Streets & Green Infrastructure:
urban co-design for health co-benefits

Kathleen Wolf, Ph.D.
Research Social Scientist

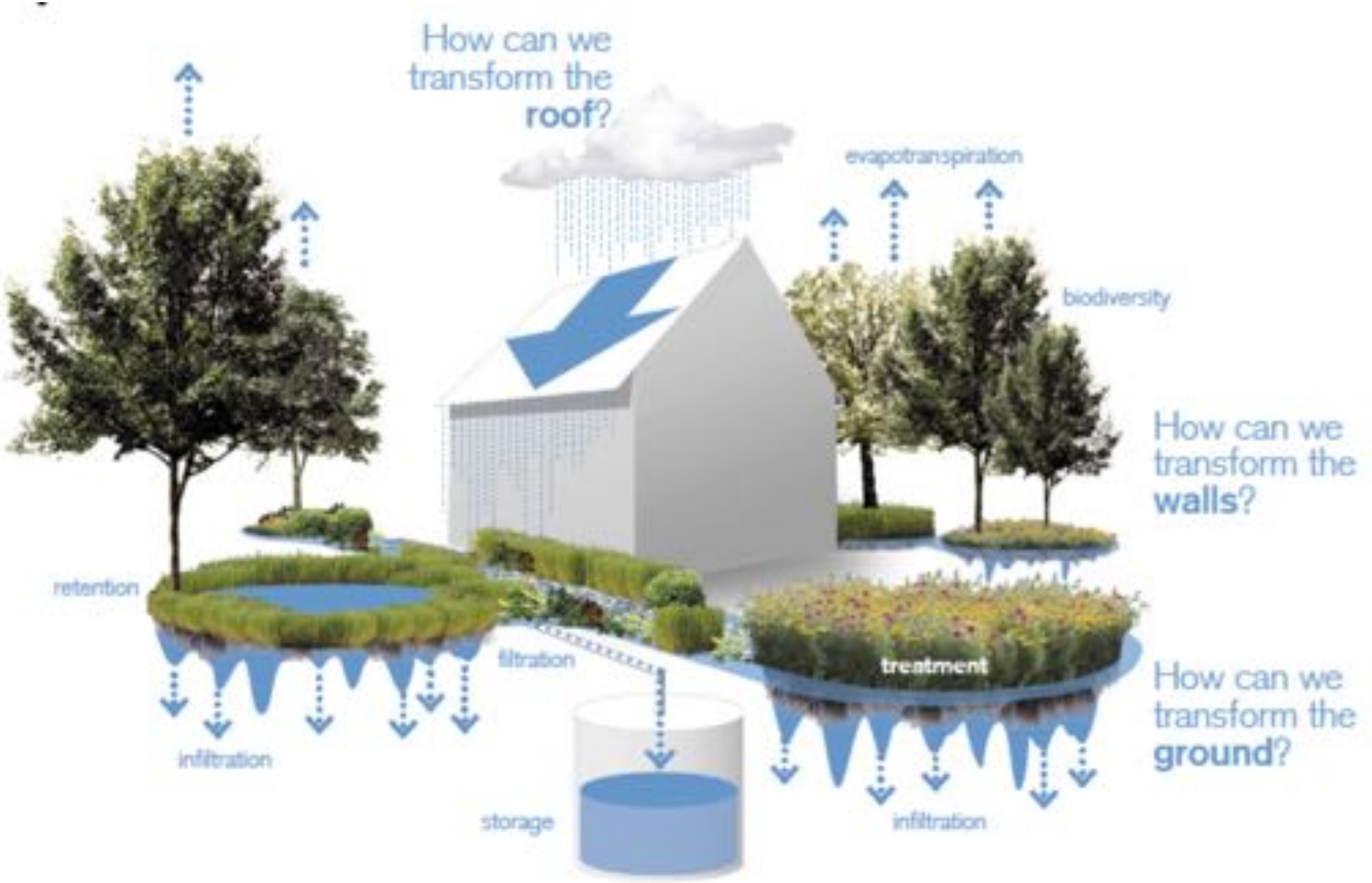
University of Washington (Seattle)
School of Environmental and Forest Sciences

University of British Columbia
Urban Forests & Design, class guest lecture
Vancouver, Canada
21 January 2019

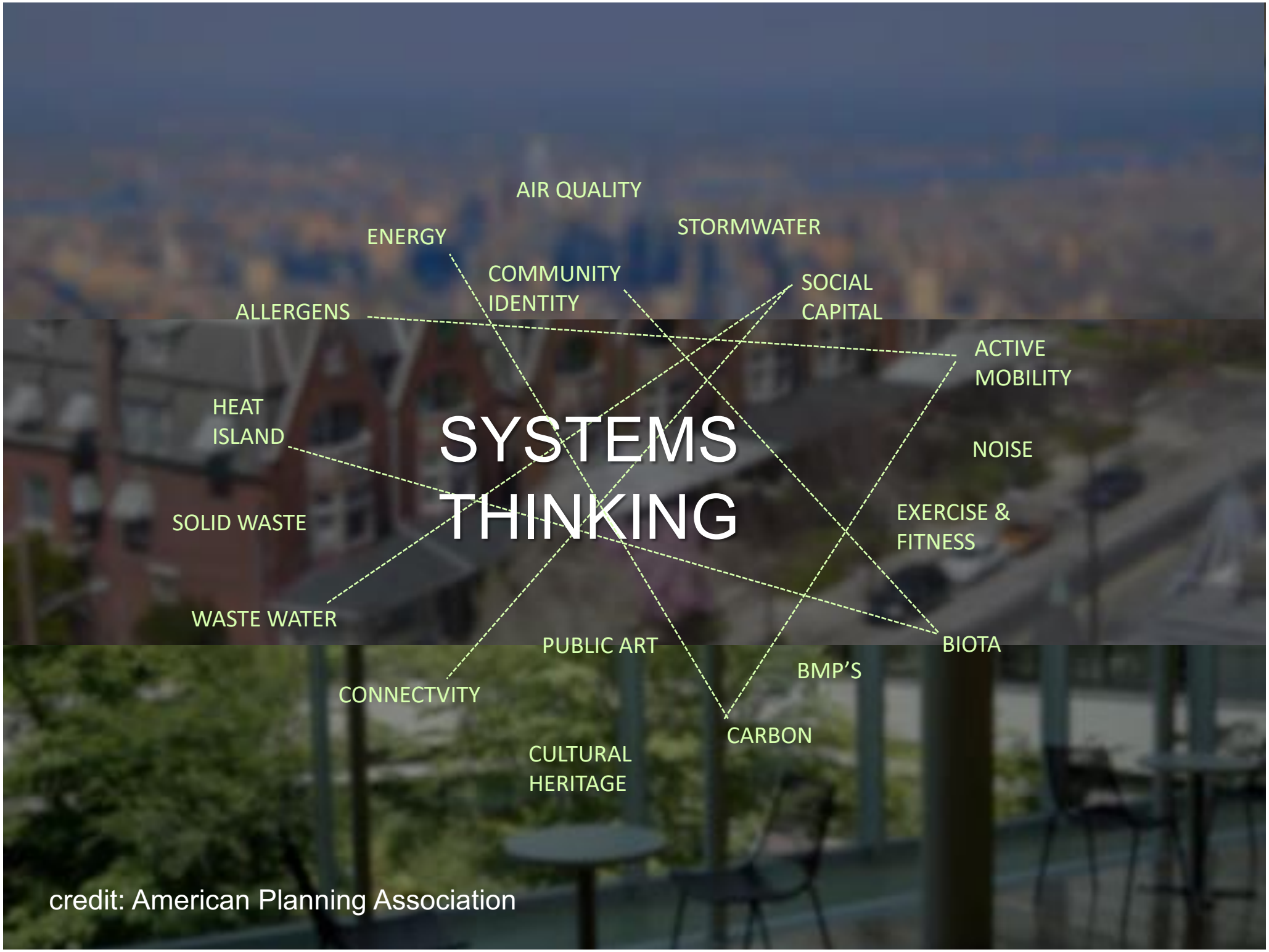
Outline

1. **Nearby Nature & Health: the evidence**
2. **Evidence to Action**
3. **Case Studies**

08/04/2005



Low Impact Development: A Design Manual for Urban Areas, 2010


AIR QUALITY
ENERGY
STORMWATER
COMMUNITY IDENTITY
SOCIAL CAPITAL
ALLERGENS
ACTIVE MOBILITY
HEAT ISLAND
SYSTEMS THINKING
NOISE
SOLID WASTE
EXERCISE & FITNESS
WASTE WATER
BIOTA
PUBLIC ART
BMP'S
CONNECTVITY
CARBON
CULTURAL HERITAGE
credit: American Planning Association

World Health Organization

Health Definition

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

Social Determinants

Green Cities: Good Health

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

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.

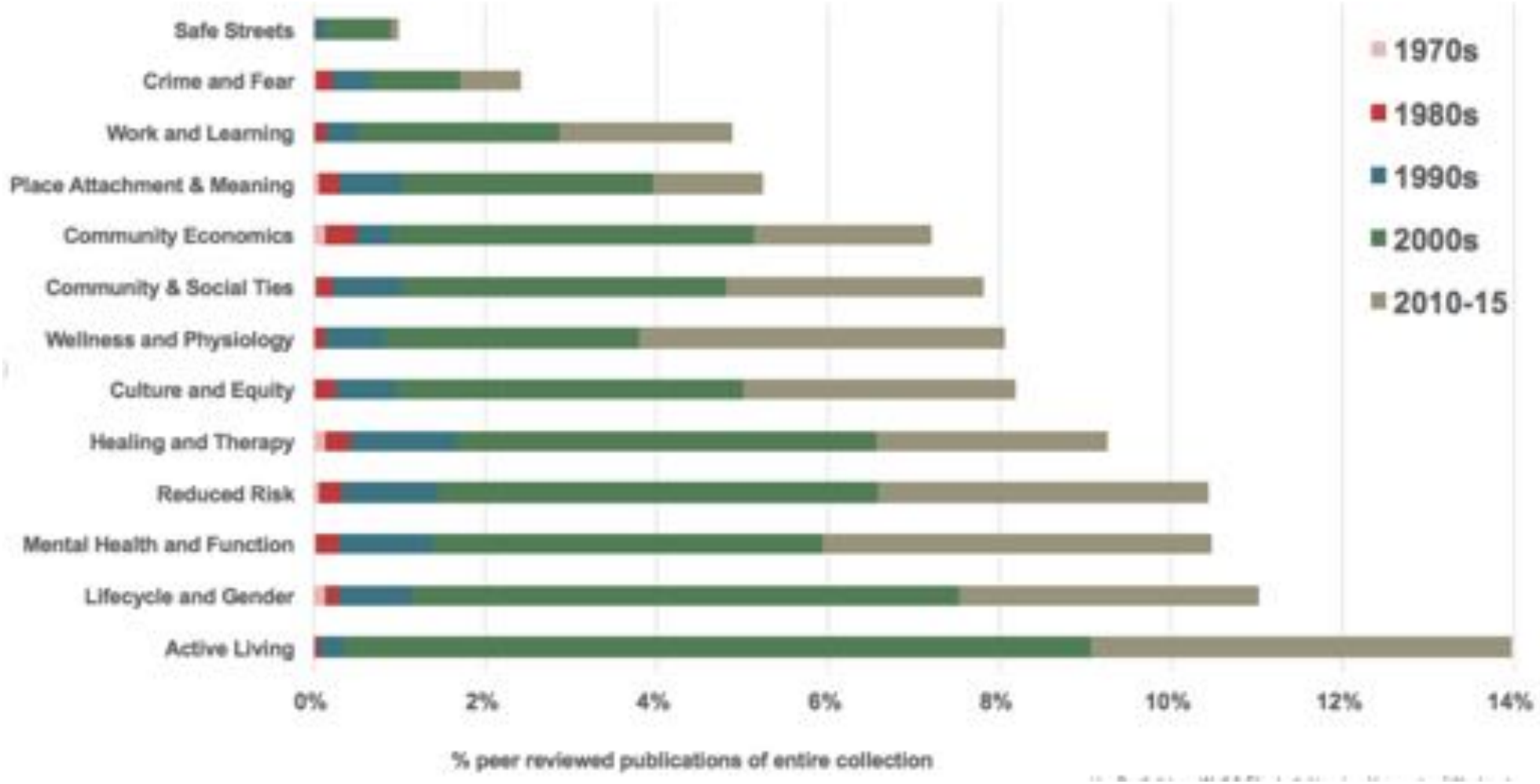
street trees boost market value of houses, providing tax revenue for communities

Fast Facts

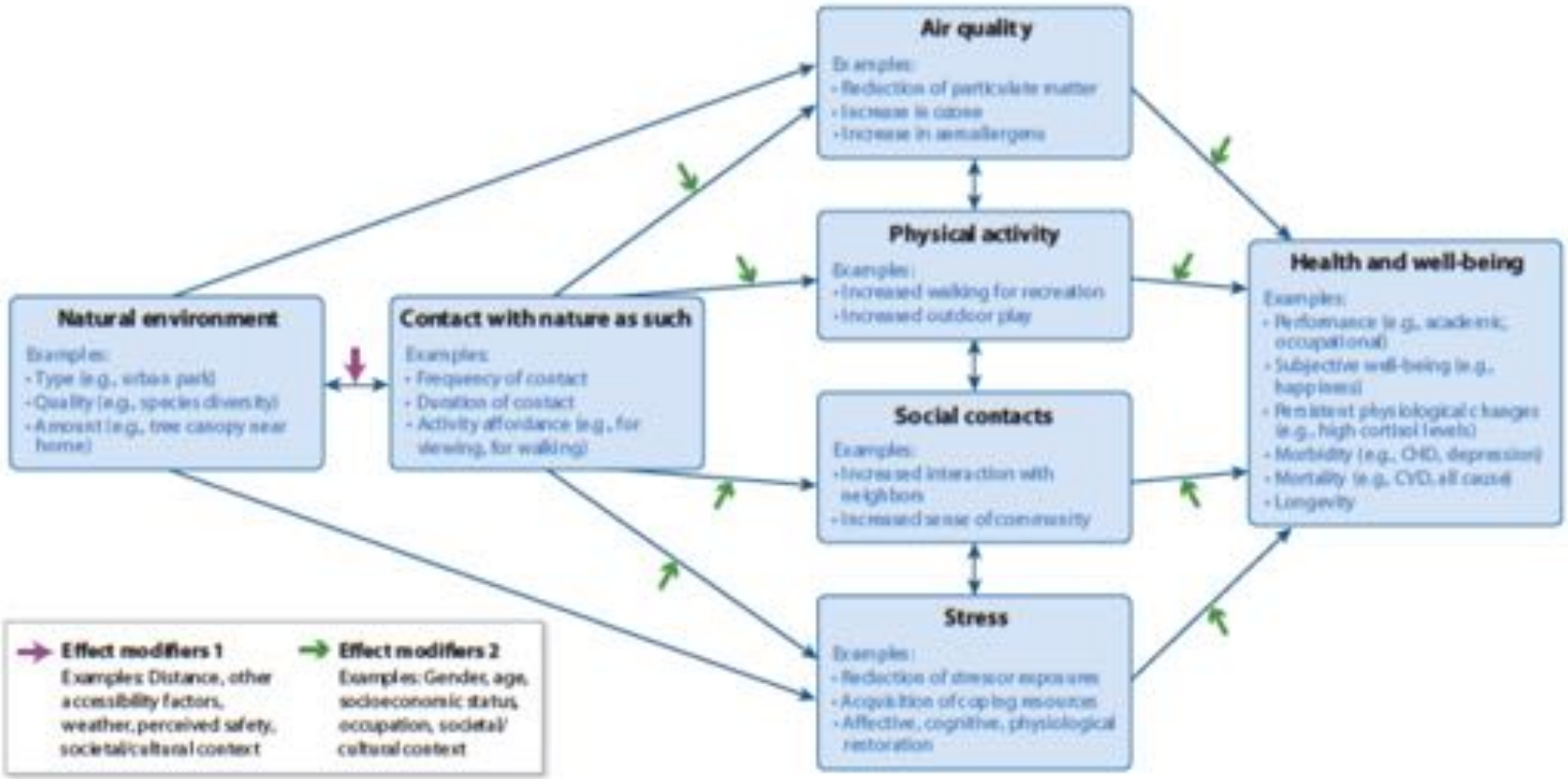
- The presence of larger trees in yards and as street trees can add from 3% to 15% to home values throughout neighborhoods.
- Averaging the market effect of street trees on all house values across Portland, Oregon yields a total value of $1.35 billion, potentially increasing annual property tax revenues $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

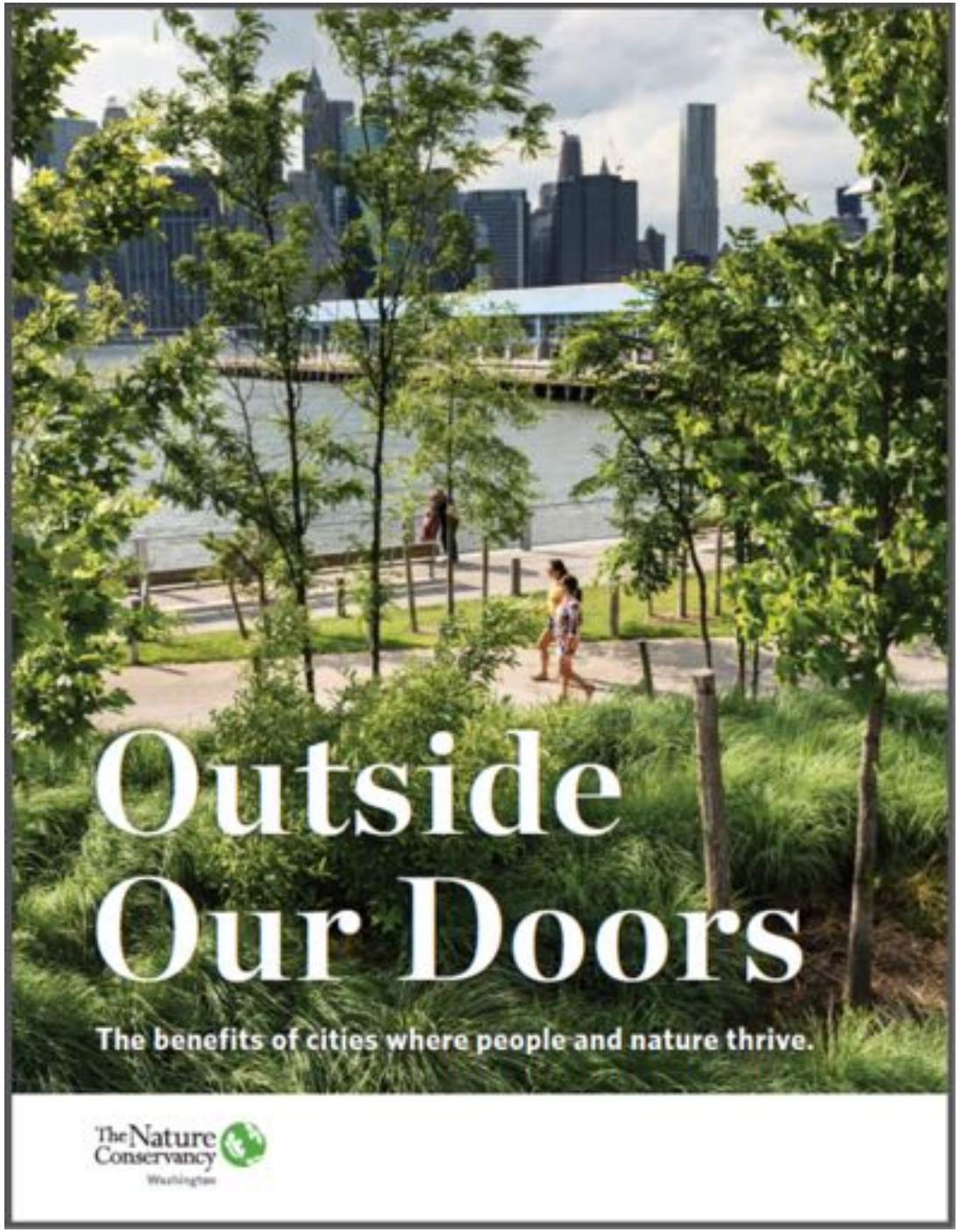
database of >4,500 peer reviewed publications



strength of evidence; causal mechanisms?



Hartig, T., R. Mitchell, S. de Vries, and H. Frumkin. 2014. Nature and Health. Annual Review of Public Health 35, 1: 207-228.



design: milepost

co-author: FOREST SERVICE U.S. DEPARTMENT OF AGRICULTURE

co-author & printing: The Nature Conservancy

Outline

1. **Nearby Nature & Health: the evidence**
2. **Evidence to Action**
3. **Case Studies**

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

Bloomfield et al. 2016 Perspectives in Public Health

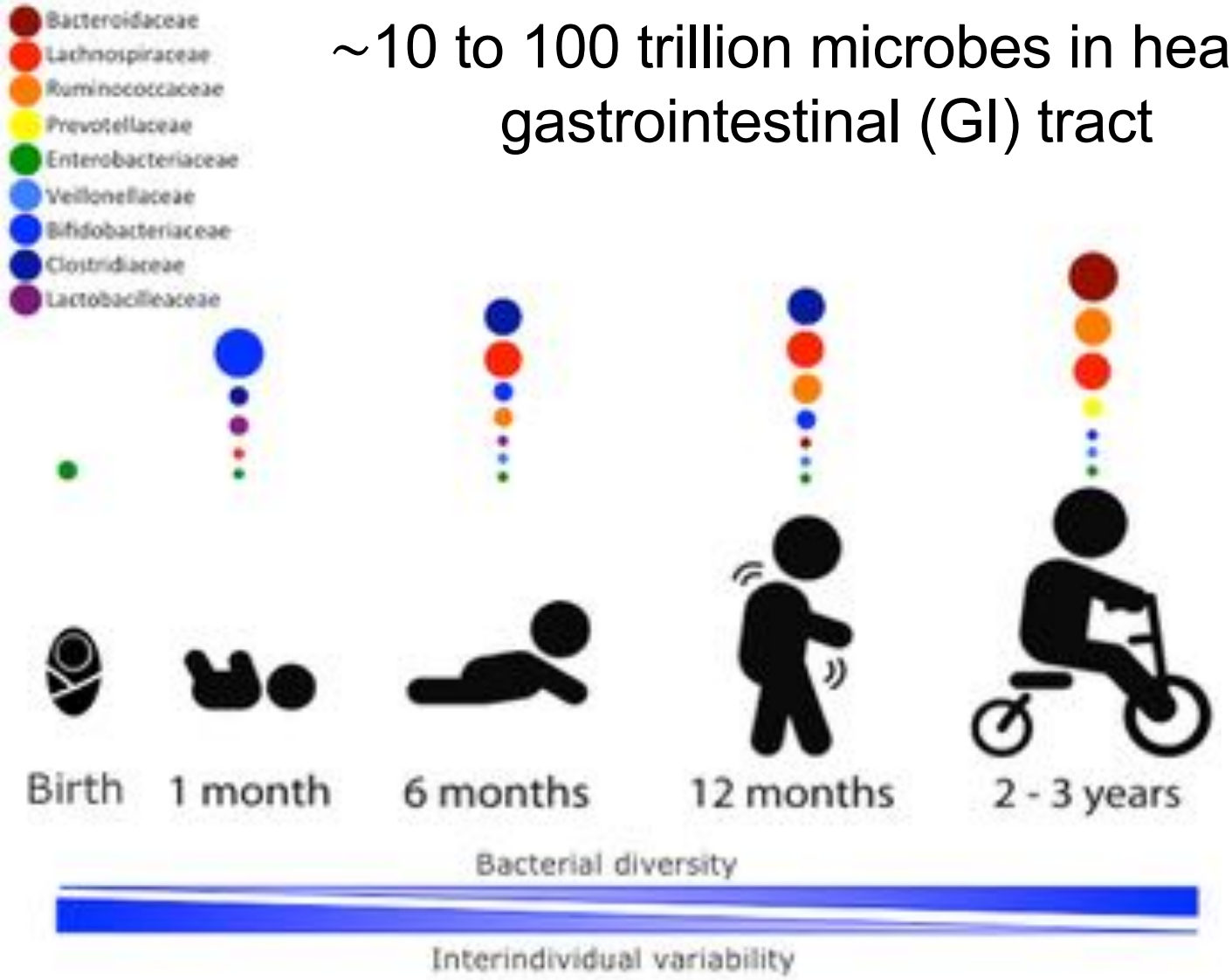
Healthy Microbiome

- control obesity & asthma
- boost immune function
- improve mental health

put aside
the
Hygiene
Hypothesis

need contact with ‘Old Friends”

~10 to 100 trillion microbes in healthy gastrointestinal (GI) tract



intestinal microbiome development

Arrieta et al. 2014. Frontiers in Immunology

Create Forests!

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

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

health agencies recommend
moderate activity for health
promotion & disease prevention
parks, active living, active transit

Walking Programs

children
elders
families

Walking Meetings

creativity, energy, communication, health

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

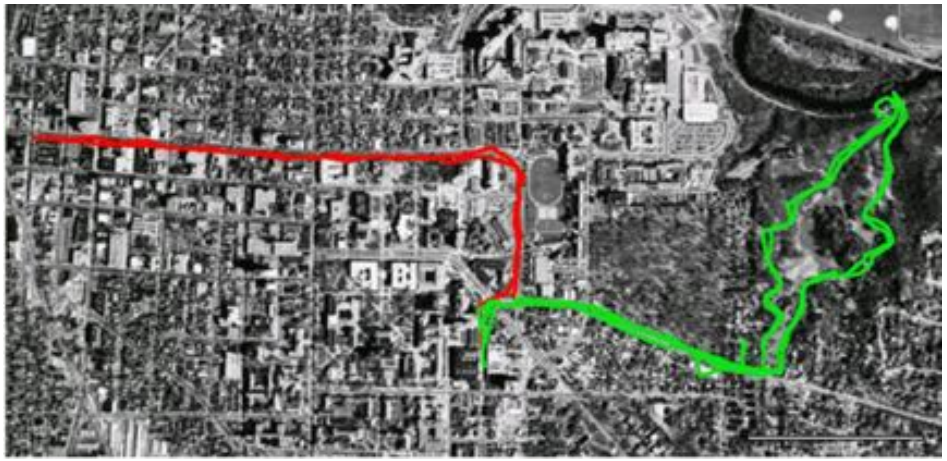
Improving Depression

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)

Berman et al. 2012. *Journal of Affective Disorders*

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

Parks Prescription

PARKS Rx

Your Prescription For Better Health

This information is provided for educational purposes and is not to be considered medical advice.

www.REACHforbetterhealth.com/ParksRx

Made possible with funding from the Centers for Disease Control and Prevention

walk with a doc
educate. exercise. empower.

credit: healthy central florida

credit: CNN.com

Evidence to Action

40 years of research
nearby nature for health benefits
> 4,000 published articles
research to application

Outline

1. **Nearby Nature & Health: the evidence**
2. **Evidence to Action**
3. **Case Studies**

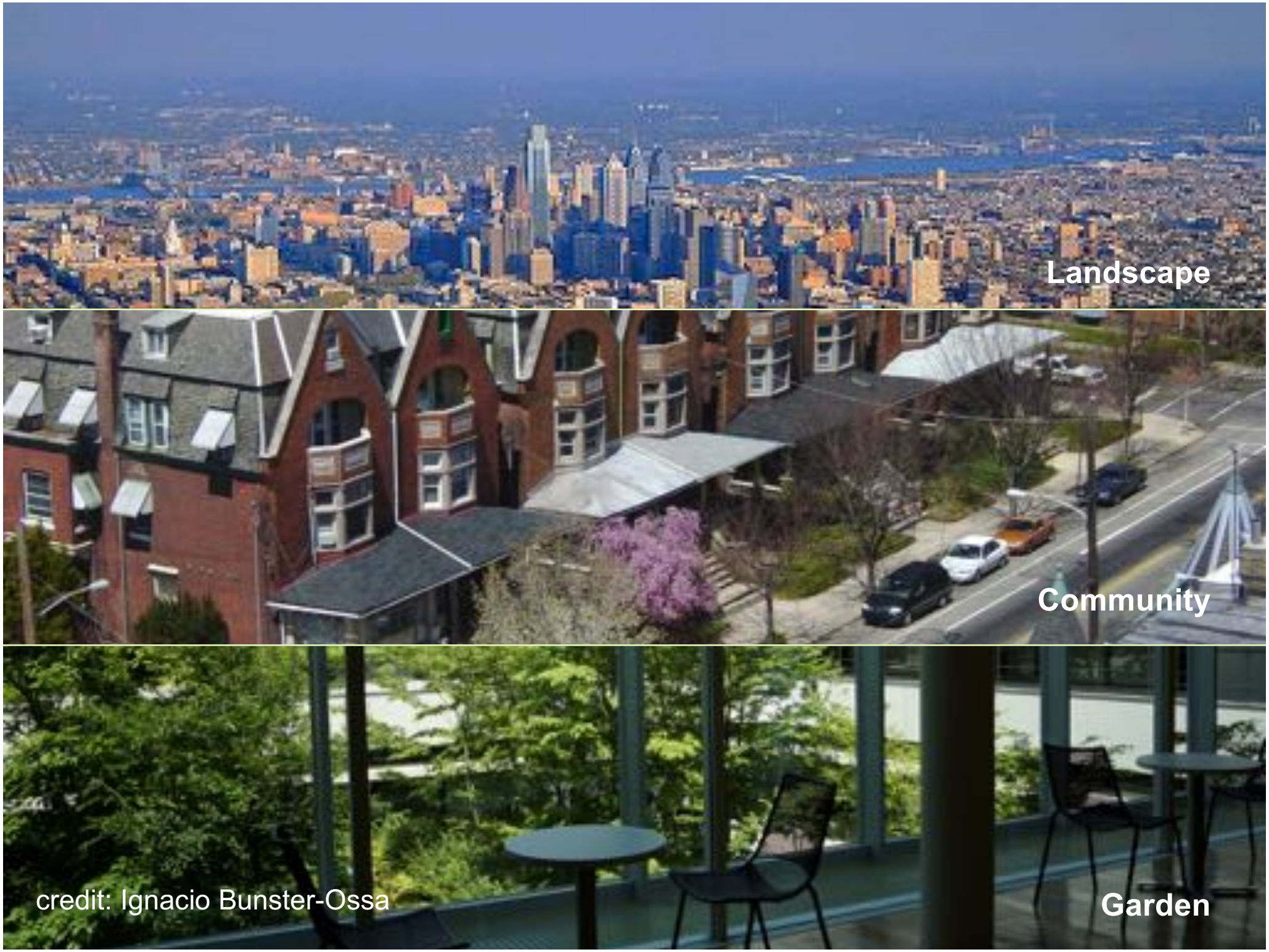
the Chenoggye freeway

Seoul, South Korea

~ 1970-2005

Cheonoggyecheon Stream Restoration

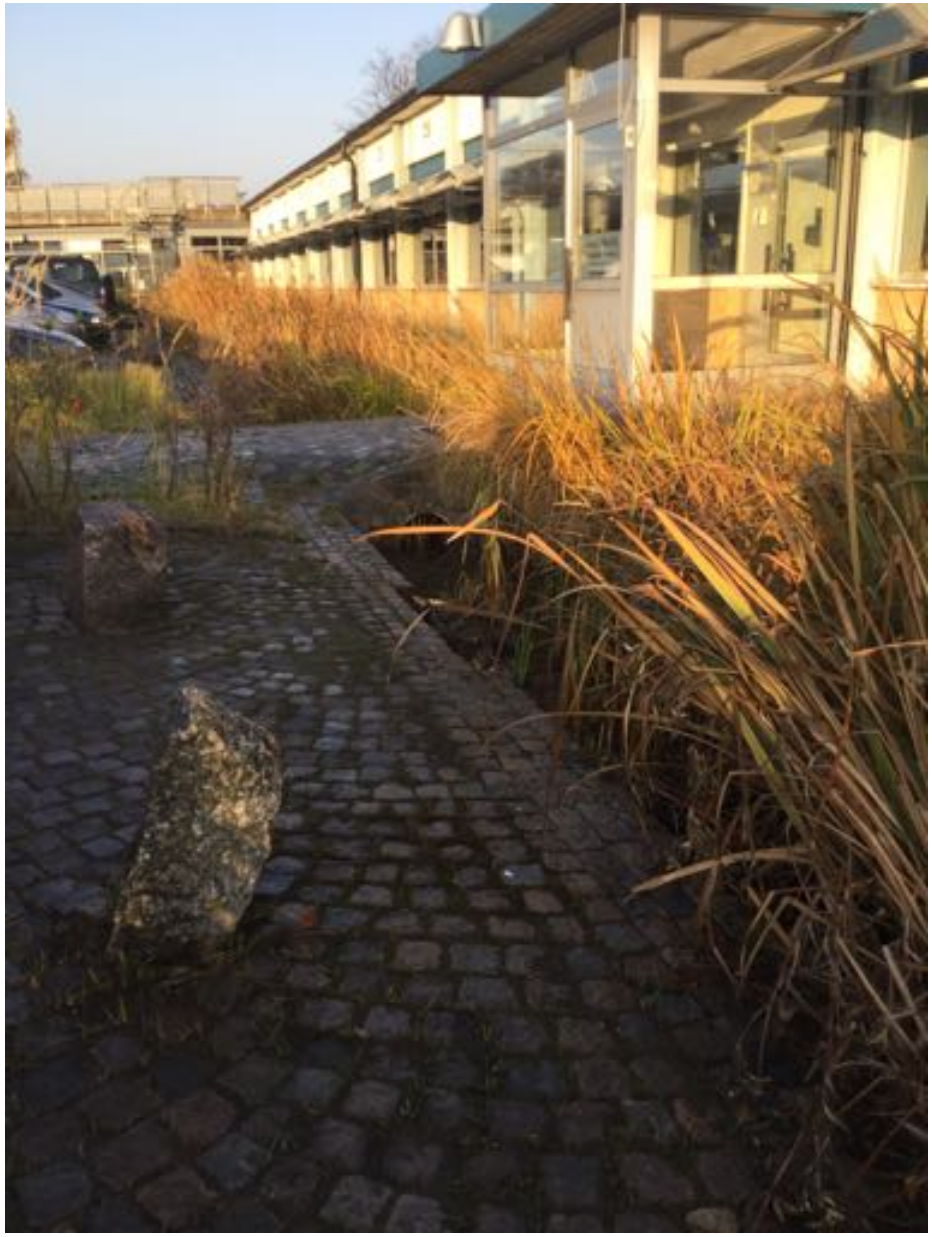
8.4 km, $900 M


Landscape
Community
credit: Ignacio Bunster-Ossa
Garden

Stormwater Management

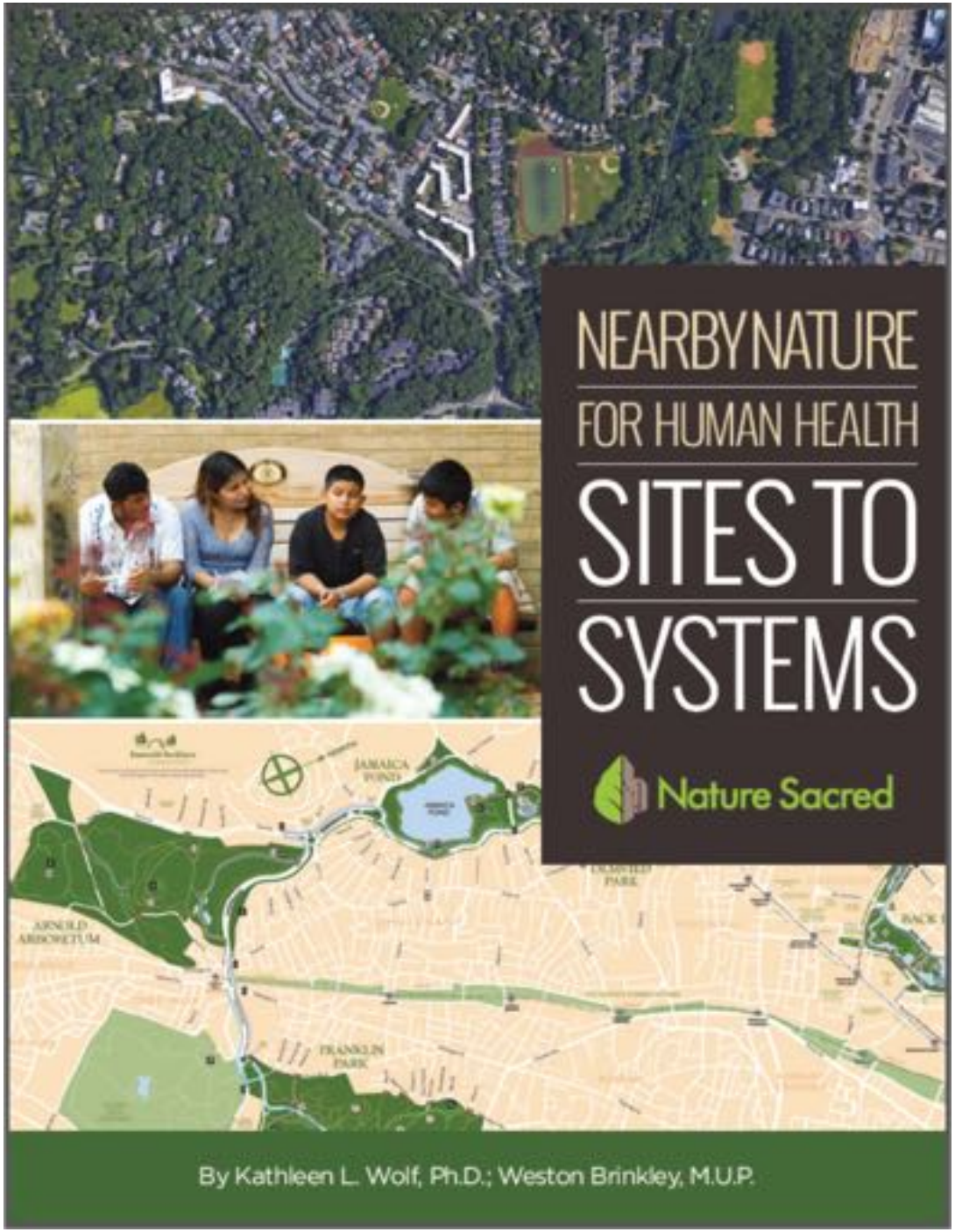
Seattle USA

Thornton Creek Water Quality Channel (SvR Design)
1 hectare, treats runoff from 275 hectares (1 hectare = 2.47 acres)



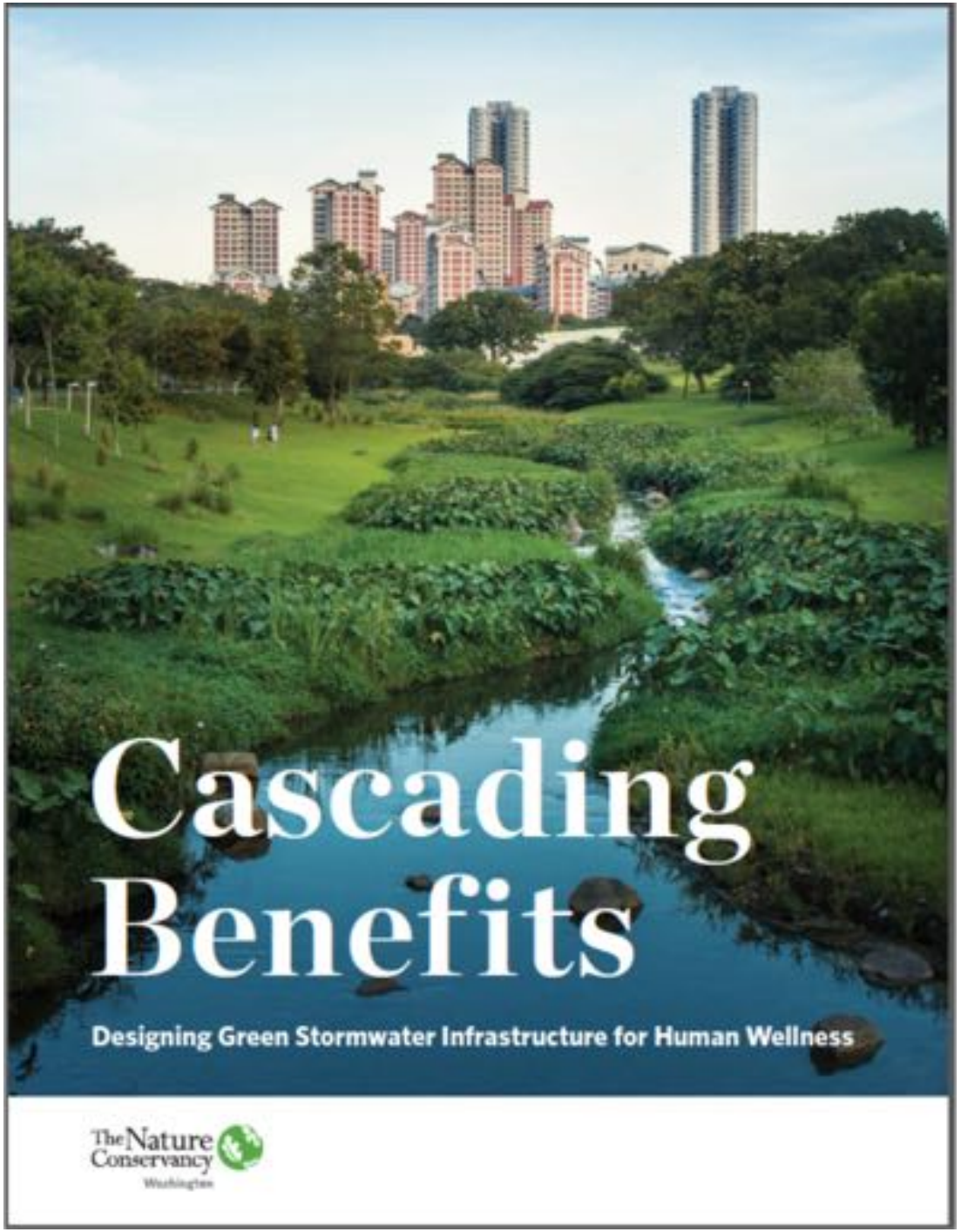
Malmo, Sweden – SUDS for cloudburst managment

Malmo, Sweden – SUDS for cloudburst managment



sponsor:

Nature Sacred



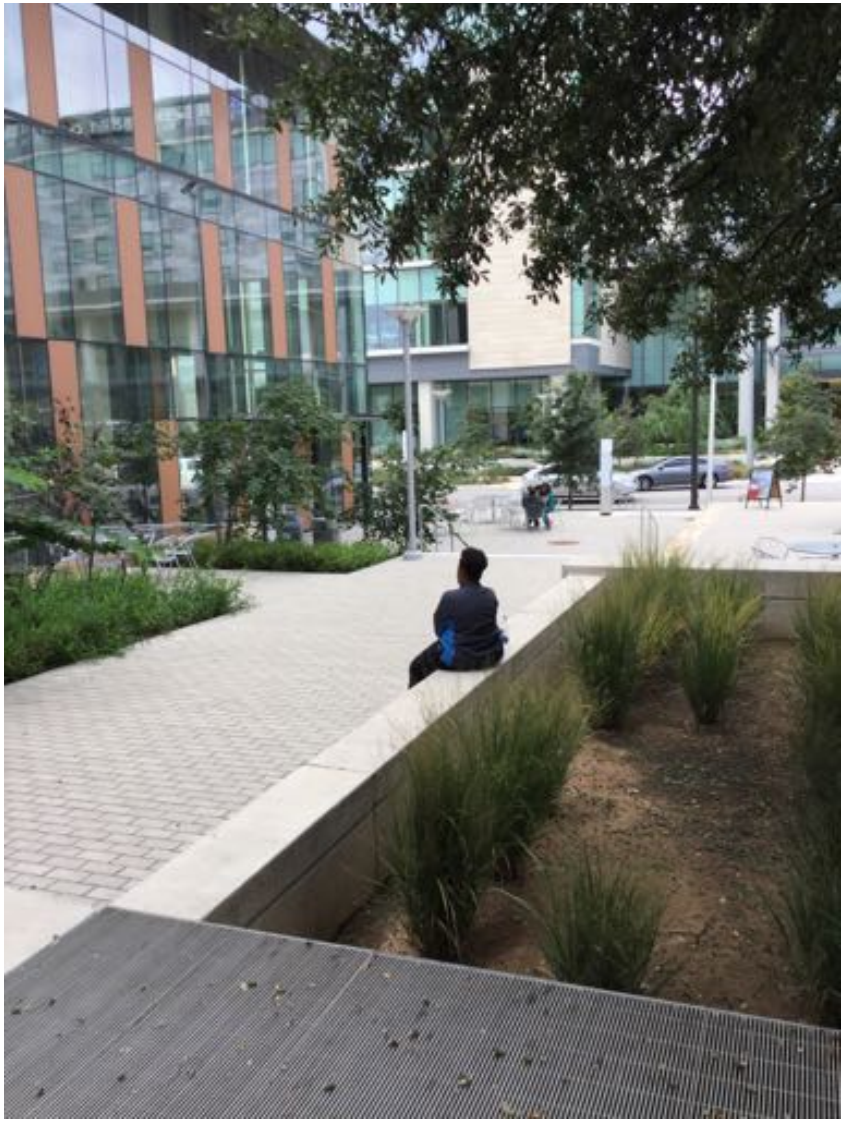
Intentional green infrastructure design for human health outcomes

co-author: USDA Forest Service

co-author & printing: The Nature Conservancy

University of Texas Medical School, Austin

SITES Landscape Architect, Heather Venhaus



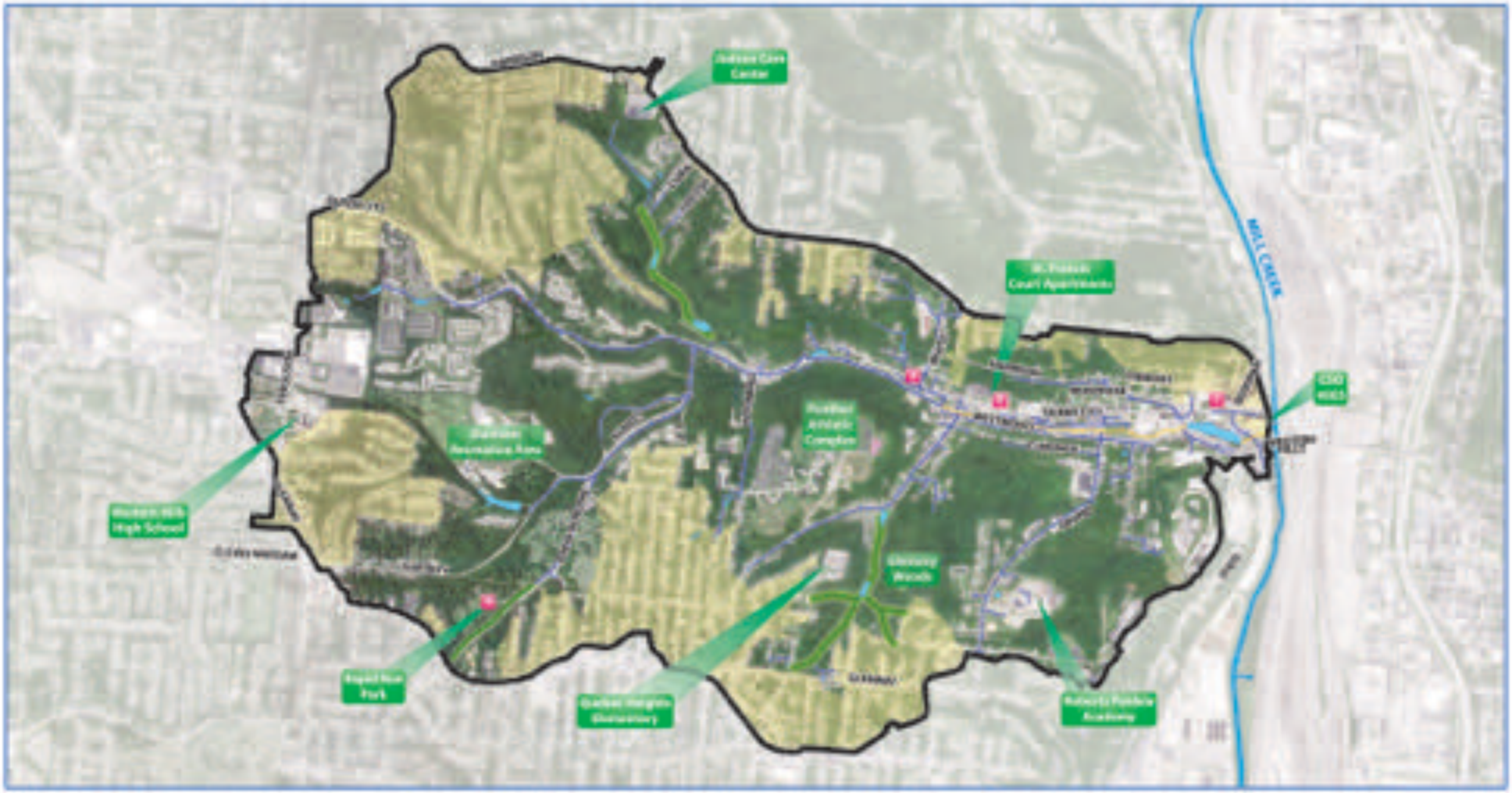
stormwater management
human health & well being

patient & medical staff interactions

patient & medical staff interactions

PROPOSED SOLUTIONS IN THE LICK RUN WATERSHED

Cincinnati USA



St Francis Early Success Project - 2010

St. Francis Court Apartments Bioretention Features
Before & After

2009: Two levels of unused parking lots

2012: Two bioinfiltration basins with walking path

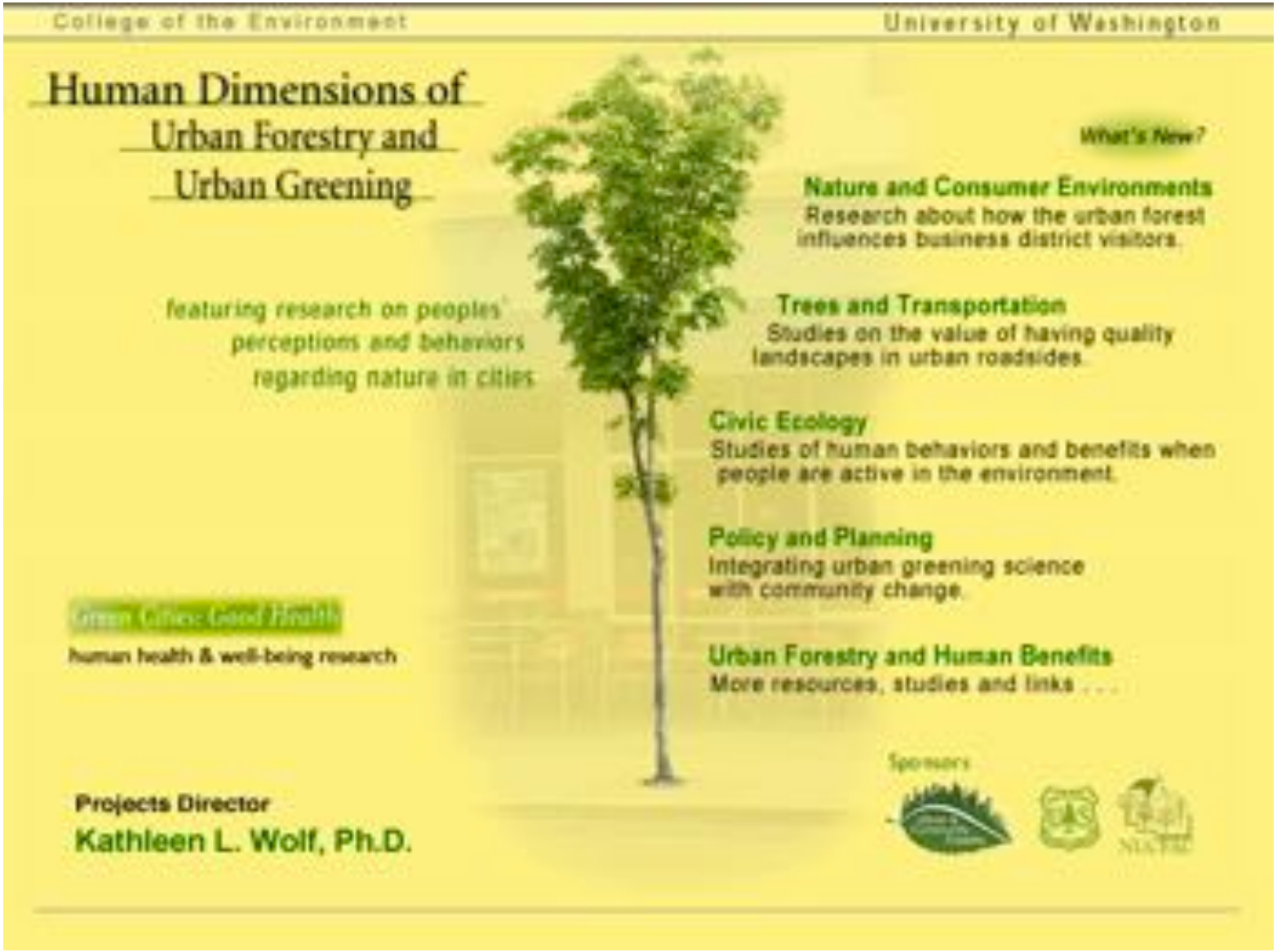
Wally's

Rally's

Spring 2011, Ponding after rain event

Summer 2011, One year after installation

Summary

from site to systems level solutions
evidence of nature for health
green infrastructure opportunities
solutions :: complexity & diversity
co-design for co-benefits

www.naturewithin.info