



Deep Grounding Land Care & Human Health

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University of Washington (Seattle USA)**

**2026 Ecological Restoration Symposium
Health & Human Dimensions of Eco Restoration
UW Botanic Gardens, Center for Urban Horticulture
April 2026**

One Health



World Health
Organization


Land Care = Human Healthcare



Volunteering Solutions



Grassroots Ecology



**Are you a
restoration ecology
scientist, practitioner,
or manager?**

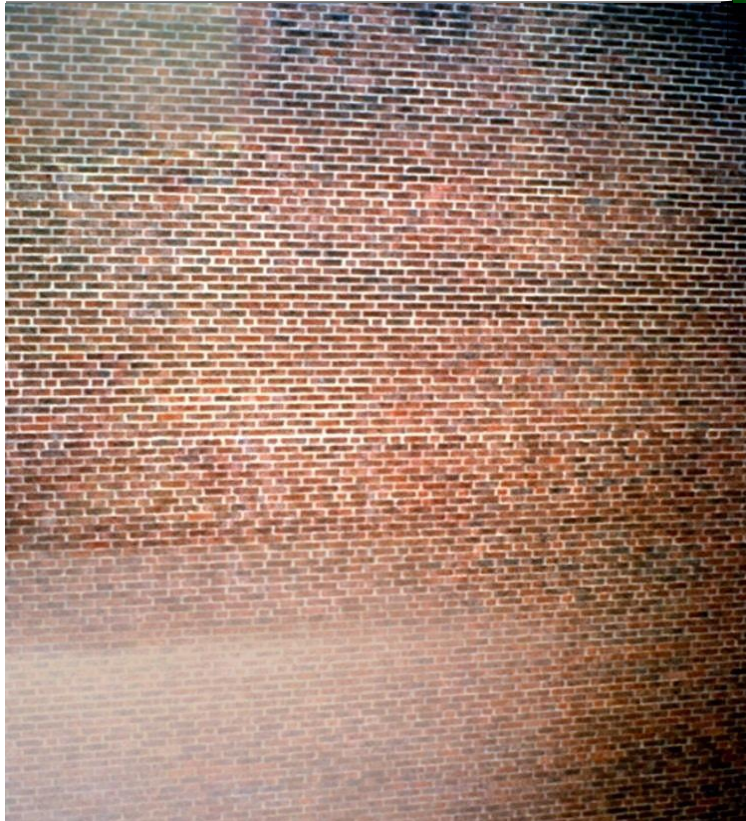
**You are a
healthcare provider!**



Nearby Nature & Human Health

Research & Evidence

Effects of nature window view on recovery from surgery (R. Ulrich, Science 1984)



- **Shorter stays**
- **Less pain**
- **Fewer minor complications**
- **Better emotional well-being**



Massachusetts General Hospital



credit: Frank Oudeman



**Nearby Nature
Human Health**

**Research & Studies
Meta-Analysis**

Green Cities: Good Health



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.^{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.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

RSS Feed

Print



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



USDA Forest Service
Urban Forestry Program



University of Washington

Urban Trees & Human Health: A Scoping Review



Purpose:

To carefully collect and synthesize the peer-reviewed evidence concerning urban trees and human health

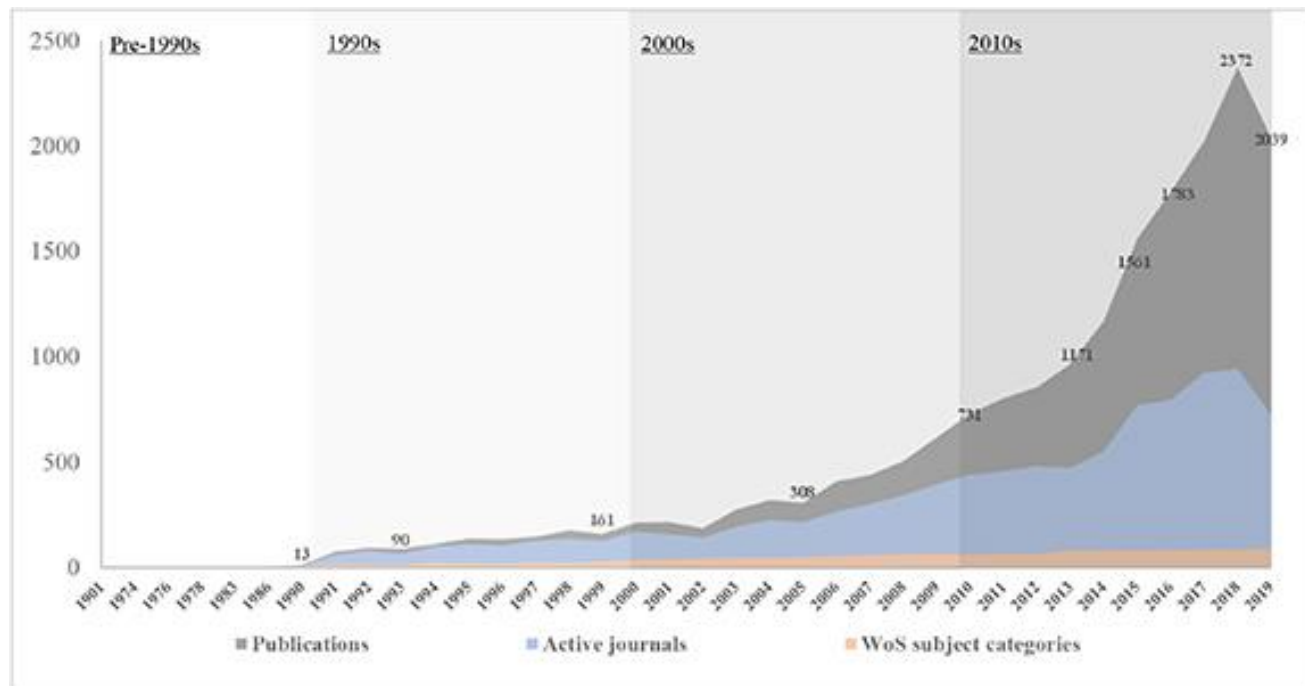


Health
Canada

Santé
Canada

Canada
Natural Resources Canada
Canadian Forest Service

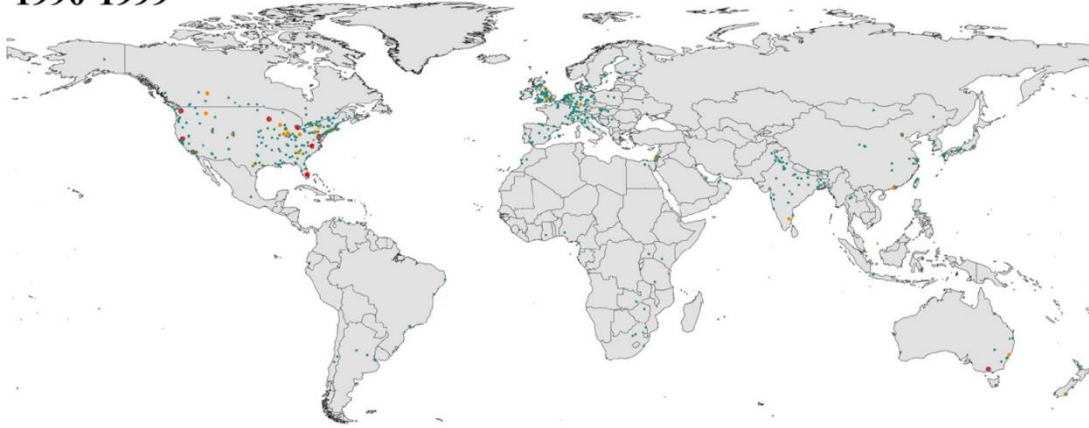
Wolf et al. 2020. Urban Trees and Human Health: A Scoping Review. *Int J Environ Res Public Health*



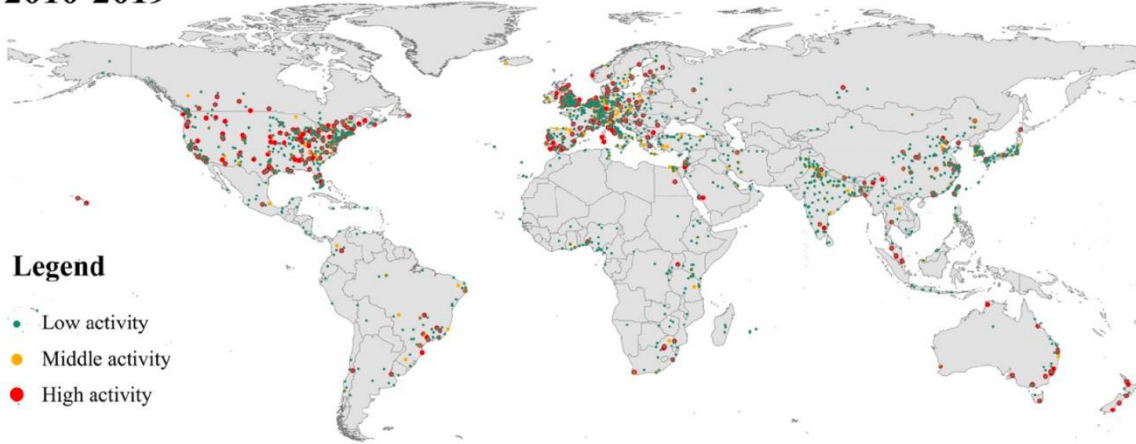
Pace of Publication

source:
Zhang et al. 2020,
bibliometric review,
green space & health

1990-1999



2010-2019



Legend

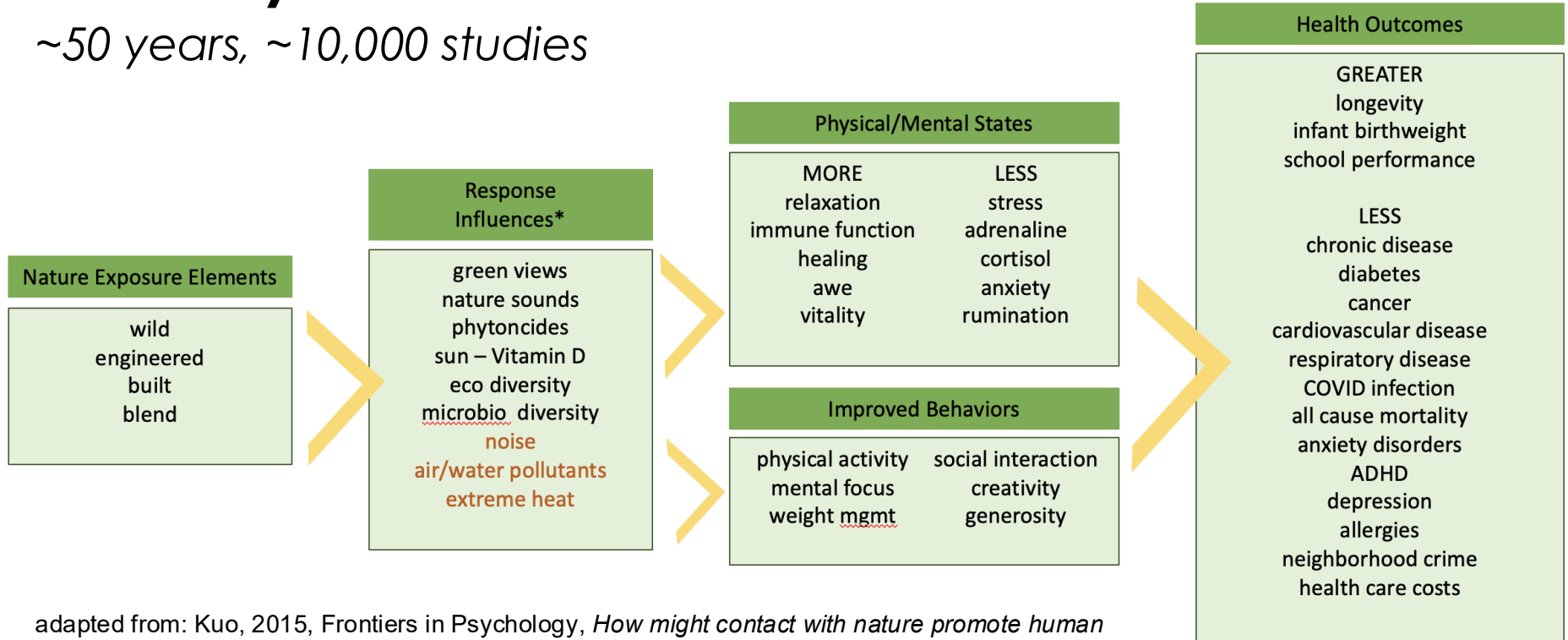
- Low activity
- Middle activity
- High activity

Geography of Publication Activity

source:
Zhang et al. 2020,
bibliometric review,
green space & health

Pathways & Effects

~50 years, ~10,000 studies



adapted from: Kuo, 2015, *Frontiers in Psychology*, *How might contact with nature promote human health?*; Bratman et al., 2019, *Nature and mental health*, *Science Advances*; *Nature Quant*, <https://www.naturequant.com/>



Nearby Nature & Human Health

50 years

~ 10,000 studies

international community of science

several efforts to monetize



What Have We Learned?

Range of Benefits

therapy



National Garden Scheme

health promotion



Guy Kramer

flourishing



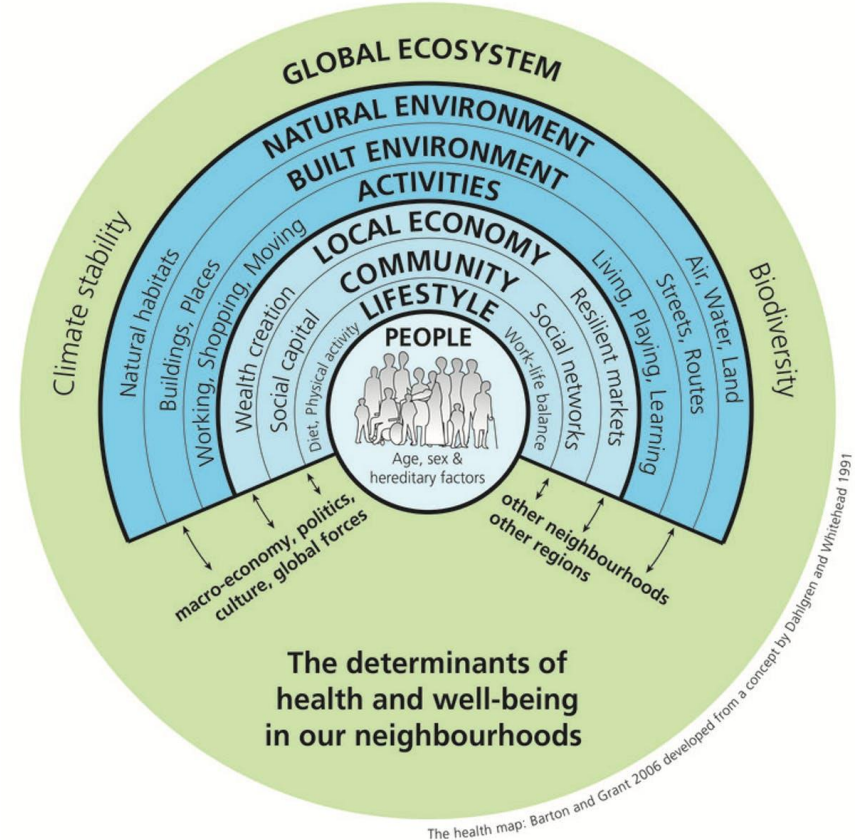
PeopleImages

Social Determinants of Health

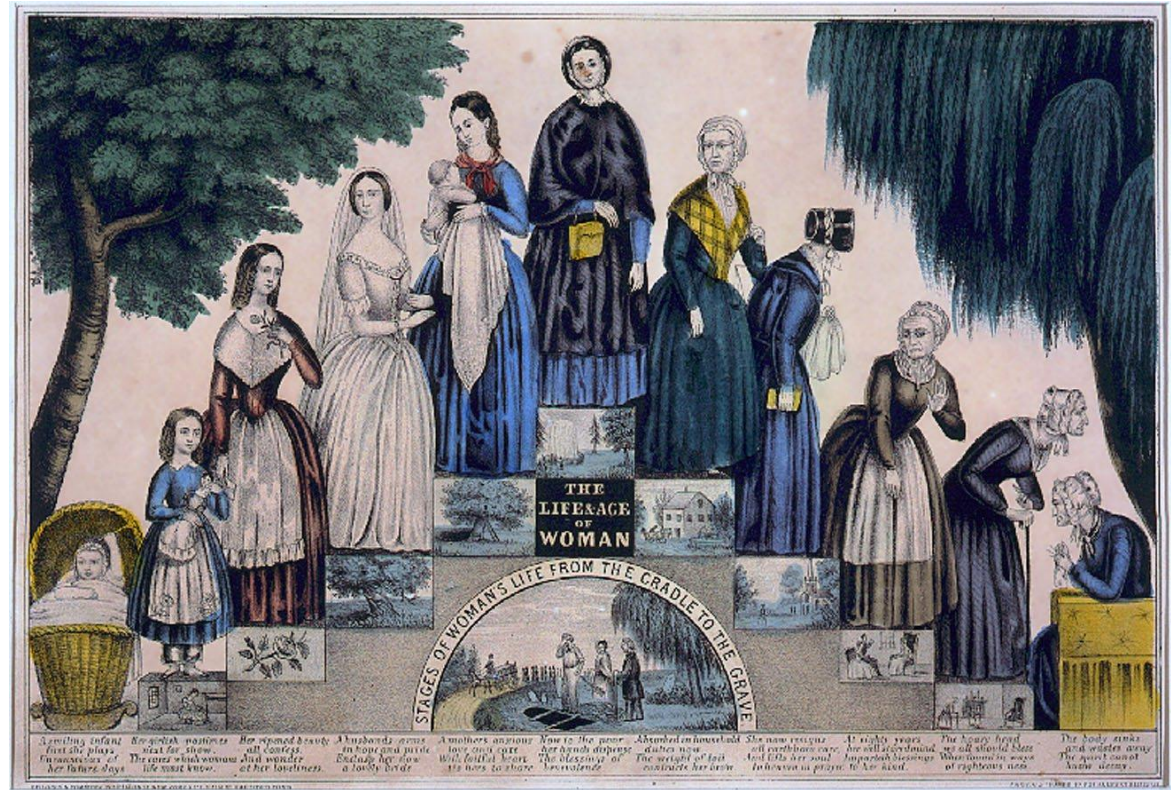
Health is...

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

(World Health Organization, 1946)



Nature for Human Health Benefits Across the Life Cycle



Urban Forest & Green Space Disparities “Nature Deprivation”



Maryland Forestry Foundation

Dosage

nature places & programming

Guy Kramer



STRESS

20-30 min
session



DEPRESSION BLOOD PRESSURE

> 30 min per week



DEPRESSION

1 garden visit
per week (peak 4-5)



HIGH WELL BEING

120 min per week
(peak 200-300)



Hunter et al. 2019.
Frontiers in
Psychology



Shanahan et al. 2016
Scientific Reports



Cox et al. 2017
International Journal of
Environmental Research
& Public Health



White et al. 2019
Scientific Reports

Mental Health Challenges



MedCity News



Canopy Strategic Partners

Mental Health & Function



AARP

Social Connection



Tree New Mexico

Biodiversity & Mental Health

vegetation cover &
afternoon bird abundance


Results:

lower prevalence of depression,
anxiety & stress:

- less depression – more than 20% cover
- less anxiety – more than 30% cover
- less stress – more than 20% cover

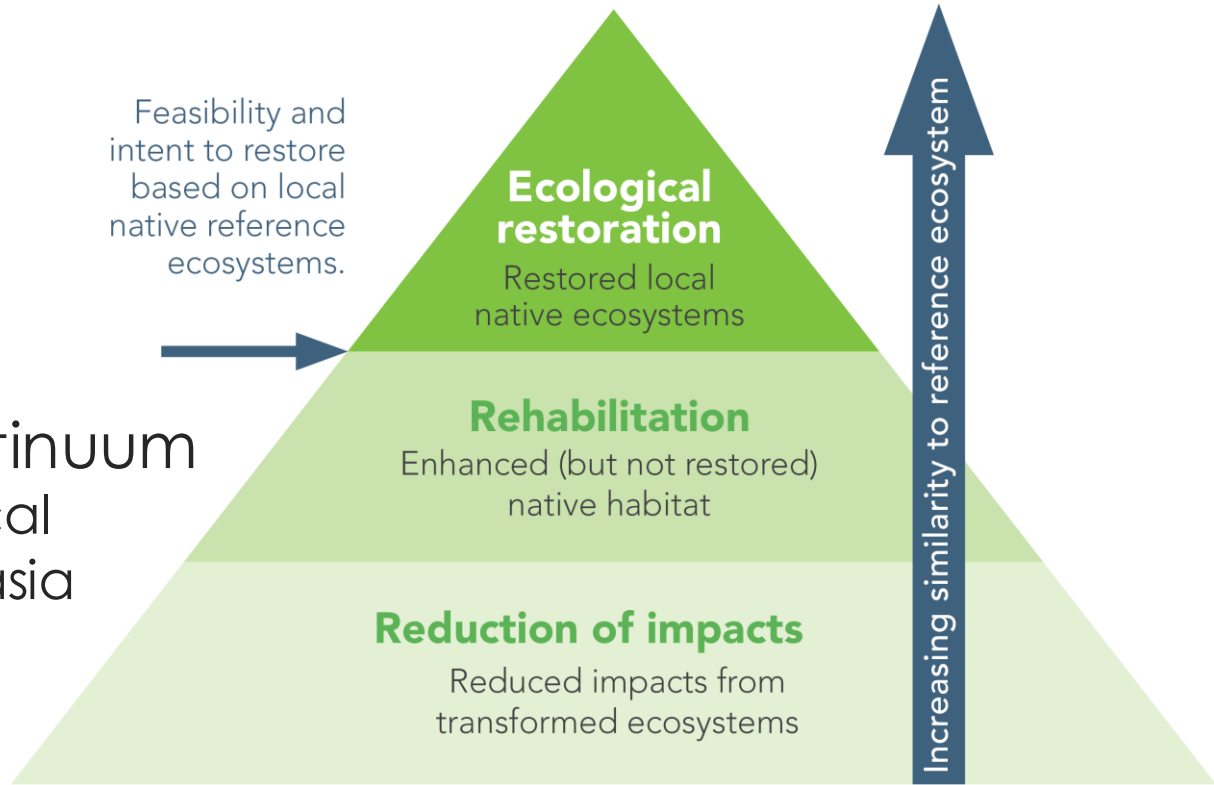
Cox et al. 2017. BioScience 67, 147-155





**- Health Evidence -
What does it mean for
Restoration Ecology?**

Restorative Continuum
Society for Ecological
Restoration Australasia





**Restoration Eco
best practices**

**reduce impact
rehabilitation**

Social-Ecological Systems Institute,
Leuphana University Lüneburg,
Germany



Who does restoration?



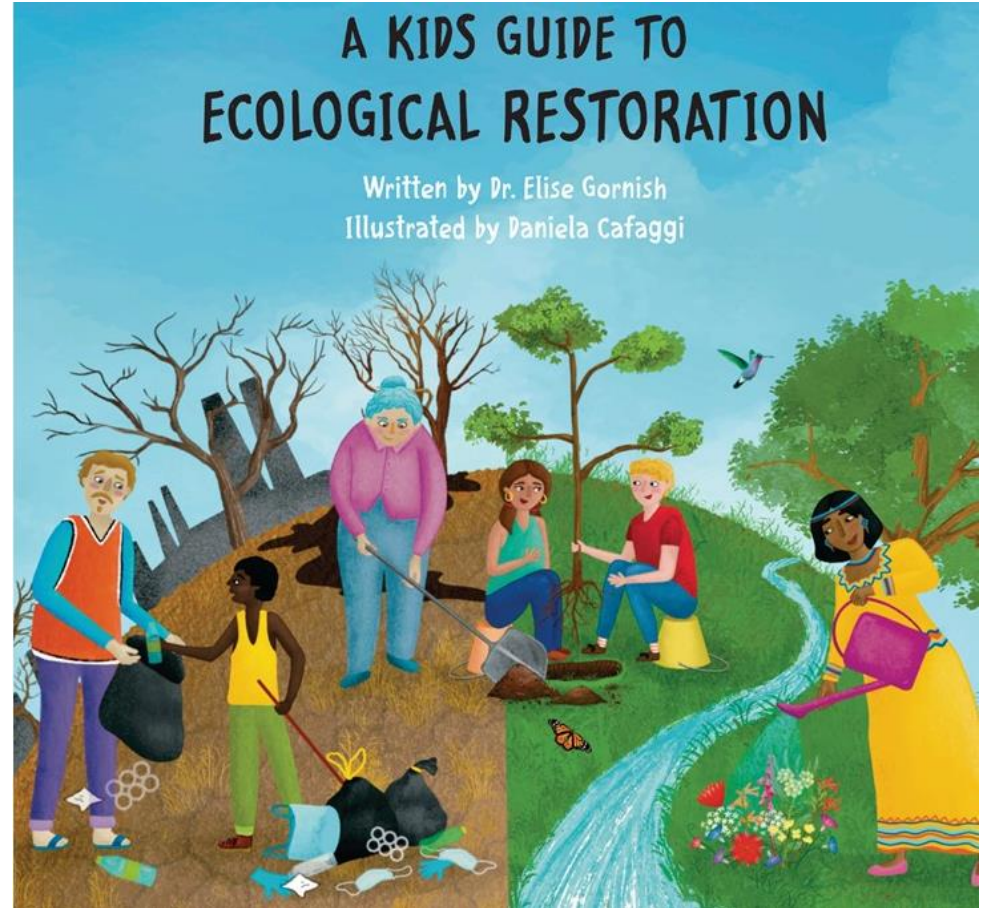
Encyclopedia Britannica



Urban Ecology Center

A Kids Guide to
Ecological
Restoration
2022

Rewilding Institute



Restoration Ecology & Youth Mental Health

Ecological Health Network

Margaret River, Western Australia



Forest Therapy

Many Mental & Physical Health Benefits

Wen et al. 2019. Medical empirical research on forest bathing (Shinrin-yoku): a systematic review. *Environmental Health and Preventive Medicine*



- ▶ Cholesterol
- ▶ Blood glucose
- ▶ Heart rate
- ▶ Blood pressure
- ▶ Sympathetic (fight-or-flight) nerve activity
- ▶ Depression, anxiety, sleep
- ▶ Subjective experience of chronic pain
- ▶ Heart rate variability (HRV)
- ▶ Salivary cortisol and salivary alpha-amylase
- ▶ Natural Killer (NK) levels and activity


imaginal capacity . . .

Amos Clifford

*nature,
meaning,
relationship,
grounding*



Thanks to Dr. Suzanne Bartlett-Hackenmiller (Ob-Gyn) for images



Reciprocity
*acts of giving back to
nature
& restoring balance*

*experiences that influence
health & wellness*

Ecopsychology in press 2026

Cultivating Reciprocity—The Nature and Health Challenge

Usha Varanasi¹ and Kathleen L. Wolf^{2,3}

¹College of the Environment, University of Washington, Seattle, Washington, USA.

²College of Built Environments, University of Washington, Seattle, Washington, USA.

³Forest Resources Management, University of British Columbia, Vancouver, British Columbia, Canada.

Across recent decades the disciplines devoted to nature and health have amassed impressive evidence that nature benefits people's physical, psychological, and social well-being (Frumkin et al., 2017; Wolf, Lam, McKeen, Richardson, van den Bosch & Banekjian, 2020). Many of the research articles call out two alarming and interacting trends: (1) increased global urbanization that threatens biodiversity and thus reduces opportunity for urban residents to interact with nature; and (2) equally compelling evidence of inequities of nature access to underserved populations,

As decision-makers and the public translate health benefits research to programs and prescriptions, increased use of local greenspace can lead to overuse and degradation, a version of the tragedy of the commons. Continued focus on human-centric benefits of nature fails to recognize that mutual care or reciprocal relationship with nature is essential for both local natural systems and the health and survival of the planet (Varanasi, 2020).

We urge the nature and health community to take initiative in research design, participant engagement, and policy recommendations—to embrace reciprocity. Multiple sustainability and biodiversity-promoting organizations around the world are calling out the necessity of this in science-policy initiatives (Diaz and Pascual, 2025), including One Health. As the concept of reciprocity gains traction, it takes on different meanings. We promote approaches that demand explicit intentionality in that people and institutions be conscious of consequences of *their actions* and the direction of causality (Vacaro, 2025). Nature and health research and programming should expand from positions of human health benefits delivery to collaboration on interdependent knowledge for mutually beneficial

Awe & Wonder



Brain Fodder



Get the Kids Outside

Joy



Think Vermont



Allegra Lillard, Author of *Dance For Joy*, image Isaac Naph

Gratitude



Cassling

7 BENEFITS OF GRATITUDE

- Improves Relationships
- Fewer Aches & Pains
- More Happiness, Less Depression
- Promotes Better Sleep
- Increased Empathy Towards Others
- Boosts Self Esteem
- Encourages Mental Fortitude & Resilience

IVYBRAINTUMORCENTER.ORG

Source: "7 Scientifically Proven Benefits of Gratitude." Psychology Today.

Ivy Brain Tumor Center; Psychology Today

Relational

**conservation
behavior**



California Water Conservation

**cultural
connection**



Patrimonio Chile

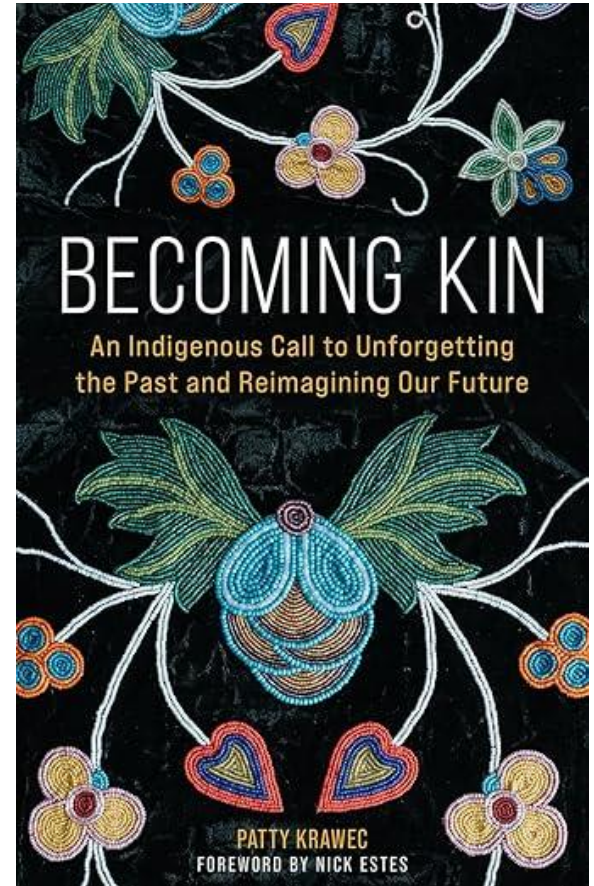
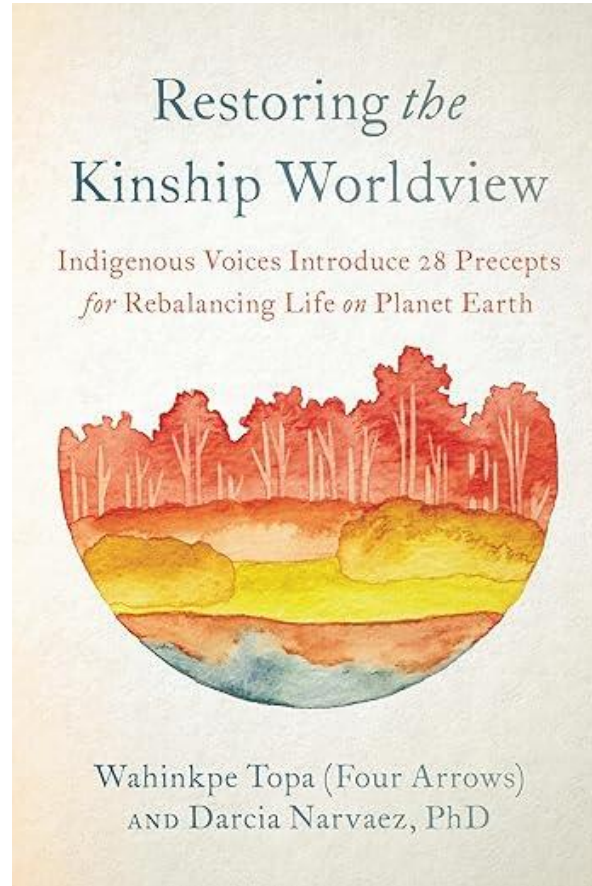
**plant/place
engagement**



Medium

Kinship

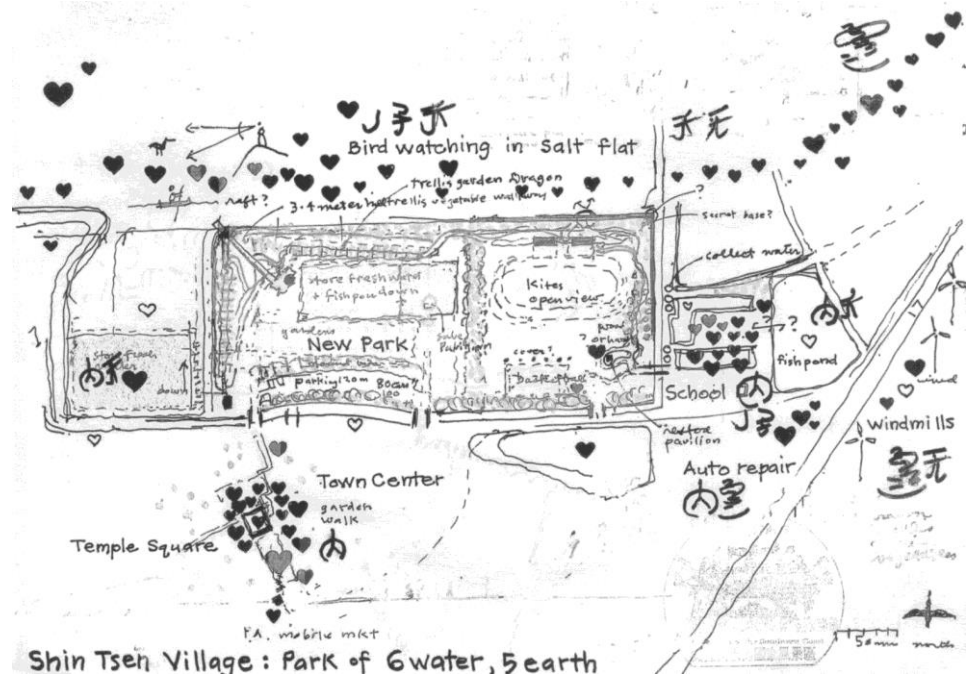
indigenous
peoples'
wisdom



Place Attachment, Identity & Meaning



Guy Kramer



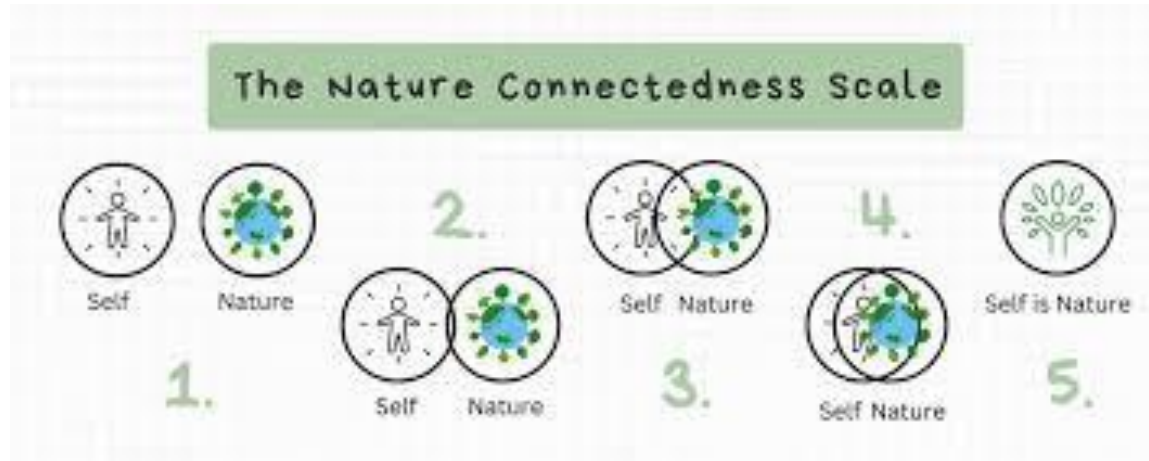
The Architect's Journal


Environmentally Responsible Behavior

psychological foundations

nature connectedness

nature relatedness





Last Thoughts!
retirement reflections
nature & health evidence
promote reciprocity
You are a healthcare provider!
your feedback?

kwolf@uw.edu