Nature for Human Health:
public gardens opportunities & programs

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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)

Social Determinants

Finding that study . . . . . .

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]

design: milepost

co-author USDA Forest Service

co-author & printing: The Nature Conservancy

Landscape
Community
credit: Ignacio Bunster-Ossa
Garden

Evidence-based ‘Story’

Health across the Human Life Cyle

‘Cradle to Grave’

Discovery: 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!

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

Civic Stewardship for Resilience

E. Svendsen, L. Campbell; USFS

Alzheimer's Disease & Dementia

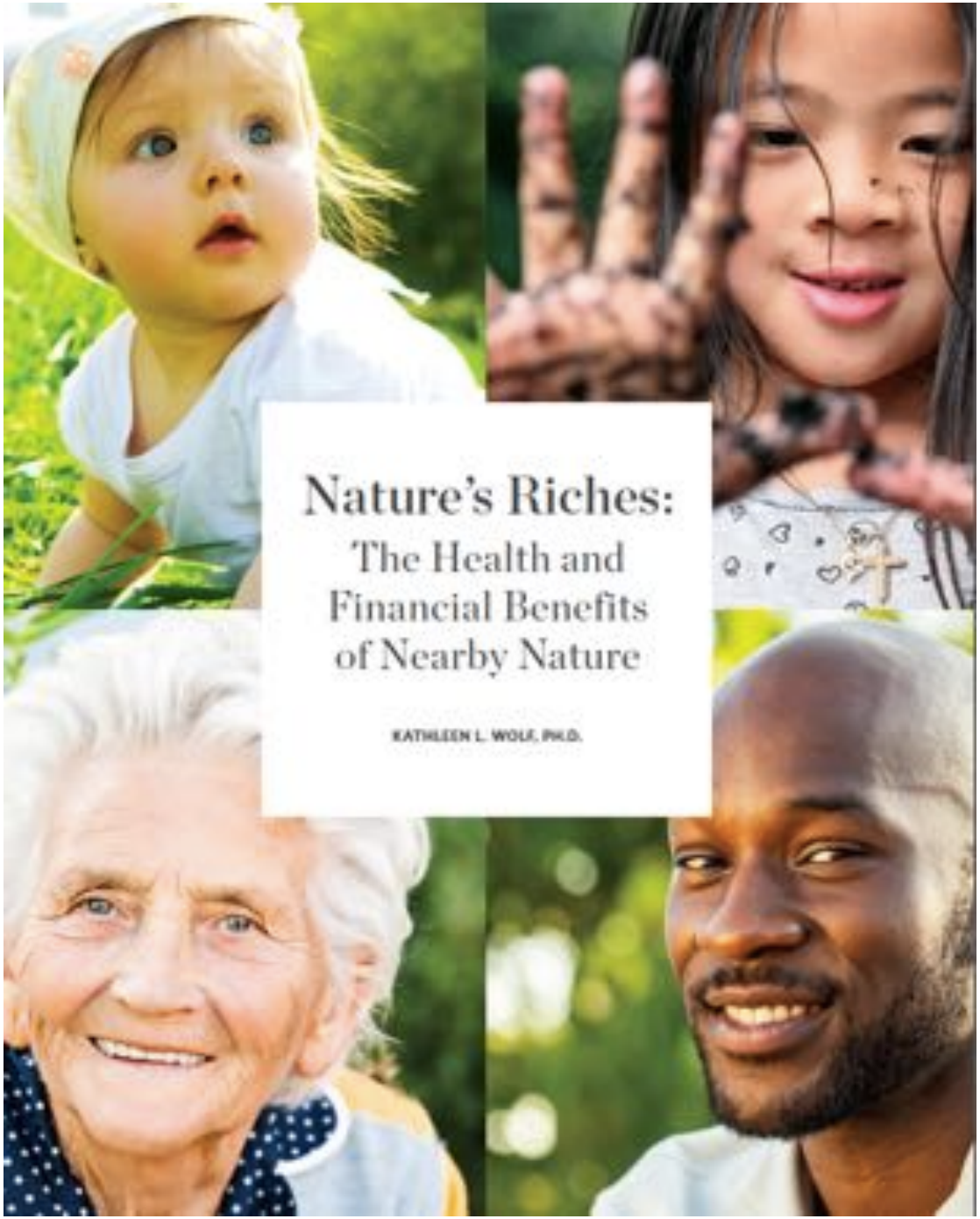
Provide wander gardens & horticulture therapy

- 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



design: milepost

author: FOREST SERVICE U S DEPARTMENT OF AGRICULTURE

printing: The Nature Conservancy

Publications

- Wolf, K.L. 2016. Uncovering benefits of the urban forest: A look at how urban forestry investment assists local economies, public health. Properties Magazine 70, 2: 55-57.
- Wolf, K.L., M.K. Measells, and S.C. Grado. (in review). Economics of nearby nature and elder health: A quantitative review. Environmental Health Perspectives.
- Wolf, K.L., M.K. Measells, S.C. Grado, and A.S.T. Robbins. 2015. Economic values of metro nature health benefits: A life course approach. Urban Forestry and Urban Greening 14: 694-701.
- Wolf, K.L., and A.S.T. Robbins. 2015. Metro nature, environmental health, and economic value. Environmental Health Perspectives 123, 5: 390-8.
- Wolf, K.L. 2015. Green strategies to improve public health and save billions. International Innovations 195: 54-55.
- Wolf, K.L. 2013. The urban forest. Communities & Banking 24, 2: 25-27.

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annual value of $11.7 billion U.S. (2015 dollars)

- cradle to grave human life cycle
- varied expressions of urban greening (metro nature)
- evidence based human health and wellness benefits
- just beginning the analysis!

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

Research about nature benefits and economic value is fairly new. Some of the quantified health benefits of nature in cities are easier to convert to economic value than others. Here are some preliminary valuations - estimated for the entire U.S. on an annual basis.

INFANTS

BIRTH WEIGHT

$144M SAVINGS ON ANNUAL HEALTH CARE COSTS.

Birth weight influences long-term childhood health and development, and has been linked to some adult diseases. Low birth weight is associated with both short- and long-term health care costs, such as longer hospital stays and increased illness. Pregnant women that have more tree canopy and green space near their homes generally have babies with healthier birth weights.

IMMUNE FUNCTION

STRONGER IMMUNE SYSTEM LEADS TO REDUCED ILLNESS AND CHRONIC DISEASE ACROSS A LIFETIME.

We are most vulnerable in the early months of our lives, when the body and mind are growing and developing at an astonishing rate. The 'hygiene hypothesis' suggests that early contact with outdoor microorganisms stimulates the development of a healthy immune response.

FAMILY DYNAMICS

IMPROVED FAMILY DYNAMICS, PERHAPS REDUCING MENTAL HEALTH TREATMENT AND COUNSELING SERVICES.

An infant's parents and siblings adjust their lives after a baby arrives, and the changes can bring on stress and anxiety. Nature views and walks help reduce these conditions and improve interactions between people within the household.

Note: All economic values are in 2008 U.S. dollars, and are potential annual savings across America (U.S.)

CHILDREN & TEENS

OVERALL HEALTH AND WELL-BEING

INCREASED PHYSICAL ACTIVITY, REDUCED ASTHMA (A LEADING CAUSE OF EMERGENCY DEPARTMENT VISITS, HOSPITALIZATIONS AND MISSED SCHOOL DAYS), AND REDUCED RISK OF ADULT SKIN CONDITIONS.

Negative conditions in a child's surroundings can create both immediate and ongoing health impacts. Nature is a positive influence, playing in nature helps children develop learning, social, and intellectual skills that improve both health and later life achievement. Green spaces clean the air our children and teens breathe, give them space for moderate to vigorous activity, and shade them from too much sun exposure.

ADHD

$266.5B-$1.0B ON MEDICATION SAVINGS PER YEAR.

Millions of children ages 3-17 are treated for Attention Deficit Hyperactivity Disorder (ADHD) in the U.S. Nature exposure is a potential alternative treatment; studies show that activity within nature or green spaces, such as play or just 20 minutes of walking, can reduce symptoms.

FUTURE FINANCIAL SUCCESS

$1.2B INCREASE IN HIGH SCHOOL GRADUATES' LIFELONG ANNUAL INCOMES.

School performance affects both near-term self-esteem and long-term success. Having green views from classrooms and common spaces in schools can improve students' capacity to direct attention and feel less stressed. Green high school campus landscapes are linked to higher graduation rates.

ADULTS

DEPRESSION AND STRESS

REDUCES FRUSTRATION, MENTAL DISTRESS AND DEPRESSION DISORDERS, AND IMPROVES BODY IMAGE, SELF-ESTEEM AND LIFE SATISFACTION.

Busy, highly scheduled lifestyles take their toll. Nature experiences reduce stress. Nearly 14 million adults experience major depression each year in the U.S., and mental, behavioral, and neuropsychiatric disorders are a leading cause of disability. Nature experiences support respite and mindfulness for improved mental health, mood, and life function. Improved mental health and function reduces disease treatment costs, and improves worker productivity.

CARDIOVASCULAR DISEASE

$1.1-$2.2B ANNUAL SAVINGS, BASED ON A 1-2% REDUCTION IN HISTORIC EXPENDITURES.

Cardiovascular Disease is the leading cause of premature death in the U.S. People show slightly reduced risk of CVD if their neighborhoods have greater nature coverage (particularly tree canopy), however it is worth noting the majority of studies have focused on trees.

CRIME & SAFETY

$900M IN REDUCED COSTS OF CRIME FOR VICTIMS AND PROPERTY OWNERS PER YEAR.

Personal safety and security are important conditions for quality of life. The presence of nature in neighborhoods – community gardens, forest canopy, and landscaped vacant lots – is associated with reduced personal and property crime.

OLDER ADULTS

MOBILITY & QUALITY OF LIFE

$1.7-$2.4B SAVINGS ON HEALTH CARE COSTS FROM FALLS PER YEAR.

One in three older adults falls each year, giving rise to fatal and nonfatal injuries. Residents' falls within elder care facilities are particularly expensive medical situations. Being out in nature sustains personal mobility, leading to reduced falls and reduced need for medications. Further, those who are socially isolated are more likely to be unhealthy, so gardening and nature walking activities that promote social interactions support positive lifestyles and quality of life.

HYPERTENSION

$1.3-$2.6B SAVINGS ON TREATMENT COSTS ANNUALLY.

Hypertension, or high blood pressure, is one of the five most expensive conditions impacting older adults. Views of nature, particularly forests, and 'forest bathing' (casual walks in naturalistic forest settings) decrease diastolic rates.

COGNITIVE DISORDERS

$1.2-$2.3B ANNUAL SAVINGS ON MEDICAL SERVICES, NOT COUNTING THE VALUE OF HOME CAREGIVERS' SERVICES.

About one in five older adults experience mental and cognitive disorders, with age being the greatest risk factor. By 2050, about 11% of people aged 65 or older were afflicted with Alzheimer's disease. Those with dementia have three times as many hospital stays per year as other elders. Encounters with nature improve symptoms related to cognitive disorders, such as agitation, depression, and reduced mobility.

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

Evidence-based ‘Story’

Experiences of Nature

Improve

Mental Health & Function

Classroom Views & Stress

School No.1

School No.4

Li & Sullivan. Landscape & Urban Planning, 2016

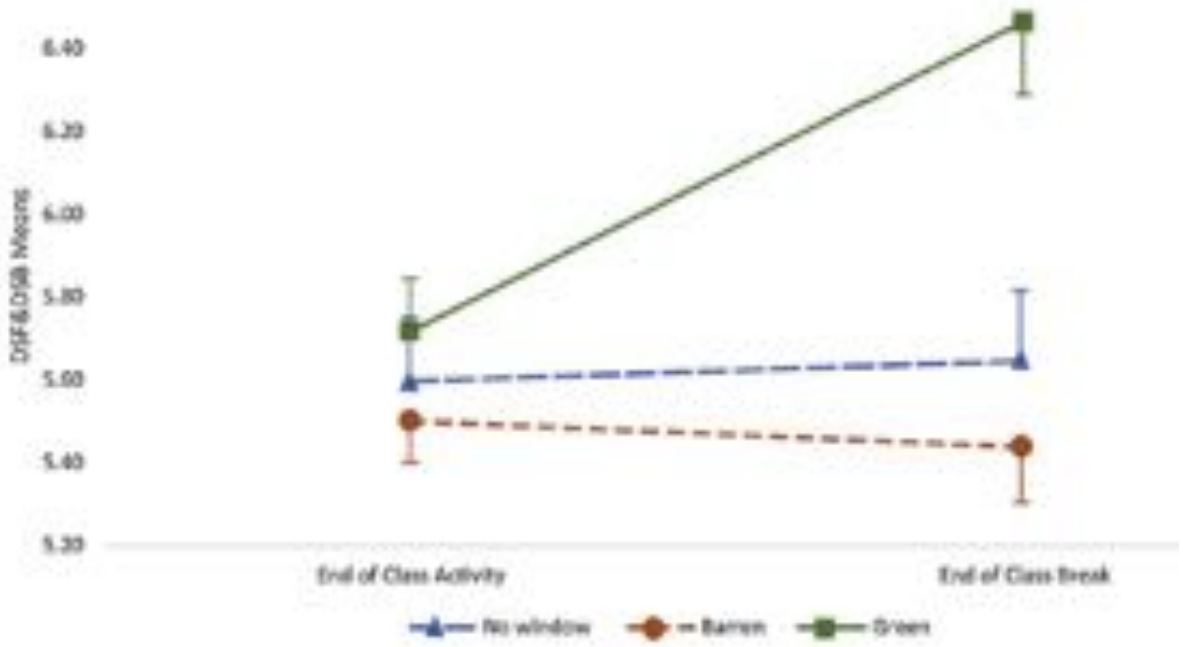


Fig. 2. Attention scores at the end of class activity and break (Means and SE).

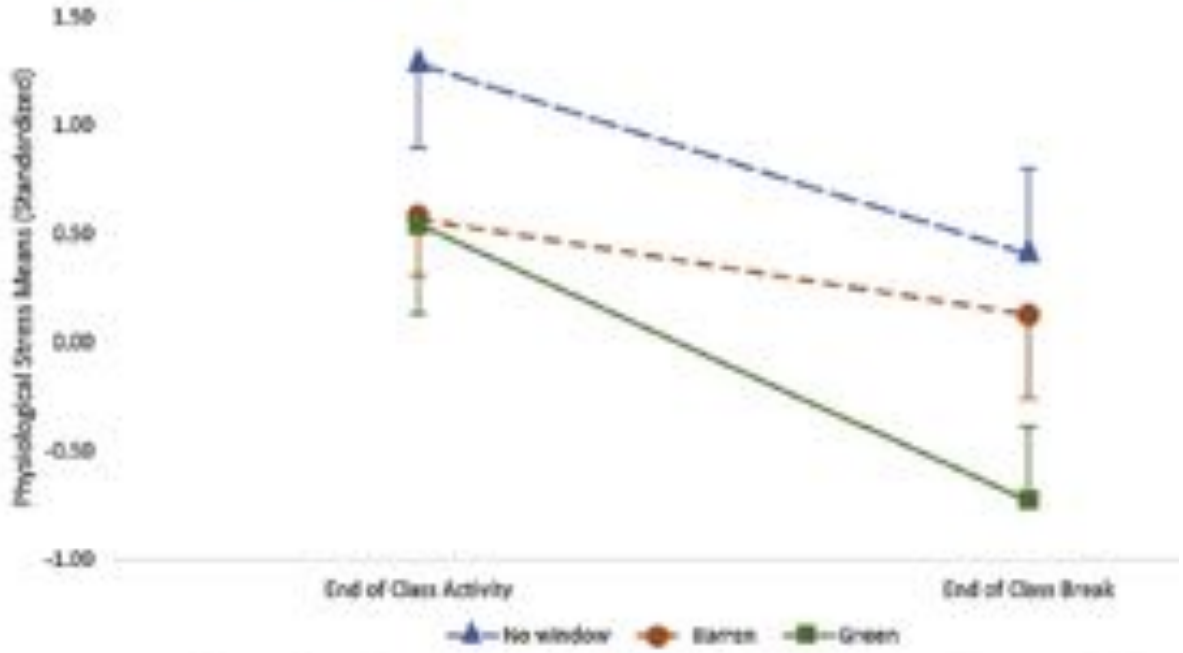


Fig. 3. Physiological stress at the end of class activity and break (Mean and SE).

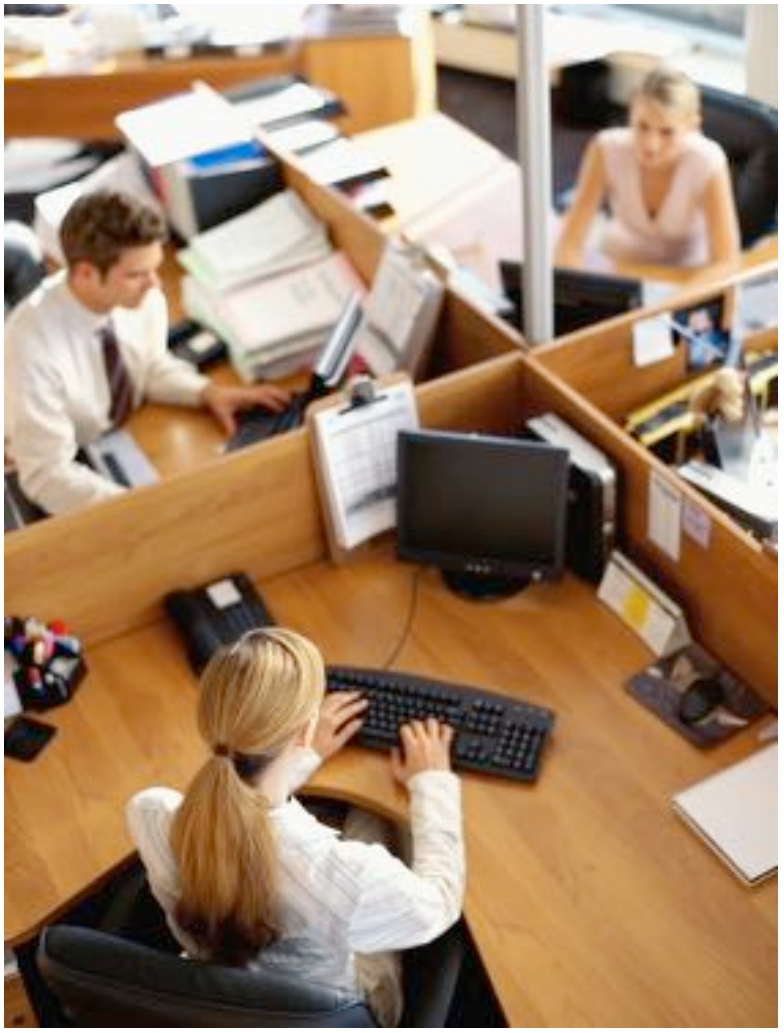
attention scores

Classroom Views & Stress high school student response

stress scores

Attention Restoration Theory

Rachel & Stephen Kaplan, U of MI



Workplace Nature & Attention Recovery

- **Well-being**
  - desk workers without view of nature reported 23% more ailments in prior 6 months

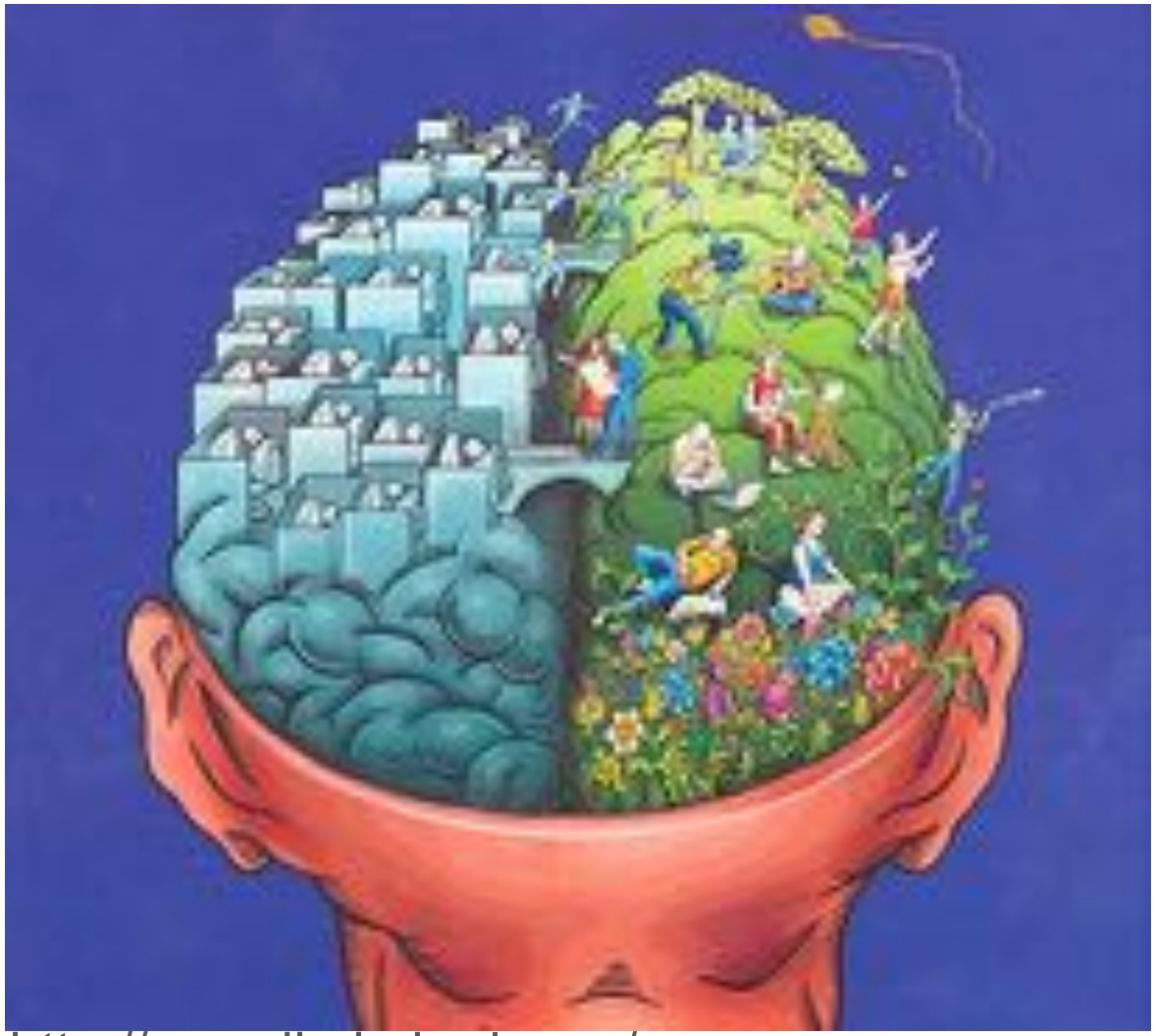
- **Job Satisfaction**
  - less frustrated and more patient
  - higher overall job satisfaction and enthusiasm

Kaplan, R. 1993. Landscape and Urban Planning

ART Design Elements

- being away
- ‘soft’ fascination
- extent
- compatibility

Nature and Creativity



http://www.jimkukral.com/

http://daycare.sulekha.com

role of nature in creativity development

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, Denmark

makes us more curious
supports flexible thinking
recharges directed-attention

www.concur.com

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

Mind Full, or Mindful?

Anna and Elena Balbusso, NY Times

constant busyness

attempted multi-tasking

‘out of balance’

Nature and Mindfulness

focus
soft fascination
undirected attention

Attention Restoration Theory, Kapan & Kaplan

credit: Michael Hellgren

Mindfulness/Meditation Training

- meta analysis; clinical/non situations
- focus on moment-to-moment experience and mental awareness

Results

- more veridical perception (reality check)
- reduce negative affect
- improve vitality and coping
- medical symptoms & sensory pain

Grossman et al. 2004. Mindfulness-Based Health Benefits. Journal of Psychosomatic Research

Mindfulness/Meditation Training

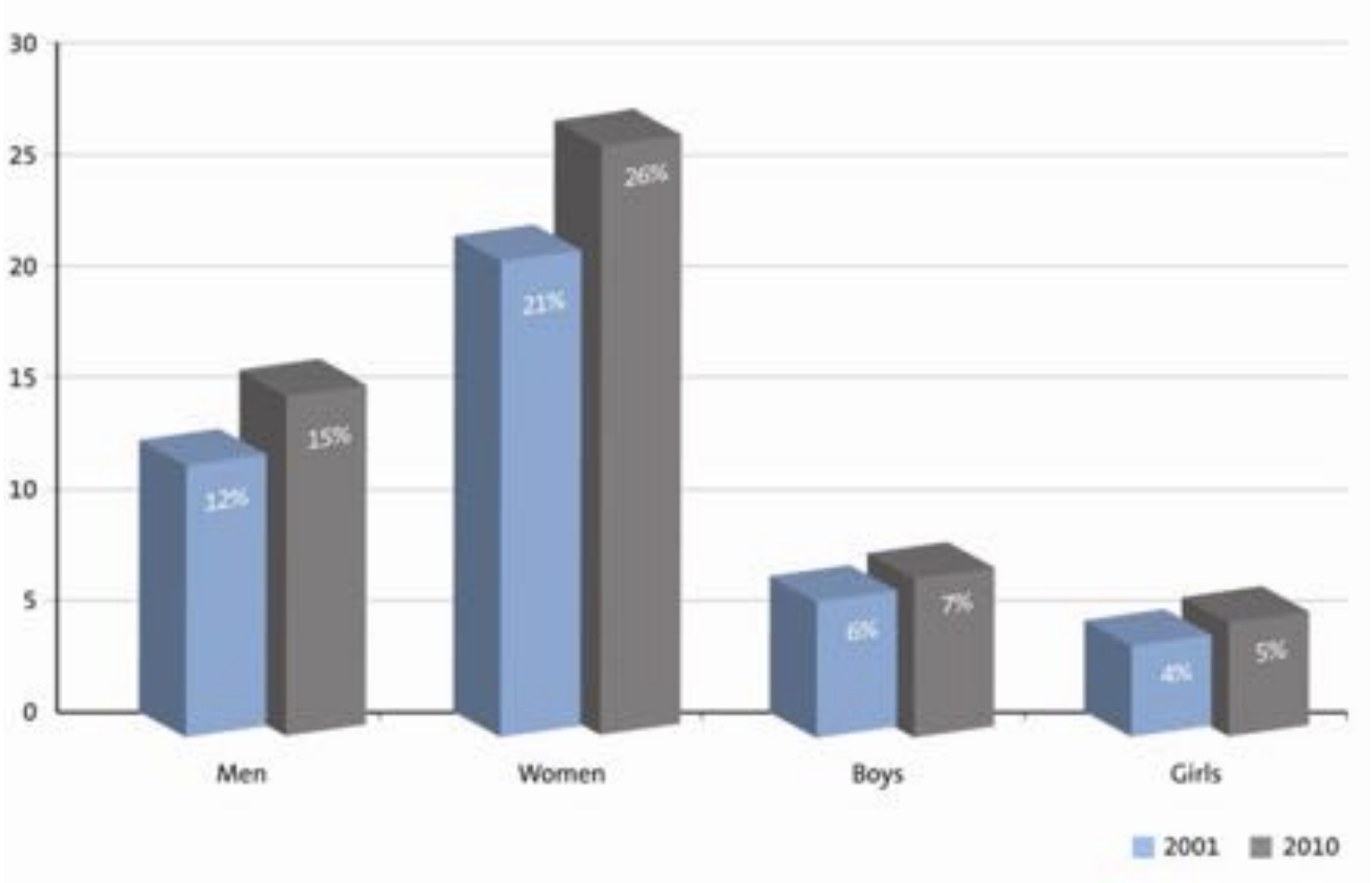
- healthy workplace employees
- 8 week mindfulness training

- **Results**
- brain electrical activity – positive affect
- brain activation – reduced 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

% of U.S. Population Using Mental Health Medications

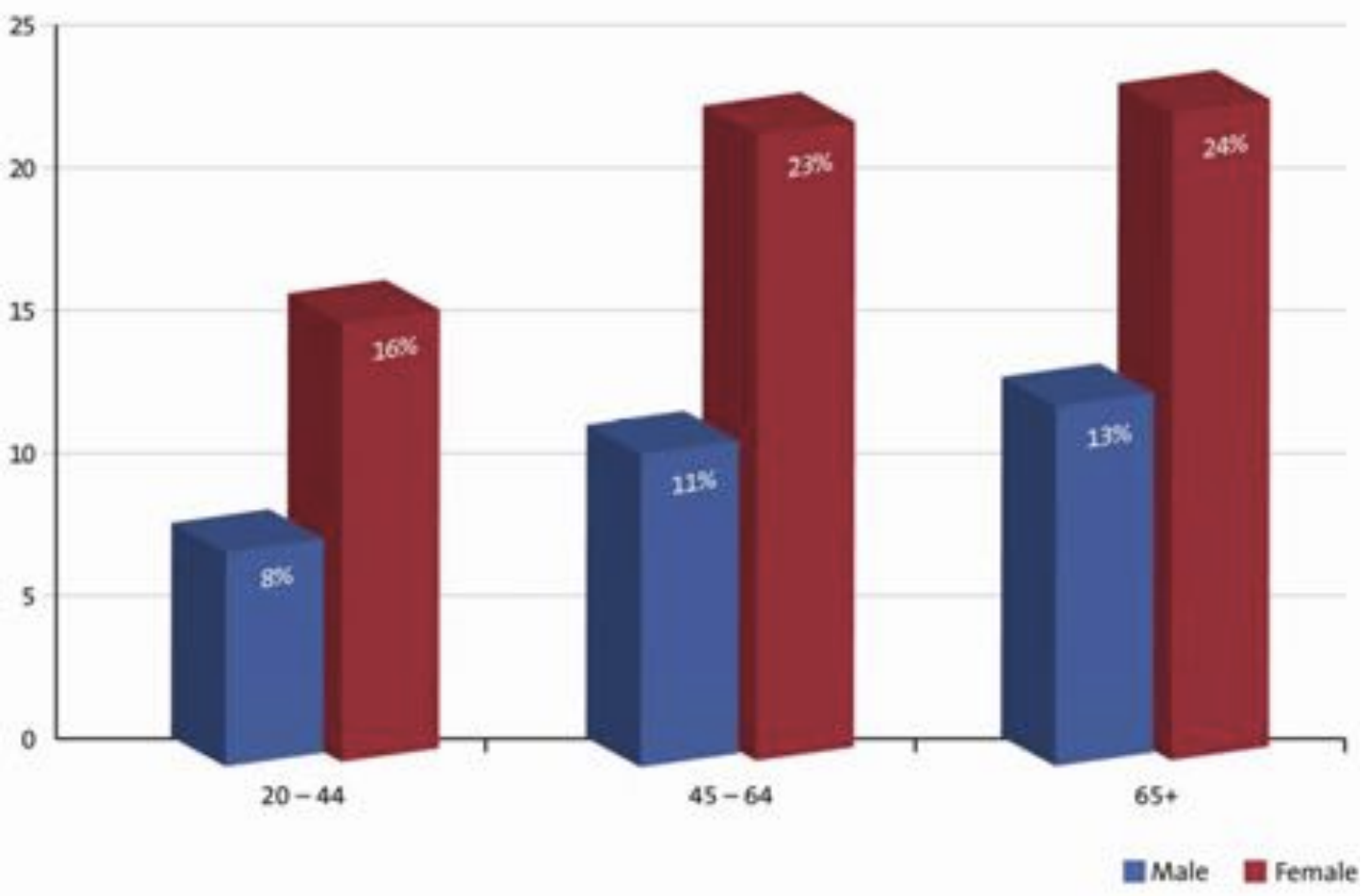
2001 vs 2010



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

Prevalence of Adult Antidepressant Use

2001 vs 2010



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

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

Josefsson et al. 2013. Physical Exercise Intervention in Depressive Disorders. Scandinavian Journal of Medicine & Science in Sports

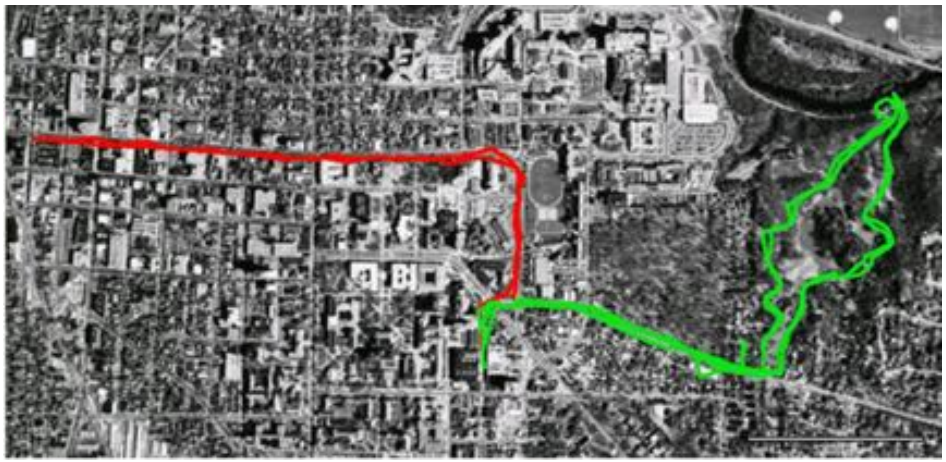
Improving Depression

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



Effects of nature window view on recovery from surgery (Roger Ulrich, 1984)

Legacy Good Samaritan Medical Center
Stenzel Healing Garden 1997
Rehabilitation Institute of Oregon

Hospital Staff – Respite and Support

Nature: A stress coping resource for employees 24-7

image credit:
Teresia
Hazen

Summary

- evidence-based human health & wellness benefits
- story: life course, cradle to grave
- story: mental health & function
- what do we know? what do we do?

Knowledge to Practice

- nearly 40 years of research
- critical mass of evidence – now what?
- greening or health programming
- donors, grants & funding?

CDC moderate activity recommendations
parks, active living, active transit

Walking Programs

children
elders
families

HIKE IT BABY

BLOEDEL
RESERVE

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.

Walking Meetings

creativity, energy, communication, health

Fiddleneck Forest School
Washington Park Arboretum (Seattle)

cognitive
social &
physical
learning

Elders: horticulture for mobility & social connections

Shinrin yoku (forest bathing)

- walking
- relaxing

- workers
- retirees

- networked system
- 52 bases in Japan

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

Doctors of BC

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

Veterans Outdoor Therapy

Les Winkeler/The Southern Illinoisan

World-Herald News Service

Hope for the Warriors

Outward Bound

American Forests

community tree plantings

Tree People, Los Angeles

parks
public gardens
street trees
neighborhood

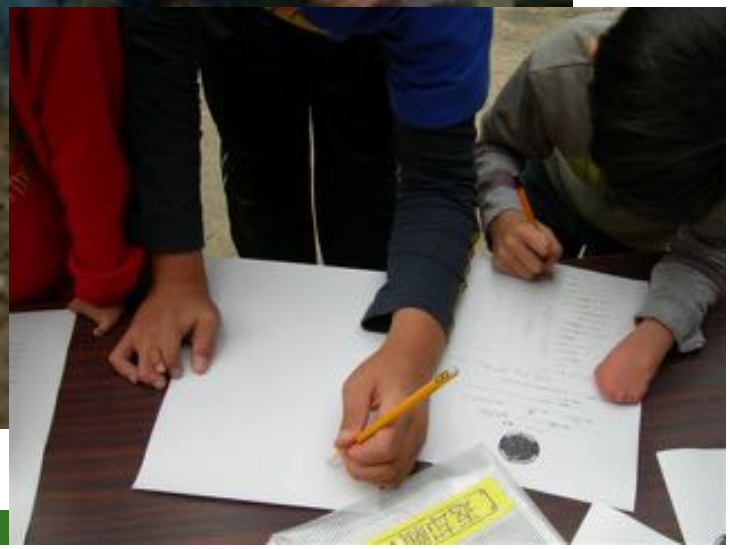
Keep Oakland Beautiful

community gardens

The Heights Community Garden, Dayton OH

local food
food security
child education
nutrition
food donations

www.treeclimbing.jp/



physically disabled & tree climbing!

recreational tree climbing – youth therapy

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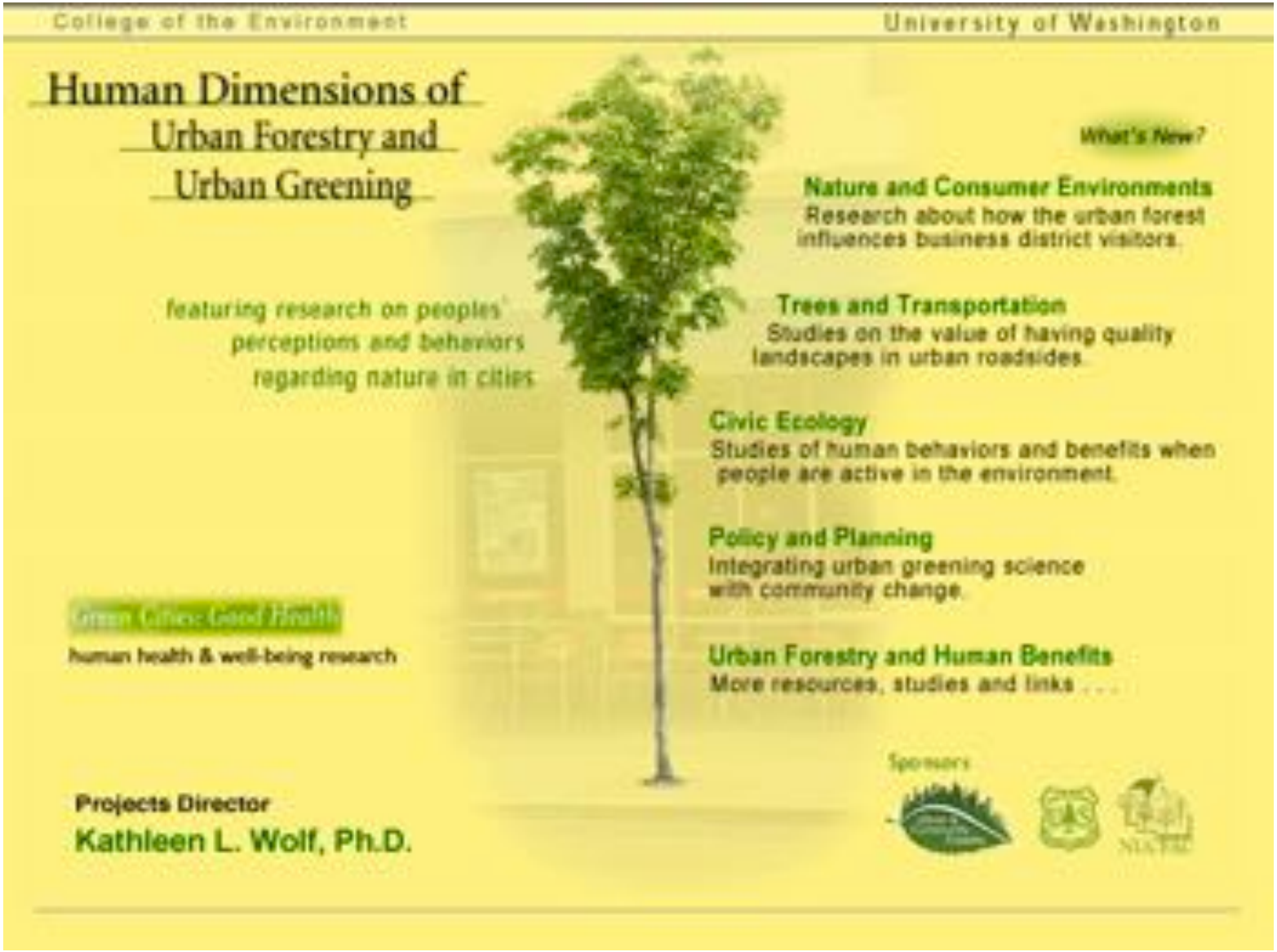
Knowledge to Practice

- nearly 40 years of research
- critical mass of evidence – now what?
- greening or health programming
- project – toolkit & technical assistance

www.naturewithin.info