

# Nature & Human Health Implications for Seattle's Urban Forest



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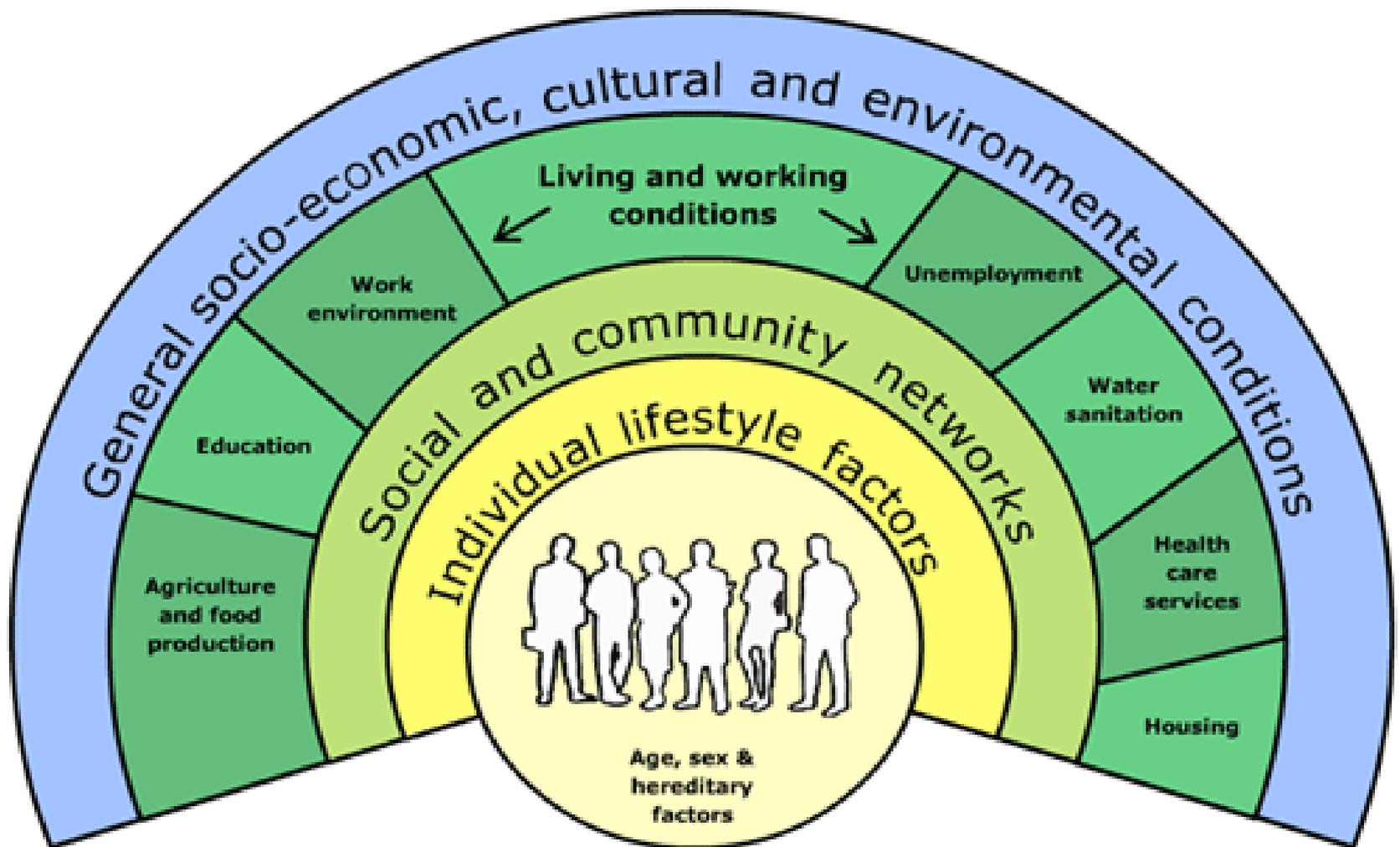
**City of Seattle, UFC/IDT Workshop**  
3 October 2018





# WHO Health Definition

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



# Social Determinants

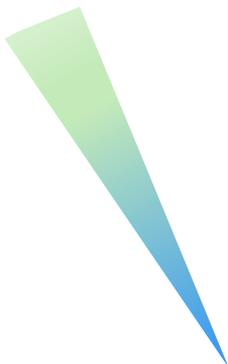


# Outline

- 1. City Trees & Health: the evidence**
- 2. Nearby Nature & Health: the evidence**



3. Program Translations



4. UF Planning/Design

# 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*



# Trees & Physical Activity



- school children in cities grades 6 to 8
- relationship of tree cover to outside-of-school physical activity
- **5% increase in treed area cover = 5% increase in free-time physical activity**

# 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.

# **EAB Tree Loss & Public Health**

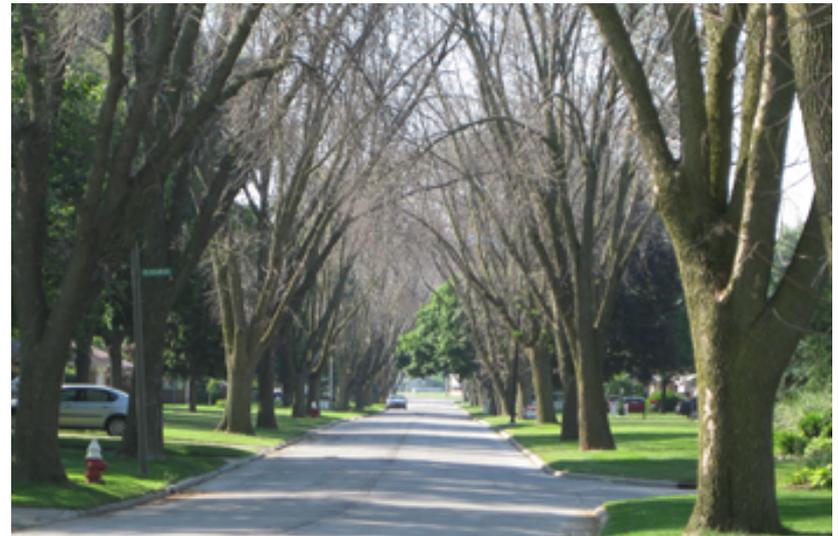
1990 to 2007, 1,296 counties in 15 states  
infected areas vs. no bugs

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**

# Improving Depression

20 adults with major depression  
walk in a park setting and a built setting

🌿 50-minute walks one week apart

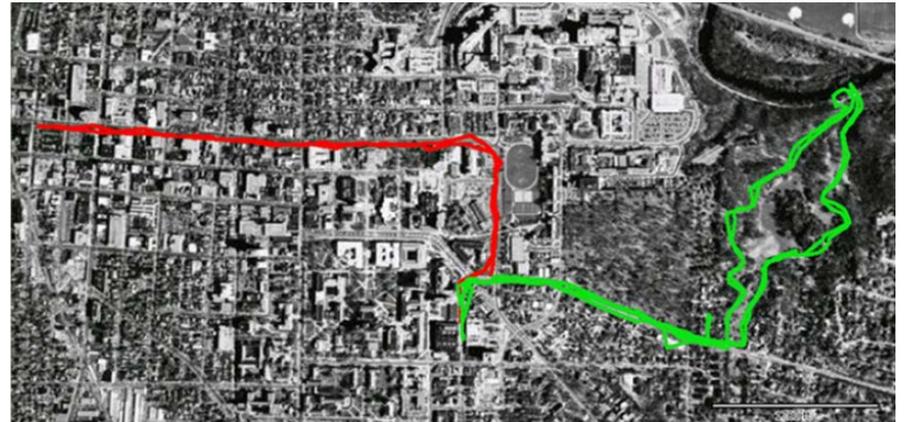
🌿 before-after testing:

🌿 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*





# City Trees & Human Health

**newborn & infant health**

**increased physical activity for kids**

**overall adult health**

**social cohesion**

**respiratory & cardiovascular health**

**reduced depression**

# City Trees and Human Health: A Systematic Review



**Purpose:** carefully collect and synthesize the peer-reviewed evidence concerning city trees and human health

**Sponsors:**



Health  
Canada

Santé  
Canada





# Project Team

-  Kathleen Wolf, Ph.D., University of Washington
-  Sharon Lam, MSc, University of Toronto
-  Jennifer McKeen, MPH, Simon Fraser University
-  Gregory Richardson, MUP, Health Canada
-  Matilda Van Den Bosch, M.D, University of British Columbia
-  Adrina Bardekjian, Ph.D., **Tree Canada**

# Methods



Keyword search (n=1644)



Abstract review (n=436)



Quality assessment (n=198)



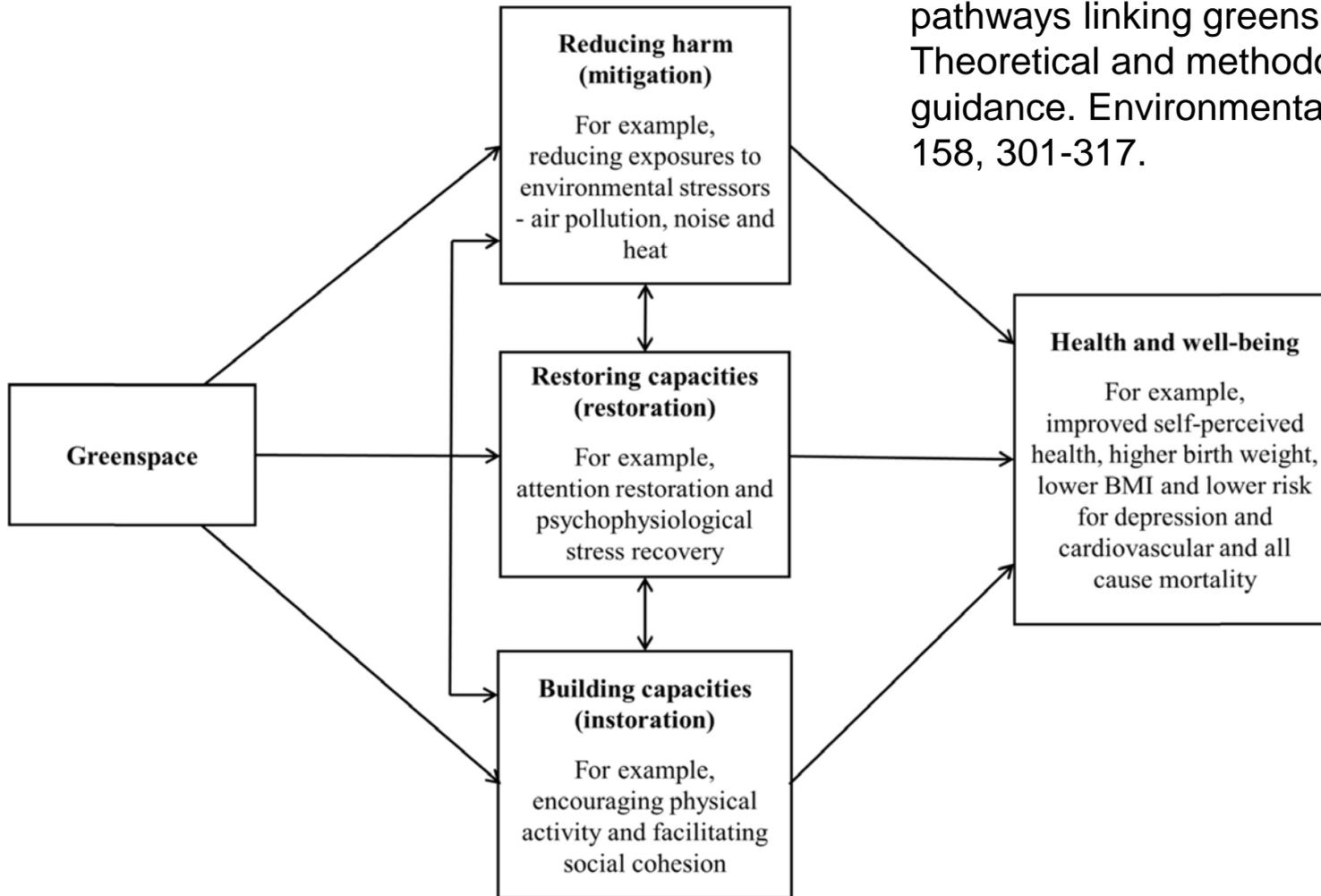
Final article set (n=182)



Synthesize and  
present findings

# Greenspace & Health Pathways

Markevych, I., et al. 2017. Exploring pathways linking greenspace to health: Theoretical and methodological guidance. *Environmental Research* 158, 301-317.



# Literature Review – City Trees & Human Health

USDA Forest Service, U of WA, Health Canada, Natural Resources Canada, Tree Fund

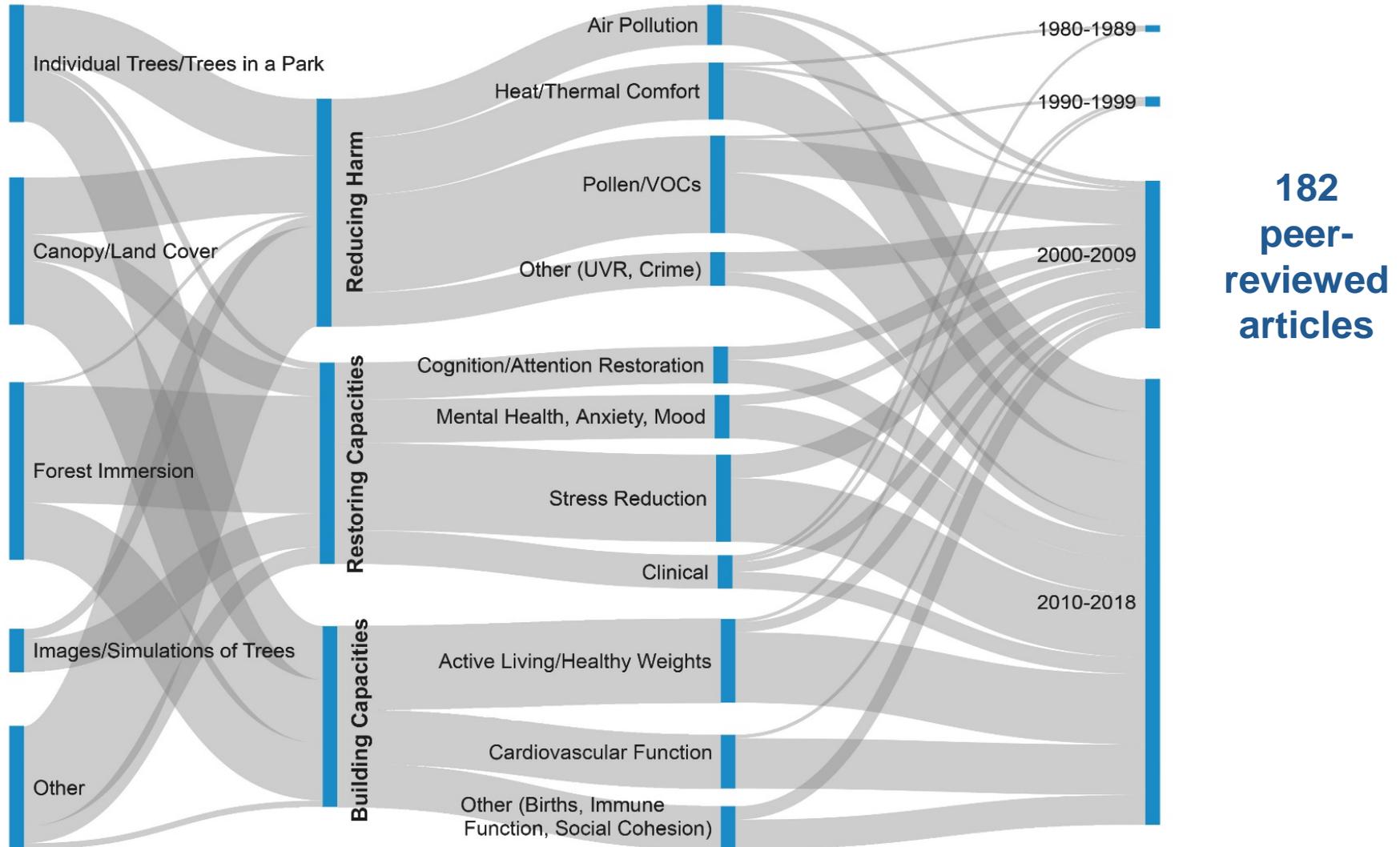


figure credit: Sharon Lam



# Limitations of Evidence

- heterogeneity of study methods, few experiments
- heterogeneity of tree or forest interventions
- lack of replication
- did not include qualitative studies
- thus, not able to conclusively state outcomes

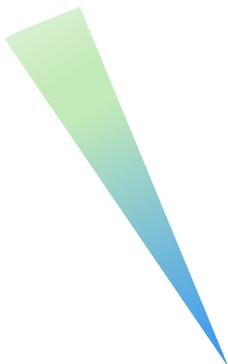


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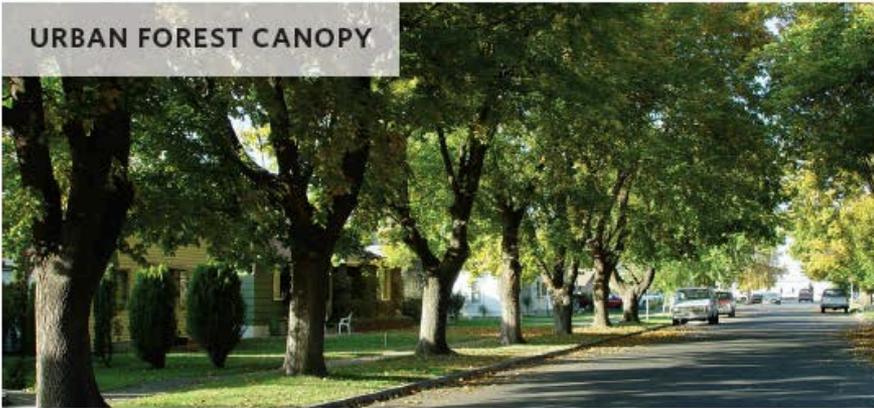


4. UF Planning/Design

# Metro Nature & Human Health

NEARBY NATURE INCLUDES A VARIETY OF SPACES AND PLACES

URBAN FOREST CANOPY



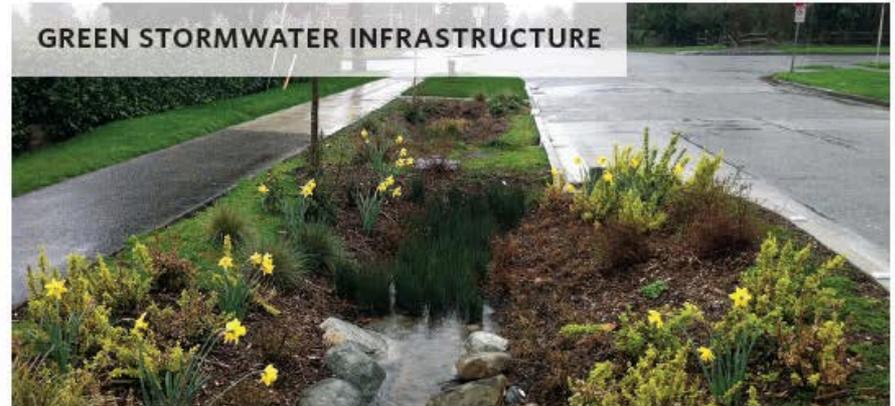
BIOPHILIC DESIGN



PARKS AND GARDENS



GREEN STORMWATER INFRASTRUCTURE



# Green Cities: Good Health

[www.greenhealth.washington.edu](http://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


[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

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.<sup>1,2</sup> 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.<sup>9</sup>
- A study found 7% higher rental rates for commercial offices having high quality landscapes.<sup>14</sup>
- Shoppers claim that they will spend 9% to 12% more for goods and services in central business districts having high quality tree canopy.<sup>34</sup>
- 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.<sup>34</sup>

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





# Science Review

nearby nature & health evidence

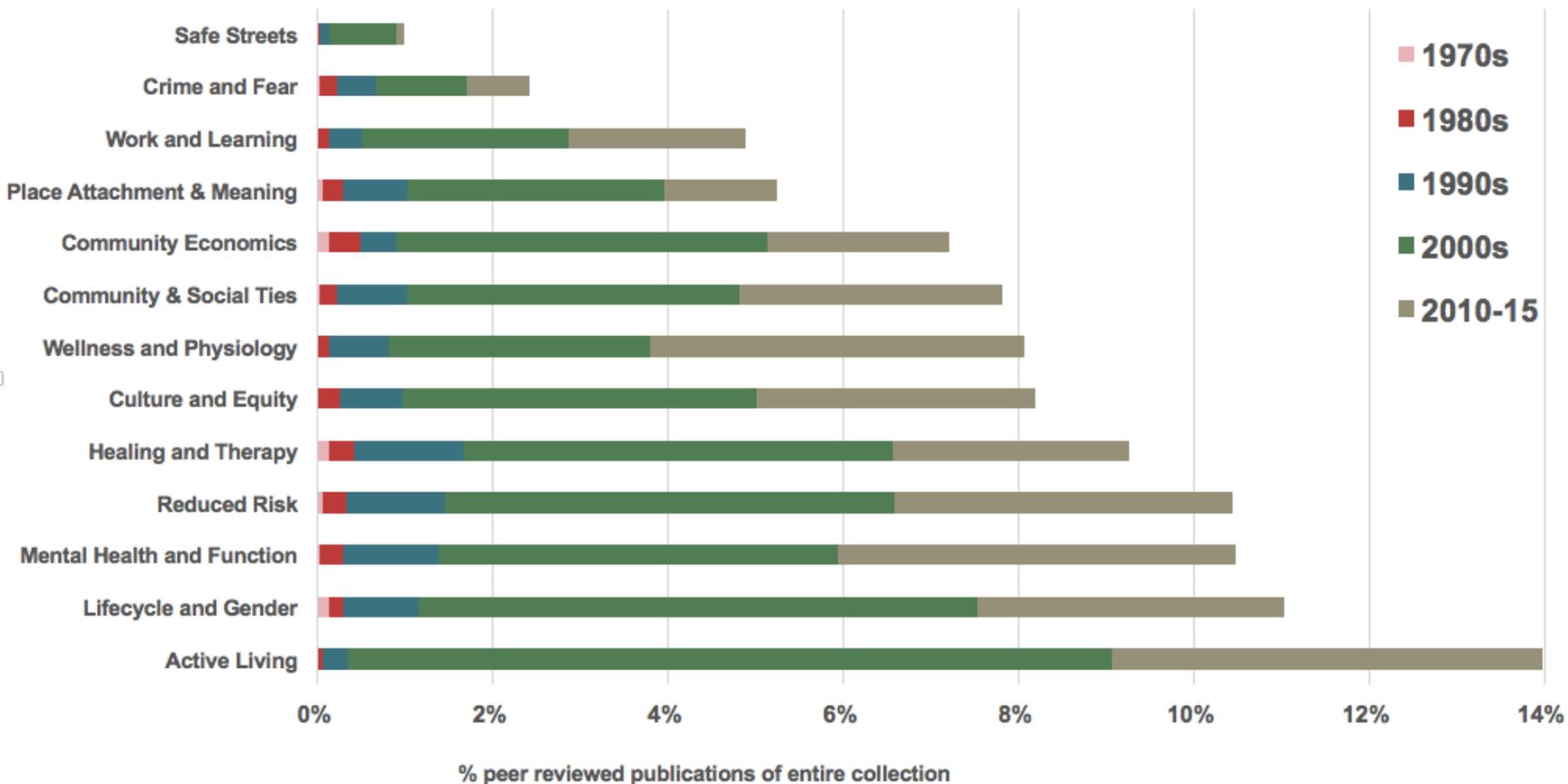
> 40 years

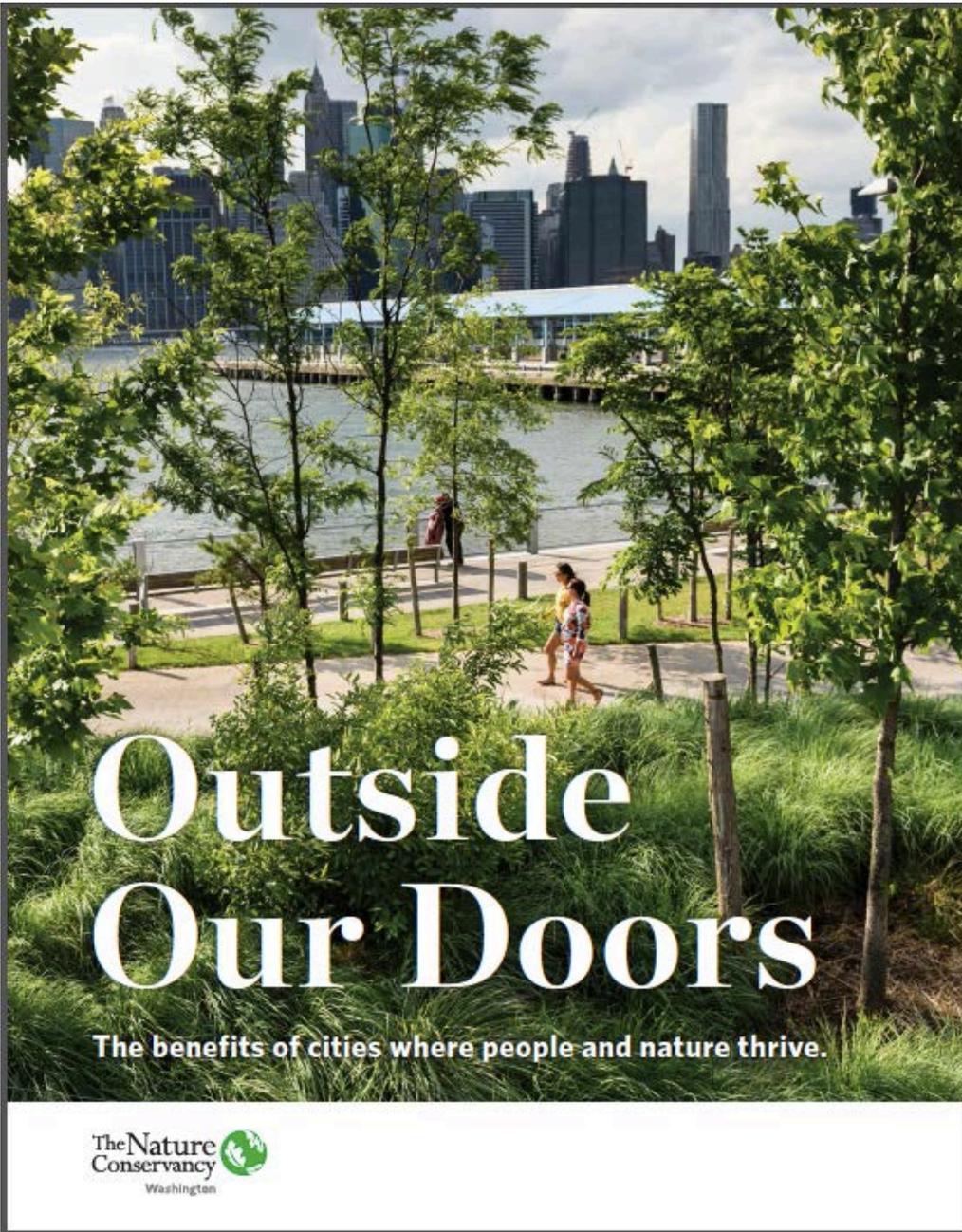
> 5,000 publications

what are the 'stories'?

# Green Cities: Good Health

database of >4,500 peer reviewed publications





# Outside Our Doors

The benefits of cities where people and nature thrive.



design: milepost

co-author: US  
FOREST SERVICE  
DEPARTMENT OF AGRICULTURE

co-author & printing:  
The Nature Conservancy 



United States Department of Agriculture



# URBAN NATURE FOR HUMAN HEALTH AND WELL-BEING

A research summary for communicating the health benefits of urban trees and green space



Forest Service

FS-1096

February 2018

## Introduction

Writers, philosophers, and naturalists have praised the benefits of nature for human health, happiness, and well-being for centuries, but only relatively recently have researchers begun studying and quantifying the complex relationship between human health and nature.

In 1984, Roger Ulrich, professor and director of the Center for Health Systems and Design at Texas A&M University, published the results of a pioneering study that looked at the recovery rates of gall bladder surgery patients in relation to the views from their rooms in a Texas hospital. Some of the patients looked out over a garden and grove of trees, while others had a view of a brick

wall. Ulrich found that patients with a natural view spent fewer days in the hospital and used fewer pain medications (Ulrich 1984).

Ulrich's study helped open the door to a new field of inquiry focused on illuminating the ways that nature influences our physical, mental, and social lives. More than three decades later, a broad and diverse body of scientific literature describes the human health value of nature, confirming that trees, parks, gardens, and other natural settings are as essential to livable and sustainable cities as the other critical systems that keep their residents moving and working.

Findings from the current literature indicate the wide range of effects.

## CONTENTS

- 1 Introduction
- 2 Defining Nature and Health Research
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# USDA Forest Service

# 2018

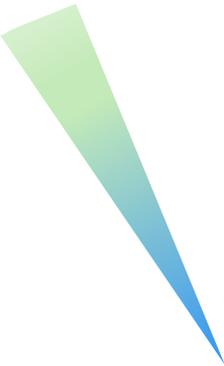


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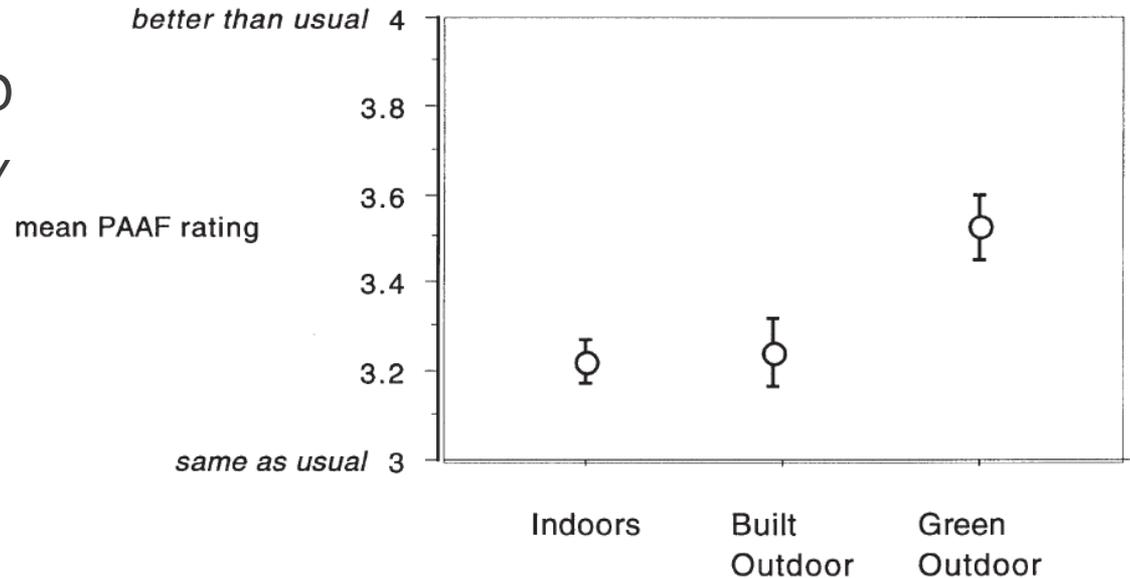
**4. UF Planning/Design**

# Story: Human Health Benefits Across the Life Cycle



# 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*

# Hygiene Hypothesis

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

Lowry et al. 2007. Neuroscience



# Eat Dirt!



# Fiddleheads Forest School Washington Park Arboretum (Seattle)



cognitive  
social &  
physical  
learning

# CDC moderate activity recommendations



parks, active living, active transit





# HIKE IT BABY



# Parks Prescription

Rx for Health

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



**PARKS Rx**  
Your Prescription For Better Health



walk WITH a  
DOC  
educate. exercise. empower.



credit: healthy central florida



credit: CNN.com

# Shinrin yoku (forest bathing)

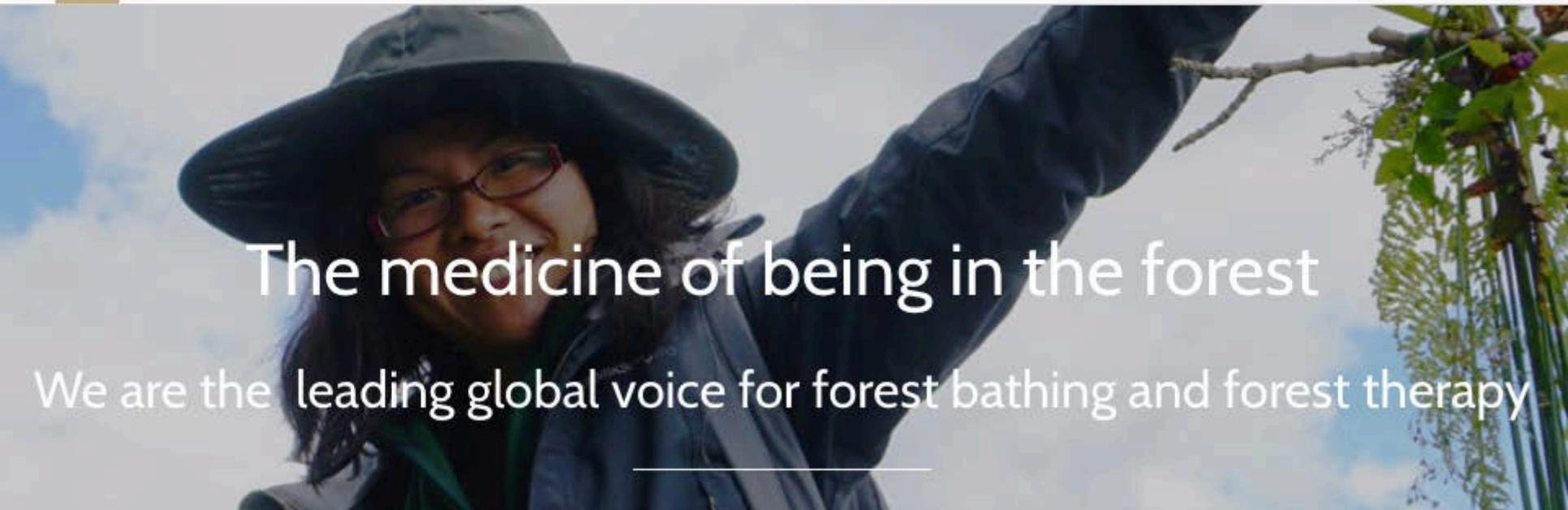
- extensive research
- restorative experiences
- workers  
retirees
- networked system,  
52 bases  
in Japan





ASSOCIATION OF  
Nature & Forest Therapy  
GUIDES & PROGRAMS

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A photograph of a woman with long dark hair, wearing a wide-brimmed hat and a dark raincoat, smiling in a forest. Her right arm is raised, reaching towards a tree branch. The background is a soft-focus forest scene with green foliage and a blue sky with light clouds.

The medicine of being in the forest

We are the leading global voice for forest bathing and forest therapy

**Santa Rosa, California**

# 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





BLOEDEL  
RESERVE

VISIT

EXPERIENCE

EVENTS

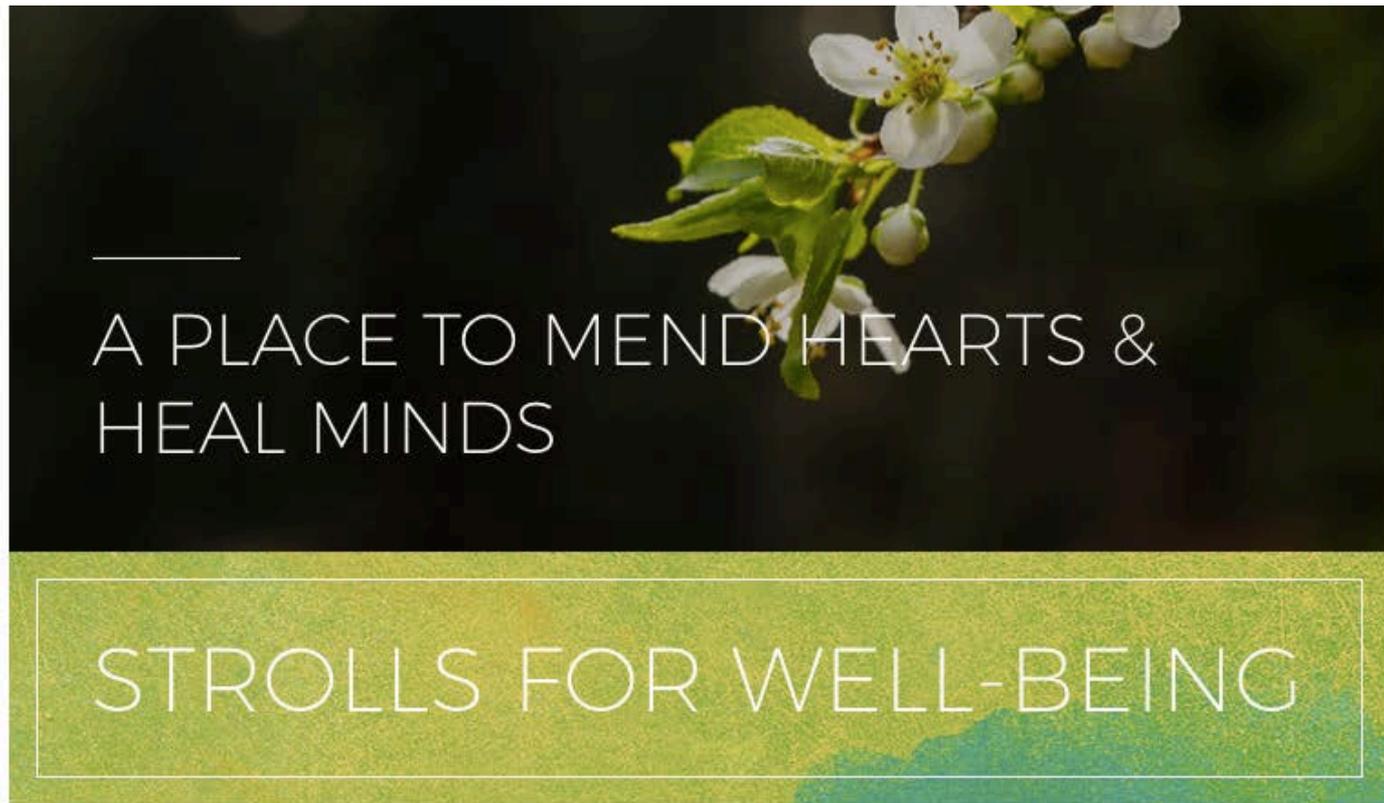
STROLLS FOR WELL-BEING

CREATIVE RESIDENCY

GET INVOLVED

ABOUT

CONTACT



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.



# Other Programs?

-  study or research
-  program interpretation
-  other possibilities within Seattle's urban forest?

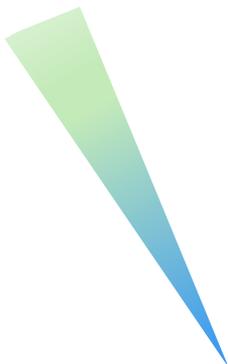


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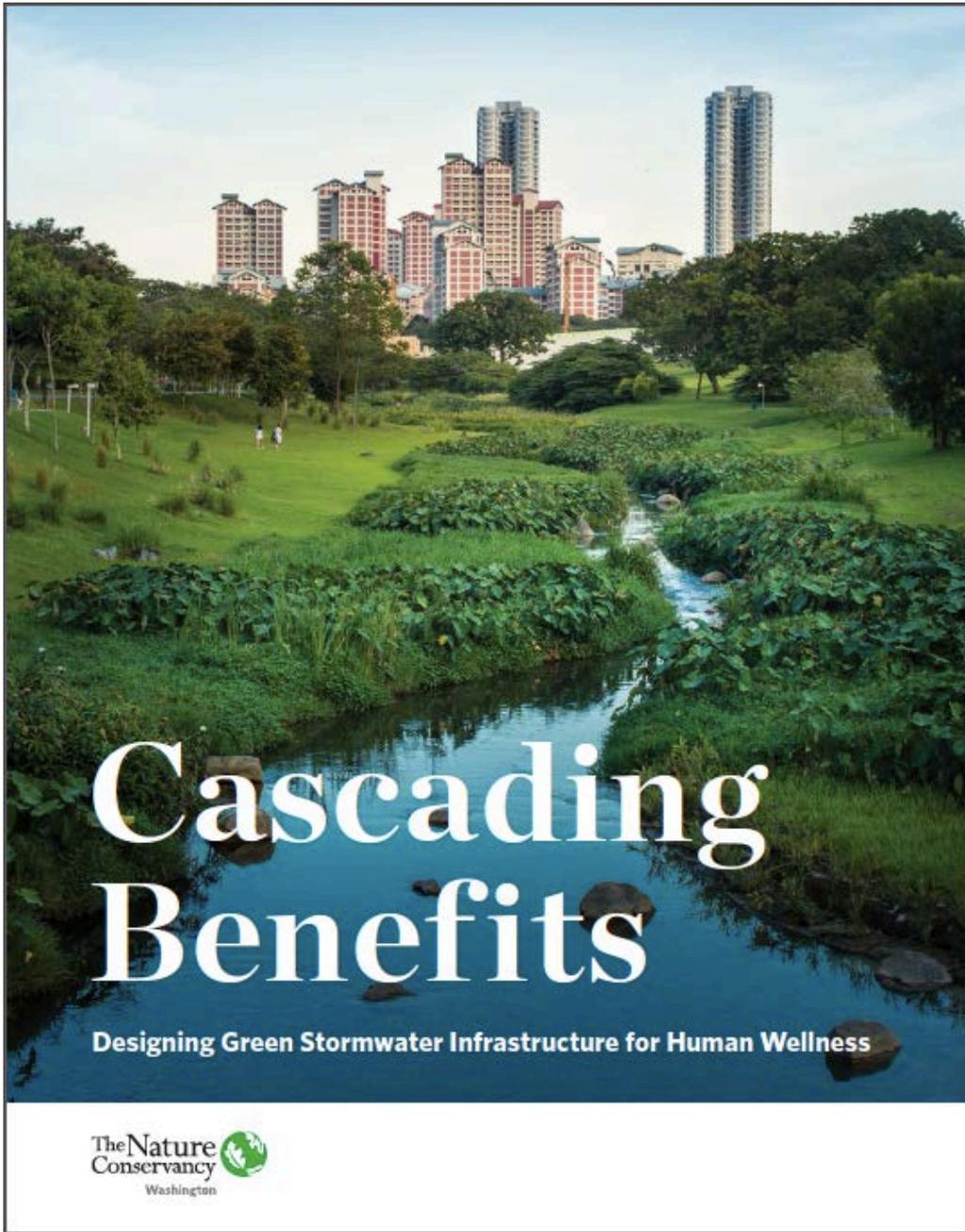
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# Cascading Benefits

Designing Green Stormwater Infrastructure for Human Wellness

The Nature Conservancy  
Washington

co-author:



co-author & printing:

The Nature Conservancy 

# Walking Programs

children  
elders  
families



Transport for Greater Manchester

## Greater Manchester Walking Weekends

Join our free guided walks  
Routes to suit all ages and abilities

16-18 September 2016  
21-23 October 2016

For more details visit:  
[www.tfgm.com/walking](http://www.tfgm.com/walking) | [f/GMwalkingfestival](https://www.facebook.com/GMwalkingfestival)

Warning: Wet Floor

# Vegetation & Mental Health

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

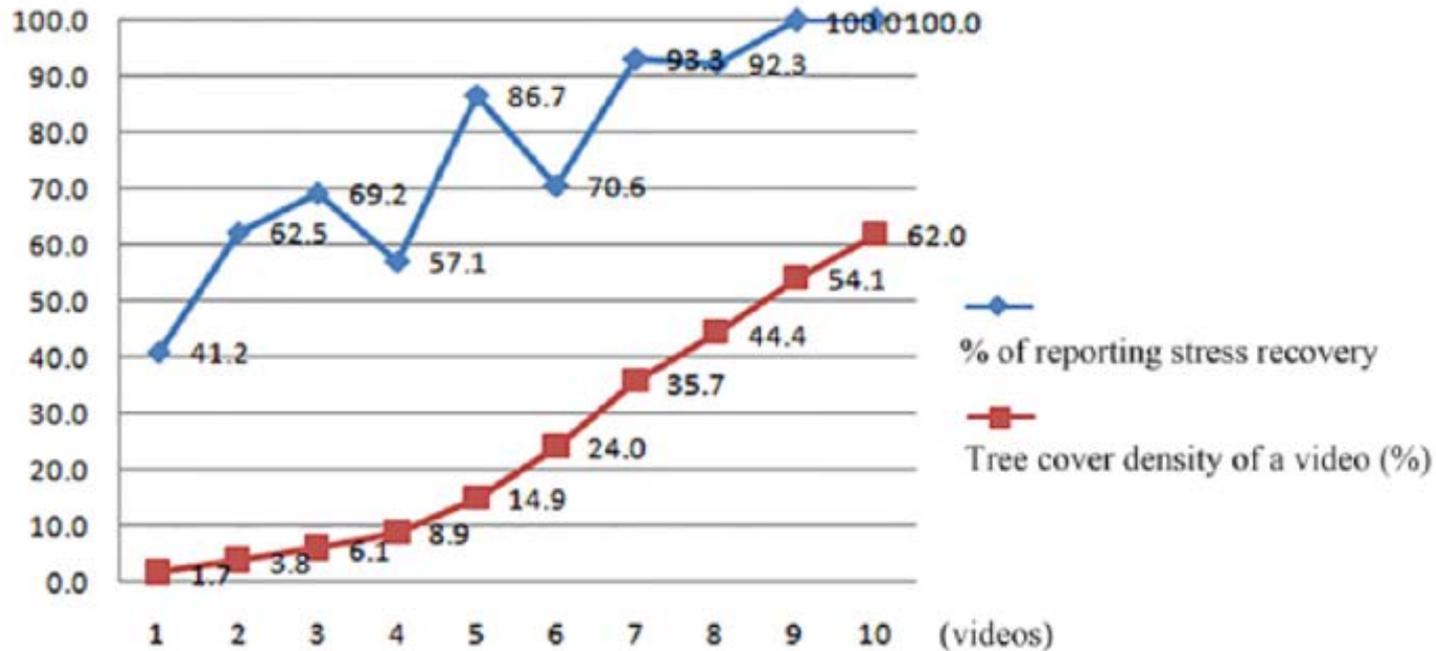
depression, more than 20% cover,  
anxiety, more than 30% cover,  
stress, more than 20% cover

**“dose” at  
which health  
issue is  
lower**

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

# Canopy Cover & Stress

images of canopy cover varied 0-60%



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

# 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*

# 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

Summary:

# Knowledge to Practice



- nearly 40 years of research:  
city trees, nearby nature
- critical mass of evidence – now what?
- integrate evidence into planning & mgmt
- integrate urban forest goals with broader urban systems needs

## Human Dimensions of Urban Forestry and Urban Greening

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

### **Green Cities: Good Health**

human health & well-being research

Projects Director  
**Kathleen L. Wolf, Ph.D.**



*What's New?*

### **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.

### **Urban Forestry and Human Benefits**

More resources, studies and links . . .

Sponsors

