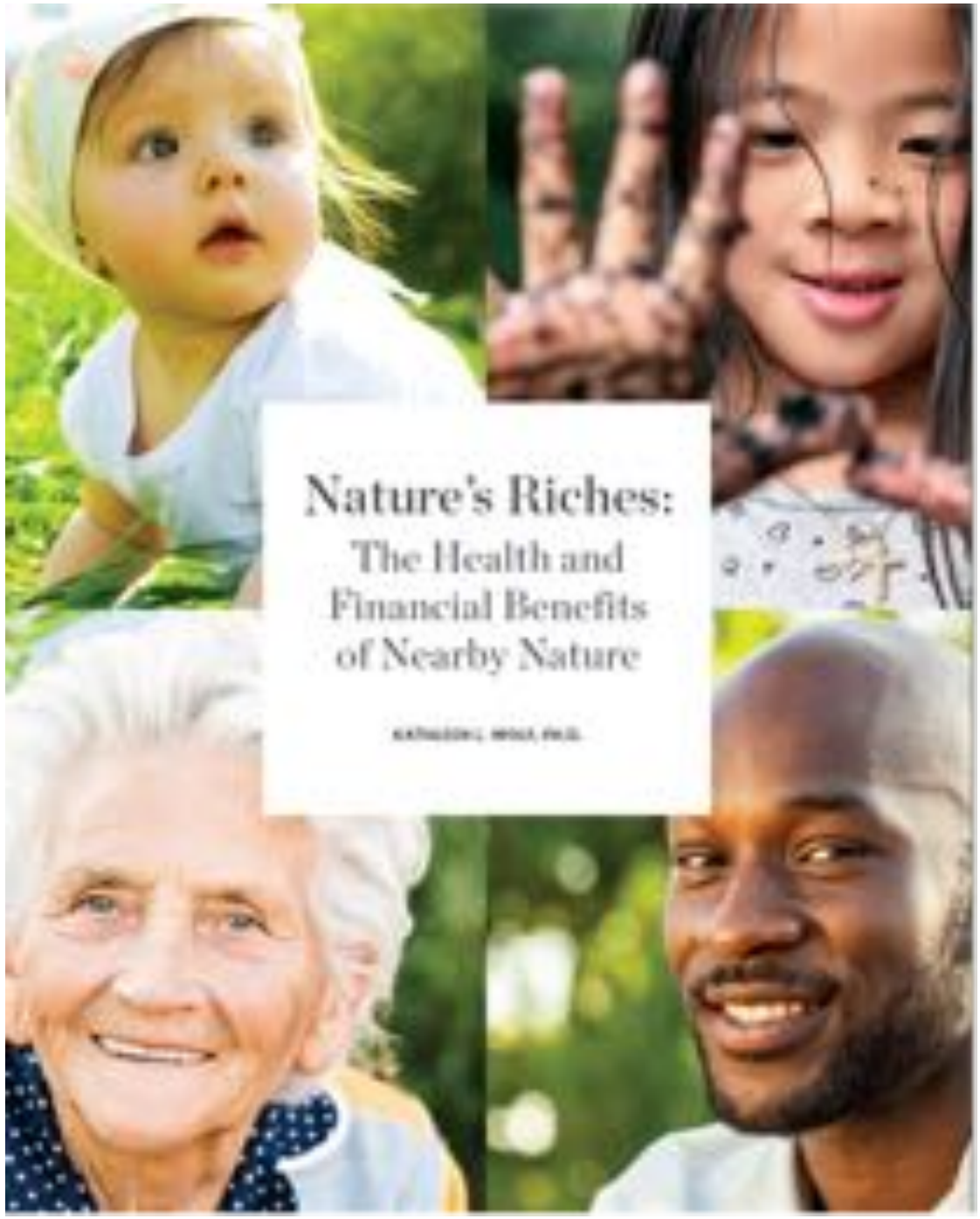
USDA Forest Service

2018



design: milepost

author:

printing:

The Nature Conservancy

also in Spanish!
and Arabic!

Nearby nature experiences are important across the entire life cycle, from cradle to grave.

INFANTS

CHILDREN & TEENS

ADULTS

OLDER ADULTS

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

Urban Forests for Human Health: A Focused Economic Valuation

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Science Review

nearby nature & health evidence

~ 40 years

> 5,000 publications

what are the ‘stories’?

meaning
Wisdom
Knowledge
Information
Data
value

Story: 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

Hygiene Hypothesis

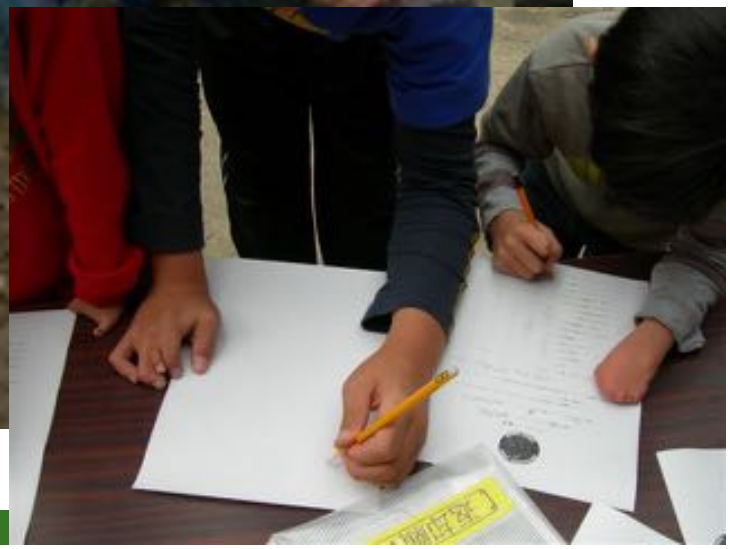
- presence of soil bacteria in body, *Mycobacterium vaccae* = increased seratonin
- boost immune function
- may alleviate depression (dirt or Prozac?)

Lowry et al. 2007. Neuroscience

Eat Dirt!

Gathright et al. 2006. Urban Forestry & Urban Greening

www.treeclimbing.jp/



physically disabled & tree climbing!

recreational tree climbing – youth therapy

Sacramento Study :: LIDAR x CHIS data

7,900 adults, 250 m buffer, covariates

more tree cover

= better overall health

= better social cohesion

Ulmer et al. 2016. *Health & Place*. Multiple health benefits of urban tree canopy: The mounting evidence for a green prescription.

Donovan et al. 2013. Journal of Preventive Medicine

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

photo credits: Dan Herms, Ohio State U

USDA Forest Service

URBAN FOREST CONNECTIONS

webinar series

The Green Heart Project: Studying the impact of trees and green space on cardiovascular health

Wednesday, March 14, 2018 / 1:00 - 2:15pm ET

Louisville Kentucky's urban laboratory is embarking on a study of how environmental differences within the city's neighborhoods give rise to health disparities, and how local social networks and personal environments created by lifestyle choices bear upon individual health and well-being. This study will specifically examine the impact that urban forests and green spaces have on cardiovascular disease (CVD) risk. While previous studies have shown that exposure to air pollutants like those found in urban areas increases CVD risk and mortality, the impact of the urban forest and overall green spaces on CVD has not been directly assessed. This presentation will discuss the pragmatic, interventional trial known as The Green Heart Project, designed to test the hypothesis that exposure to neighborhood greenery diminishes CVD risk by decreasing the levels of local air pollution.

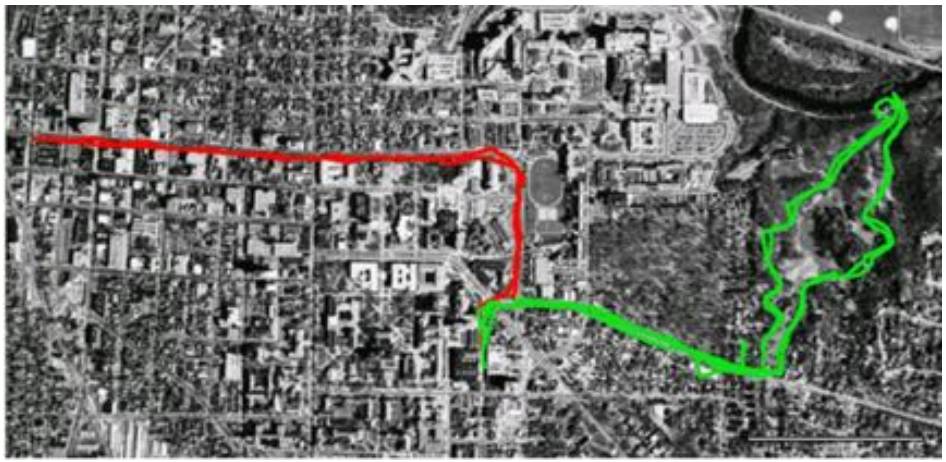
Improving Depression

Berman et al. 2012.
Journal of Affective Disorders

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



Shinrin yoku (forest bathing)

- extensive research
- restorative experiences
- workers retirees
- networked system, 52 bases in Japan

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*

Tim Lynch Associates

www.rph.org/eden.html

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Trees, Income & Health

▲ income ▲ health care ▲ health

11 more trees in a city block

decreased cardio-metabolic conditions =

increase in annual personal income

of $20,000, or

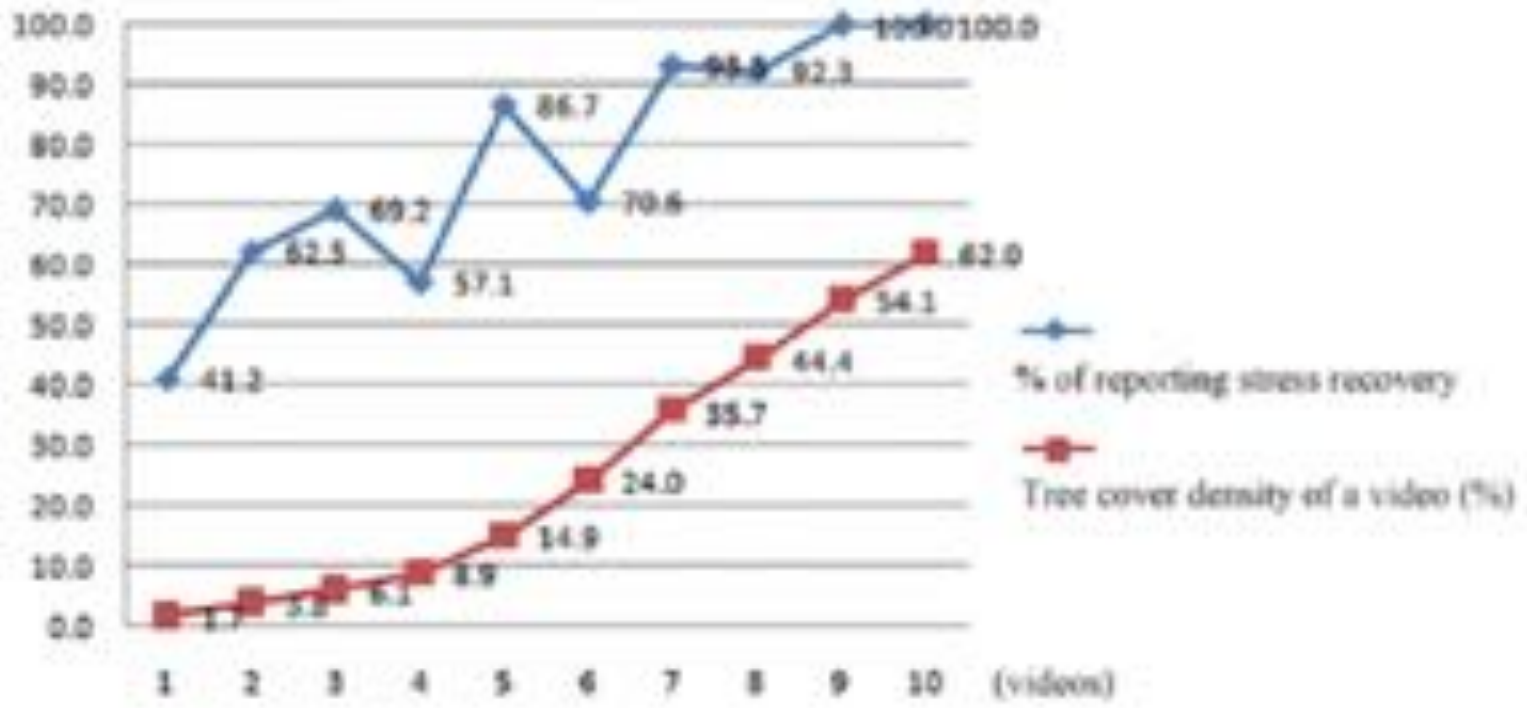
moving to a neighborhood

with $20,000 higher median income

Kardan, et al. 2015. Scientific Reports 5, 11610

Canopy Cover & Stress

images of canopy cover varied 0-60%



Jiang, et al. 2016. Environment and Behavior 48,607-629.

Vegetation & Mental Health

- vegetation cover and afternoon bird abundances
- lower prevalence of depression, anxiety, and stress:

  depression, more than 20% cover,

  anxiety, more than 30% cover,

  stress, more than 20% cover

“dose” at which health issue is lower

Cox et al. 2017. BioScience 67, 147-155.

Trees & Physical Activity

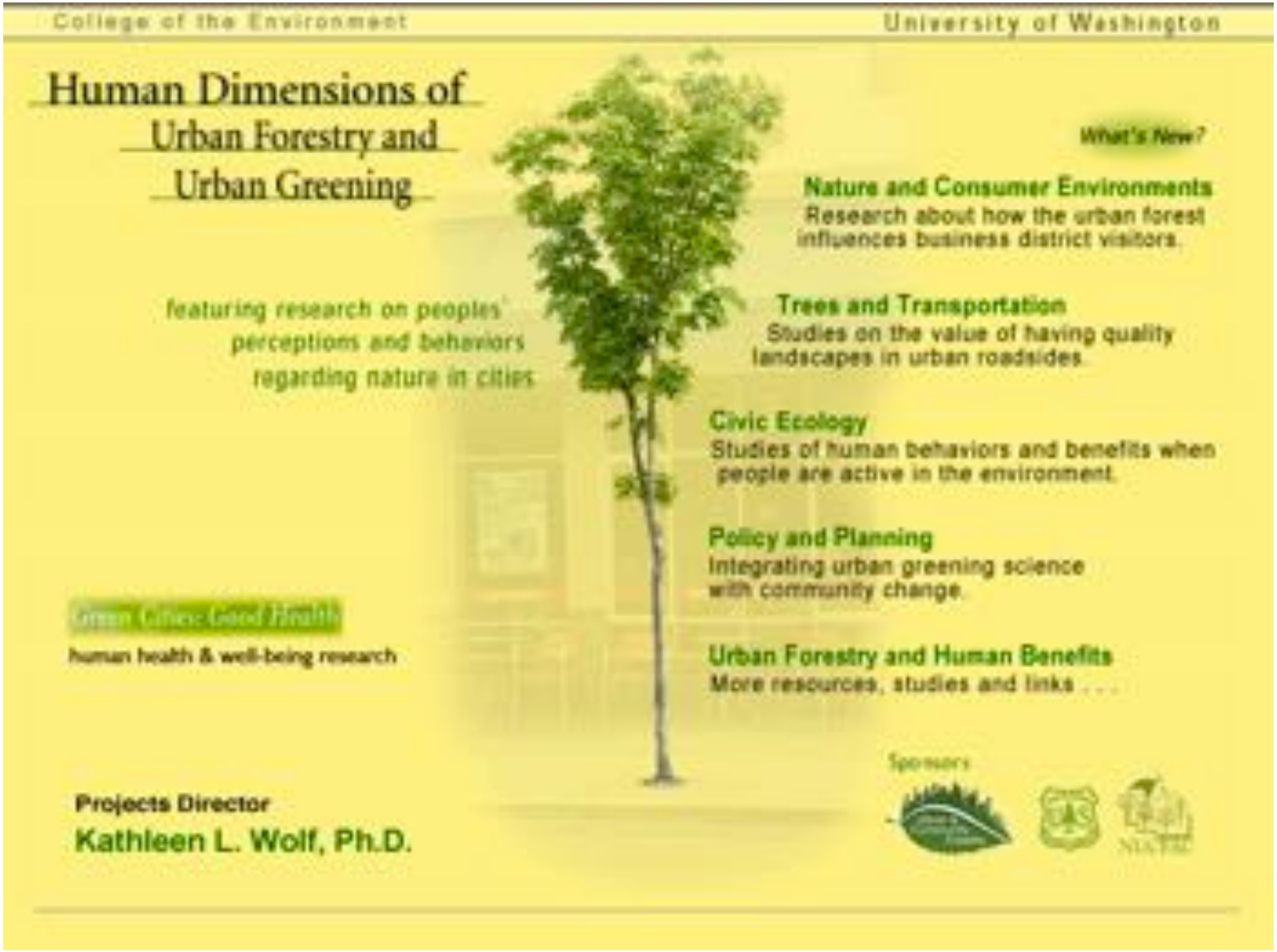
- grades 6 to 8, urban residents, 2009/10 Canada Health Behaviour in School-Aged Children survey
- proportion of neighborhood land covered by trees associated with physical activity outcome
- 5% increase in treed area cover - 5% increase in relative odds of increasing free-time physical activity outside of school hours

Janssen et al. 2015. International Journal of Behavioral Nutrition and Physical Activity

Summary:
Knowledge to Practice

- nearly 40 years of research
- critical mass of evidence – next
- policy, programs, equity
- integrating urban forest goals with broader urban systems needs

Everyday Need & Value

NEARBY NATURE INCLUDES A VARIETY OF SPACES AND PLACES

www.naturewithin.info