

URBAN GREENING FOR RESILIENCE & SUSTAINABILITY

KATHLEEN WOLF, PH.D., UNIVERSITY OF WASHINGTON

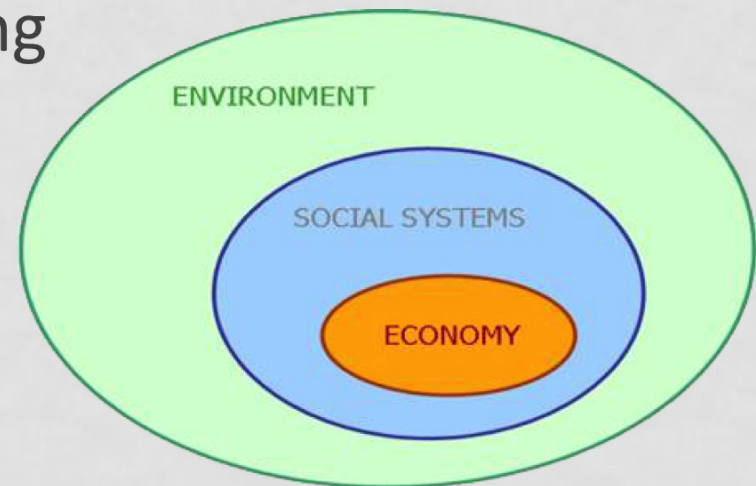


RESILIENCE: WHAT DOES IT MEAN?

- ability to cope with stress and adversity
- capacity to 'bounce back' from challenges
- ability to recover and adjust
- enduring change and hardship without failure

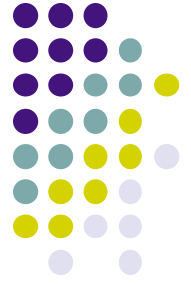
URBAN TREES & NATURE: SUSTAINABILITY & RESILIENCE

- beautification and aesthetics – so much more!
- environmental services of urban trees, parks, and green infrastructure
- social and cultural services - nature providing support, restoration, health, and healing
- scientific evidence!
- planning & management



i-Tree Suite of Software

USDA Forest Service

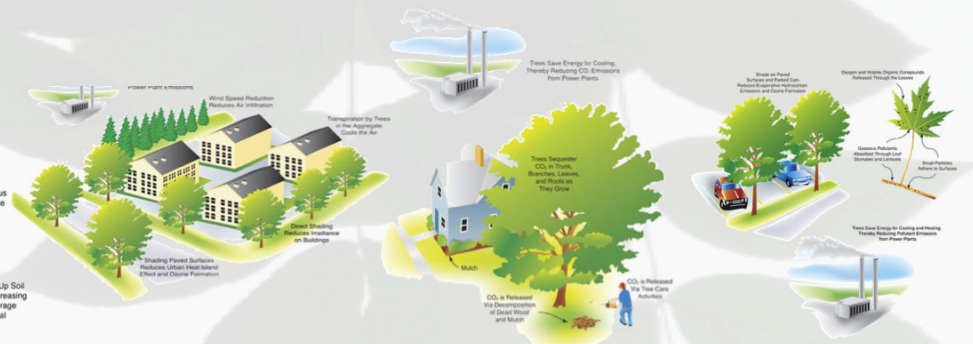
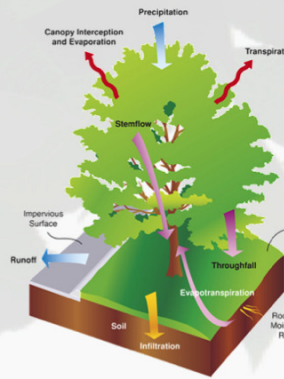




i-Tree™

Eco (UFORE)
 Streets (STRATUM)
 Hydro
 Vue

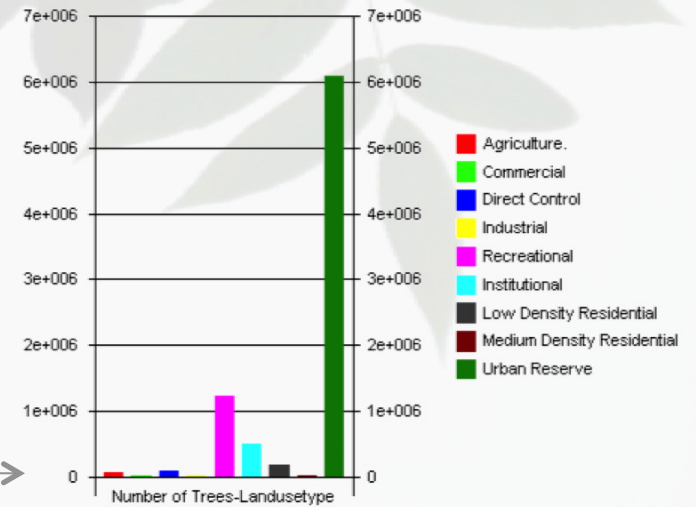
**STRUCTURE
 FUNCTION**



VALUE



MANAGEMENT



Reducing Atmospheric Carbon Dioxide



Image courtesy of the Center for Urban Forest Research

Reducing Stormwater Runoff

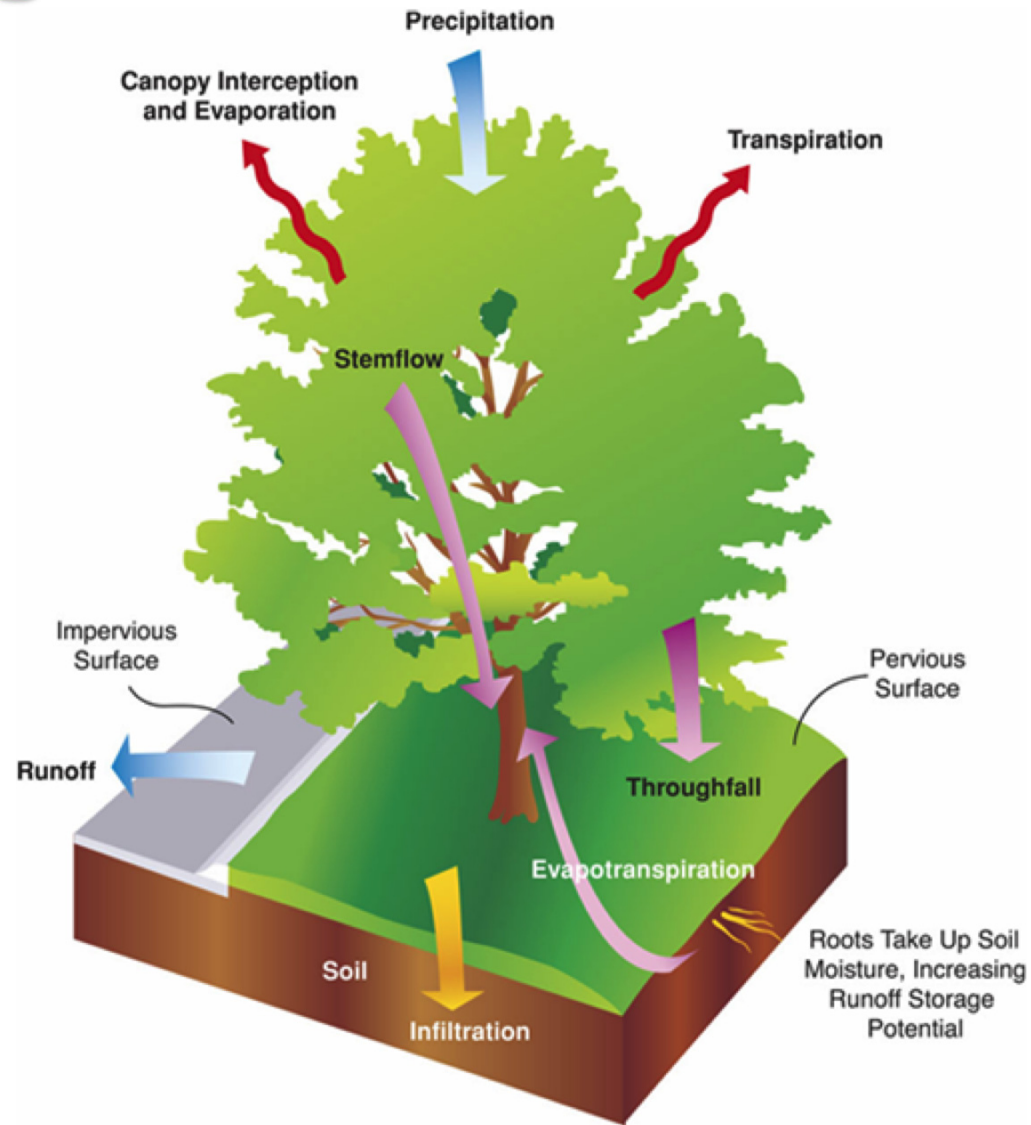


Image courtesy of the Center for Urban Forest Research

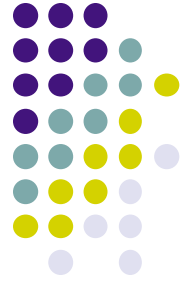
Why are city trees & urban greening important?



**human health,
functioning, &
well-being**



Research Reviews



Urban Forestry/Urban Greening Research

Green Cities: Good Health

UAS UNIVERSITY of WASHINGTON

INTRODUCTION RESOURCES FUTURE RESEARCH REFERENCES

Metro nature - including trees, parks, gardens, and natural areas - enhance quality of life in cities and towns. The experience of nature improves human health and well-being in many ways. Nearly 40 years of scientific studies tell us how. Here's the research ...

RESEARCH THEMES

- Livable Cities
- Place Attachment & Meaning
- Community Building
- Community Economics
- Social Ties
- Crime & Fear
- Reduced Risk
- Wellness & Physiology
- Active Living
- Healing & Therapy
- Mental Health & Functioning

first phase:
June 2010

summaries
complete:
August 2012

additional
products

www.greenhealth.washington.edu



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sponsors:

University of Washington

USDA Forest Service, U&CF Program

ARRA funding

NGO partners



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

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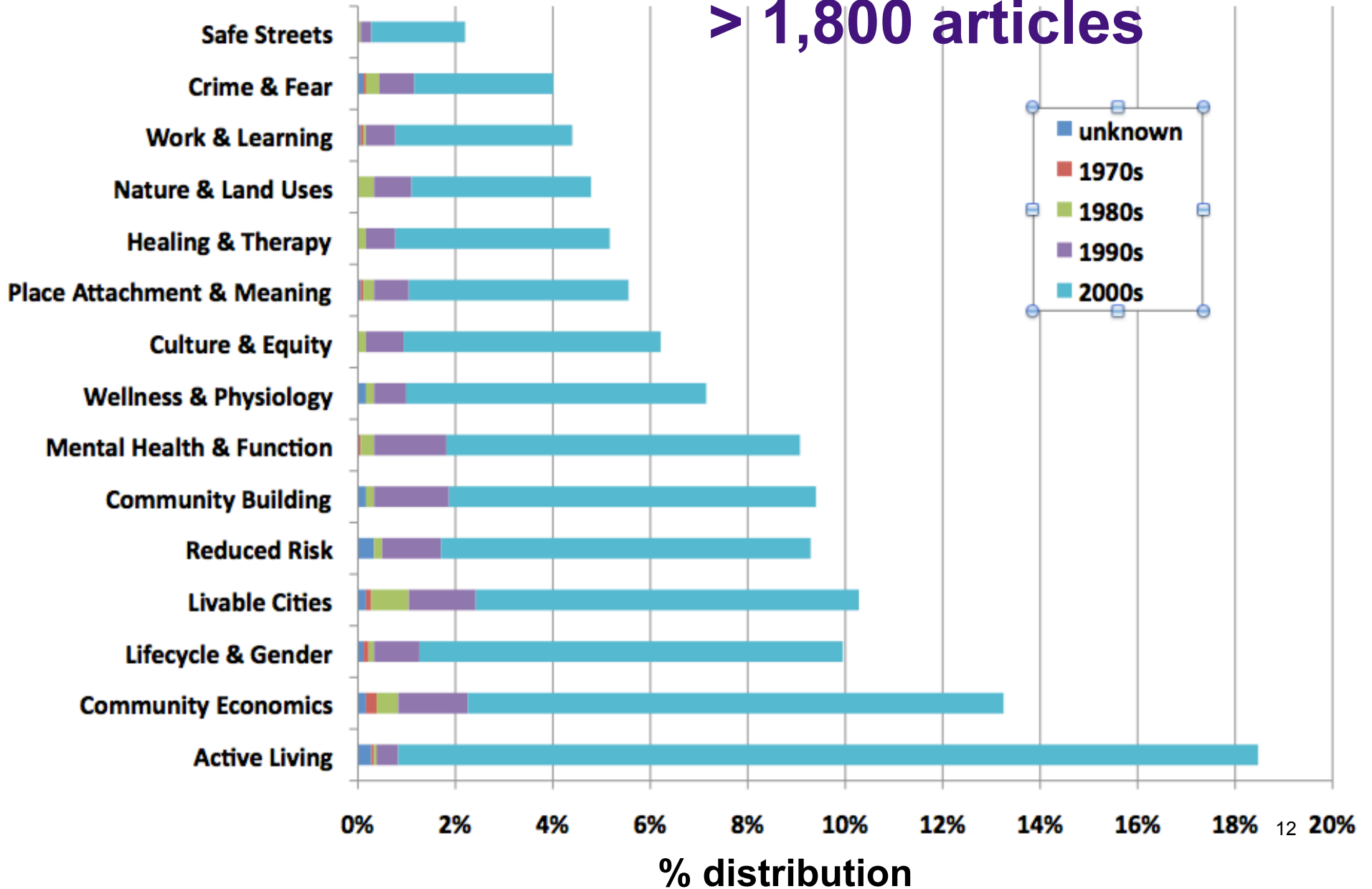
street trees boost market value of houses, providing tax revenue for communities



Urban Green :: Public Health & Well Being

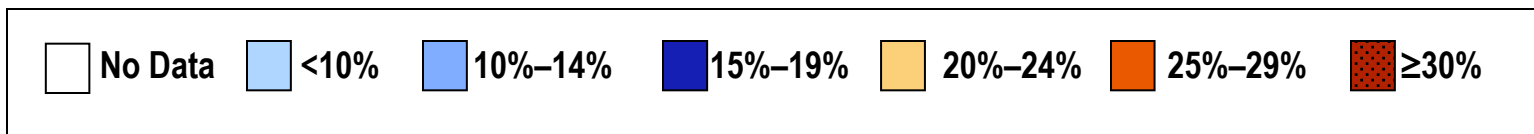
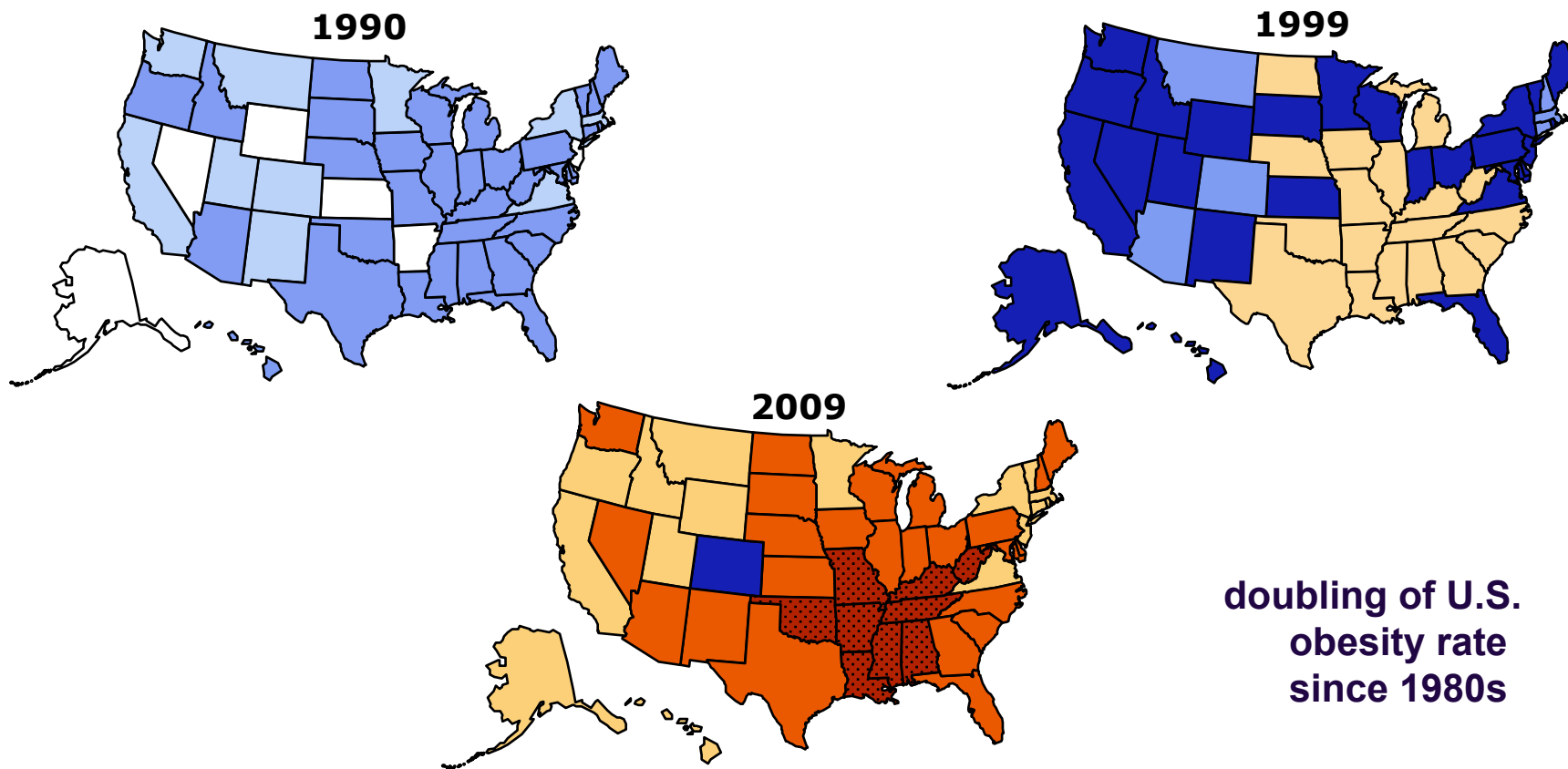


> 1,800 articles



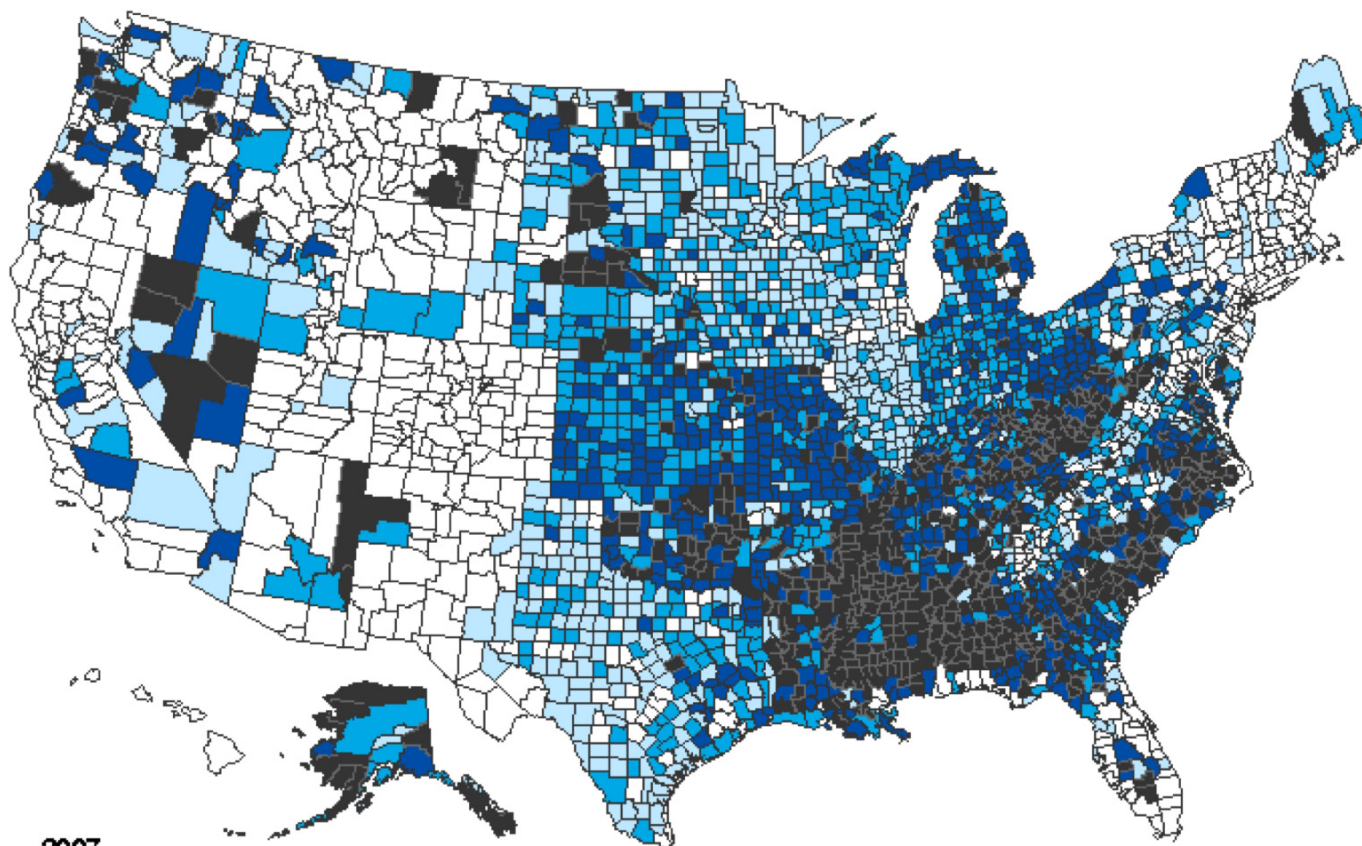
Obesity Trends* Among U.S. Adults 1990, 1999, 2009

(*BMI ≥ 30 , or about 30 lbs. overweight for 5'4" person)



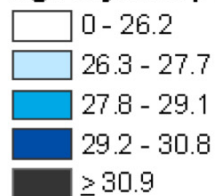
Source: Behavioral Risk Factor Surveillance System, CDC.

Age-adjusted % of adults aged ≥ 20 years who are obese, 2007



2007

Age-adjusted percent of adults ≥ 20 years old who are obese



CDC's Division of Diabetes Translation. National Diabetes Surveillance System available at <http://www.cdc.gov/diabetes/statistics> MMWR 58:1259-1263, 2009



Physical Inactivity & Obesity

majority of Americans not active enough
goal-30 minutes per day of moderate activity
to reduce risk factors for chronic diseases
(heart, stroke, cancer, diabetes)
significant costs to national health services

\$168 billion medical costs
17% of all U.S. medical costs

CDC 2010

• CANINE CONSTITUTIONAL



Tom Rowell / Dispatch

A brisk walk in the park keeps Marey B in shape between dog shows. His owner, Columbus resident Cathy Stumbo, got up early

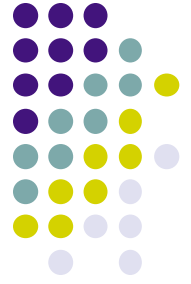
to give her 3-year-old Doberman his regular workout. They typically log 15 miles in Berliner Park.



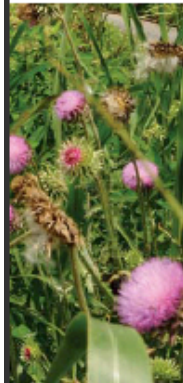
parks, open spaces & trails

Parks Prescription

San Francisco
Albuquerque



FROM FITNESS ZONES
TO THE MEDICAL MILE:
*How Urban Park Systems Can Best
Promote Health and Wellness*



THE TRUST *for* PUBLIC LAND
CONSERVING LAND FOR PEOPLE



walkable places = health & happiness

City Trees & Nature

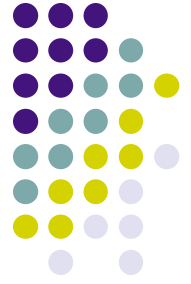
Active Living



	Positive Elements
Physical Environment	<p>higher population density (city core rather than suburbs)</p> <p>higher housing density</p> <p>mix of land uses (such as residential and retail)</p> <p>street design with more connectivity (rather than cul-de-sacs)</p> <p>availability of public transit</p> <p>walking and biking infrastructure (such as sidewalks and bike lanes)</p>
Psycho-Social Environment	<p>safety from crime</p> <p>safety from traffic</p> <p>absence of social disorder</p> <p>aesthetics (including trees and landscape)</p> <p>educational campaigns (such as Walk-to-School)</p> <p>incentive programs (such as work place reimbursement for transit use)</p>

Table 1: Determinants of City Walkability

Nature, Human Health & Walkable Neighborhoods



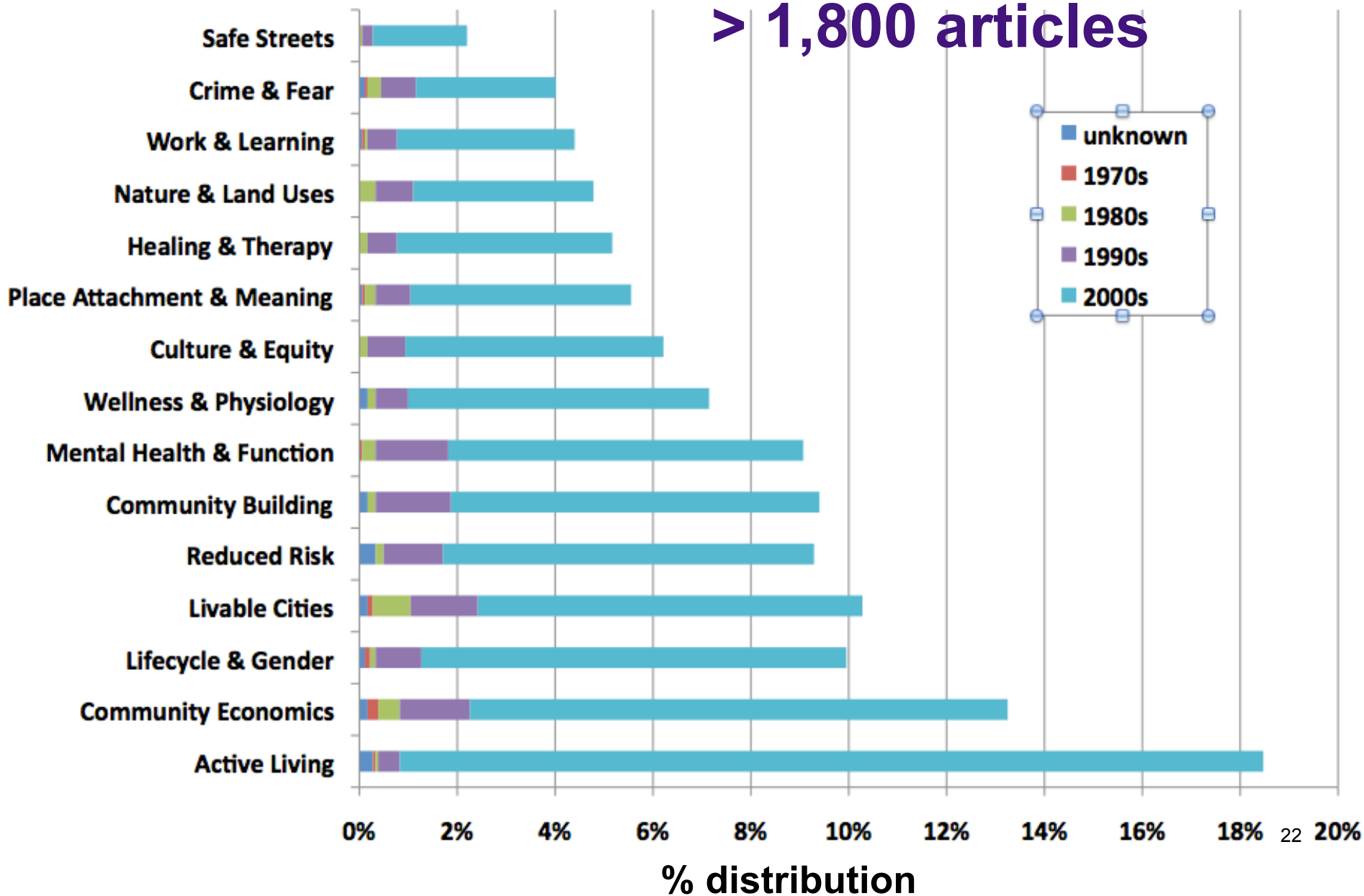
- Outcomes: Elderly People & Walking
 - less illness
 - lower mortality rate
- Environments: Neighborhood Streets (Tokyo)
 - tree - lined
 - parks

Takano, Nakamura, Watanabe. 2002.
Journal of Epidemiology & Community Health

Urban Green :: Public Health & Well Being



> 1,800 articles

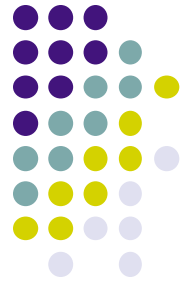


Nature & Psych Development children's play & imagination



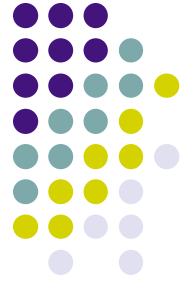
Nature Deficits

Richard Louv



School & Learning





the nature advantage

- College students with more natural views from their dorm windows
 - scored higher on tests of capacity to direct attention
 - rated themselves as able to function more effectively

Tennessen & Cimprich. 1995.
Journal of Environmental Psychology



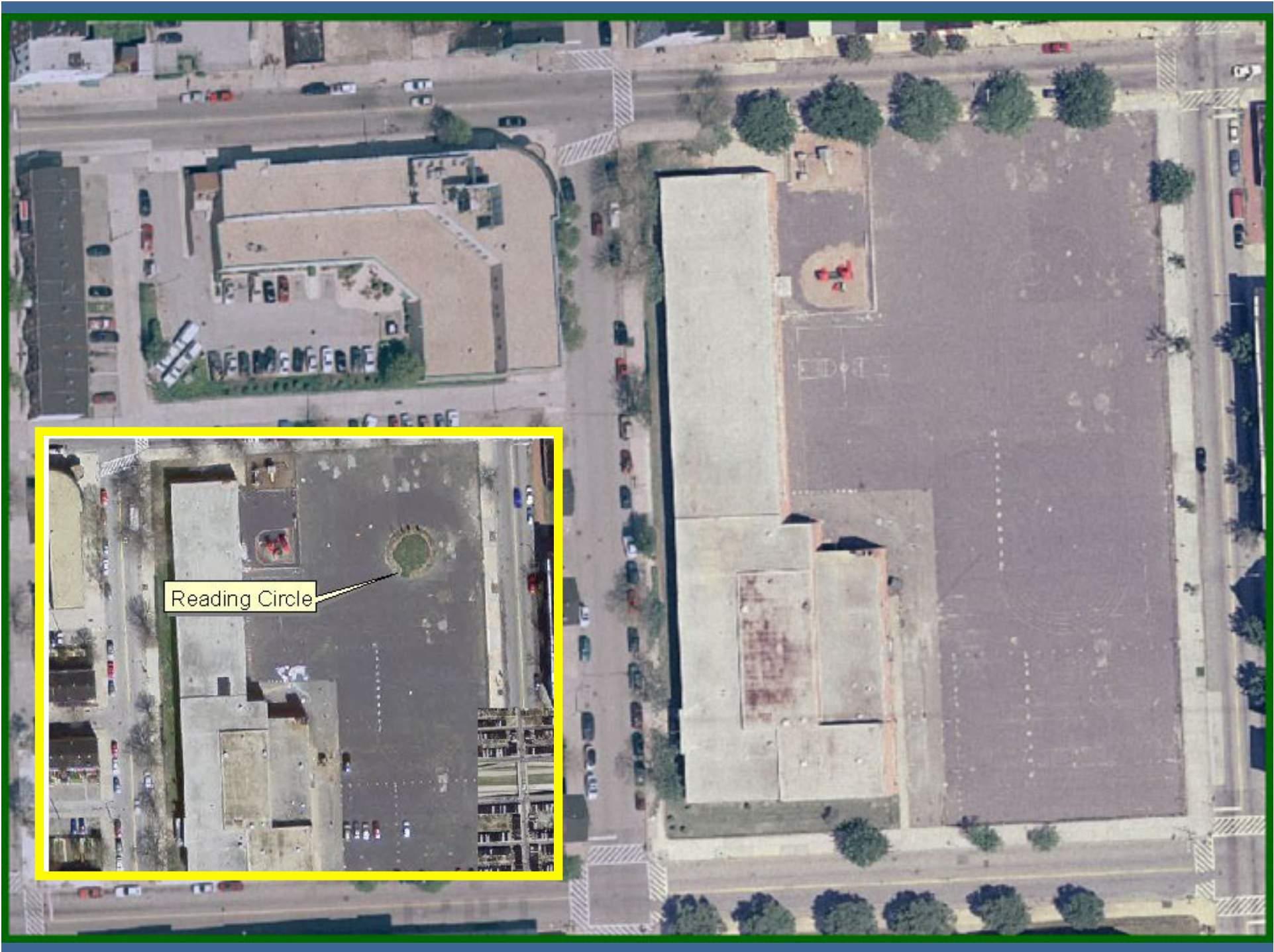
Green High School Campuses

- cafeteria & classroom window views with greater quantities of trees and shrubs
- positively associated with:
 - standardized test scores,
 - graduation rates
 - %s of students planning to attend a four-year college
 - fewer occurrences of criminal behavior



Parks & People Foundation, Baltimore

nature recovery & schools



Reading Circle



Parks & People Foundation, Baltimore

first phase - reading circle



Parks & People Foundation, Baltimore

depaving & nature recovery

Parks & People Foundation, Baltimore

planning skills & efficacy



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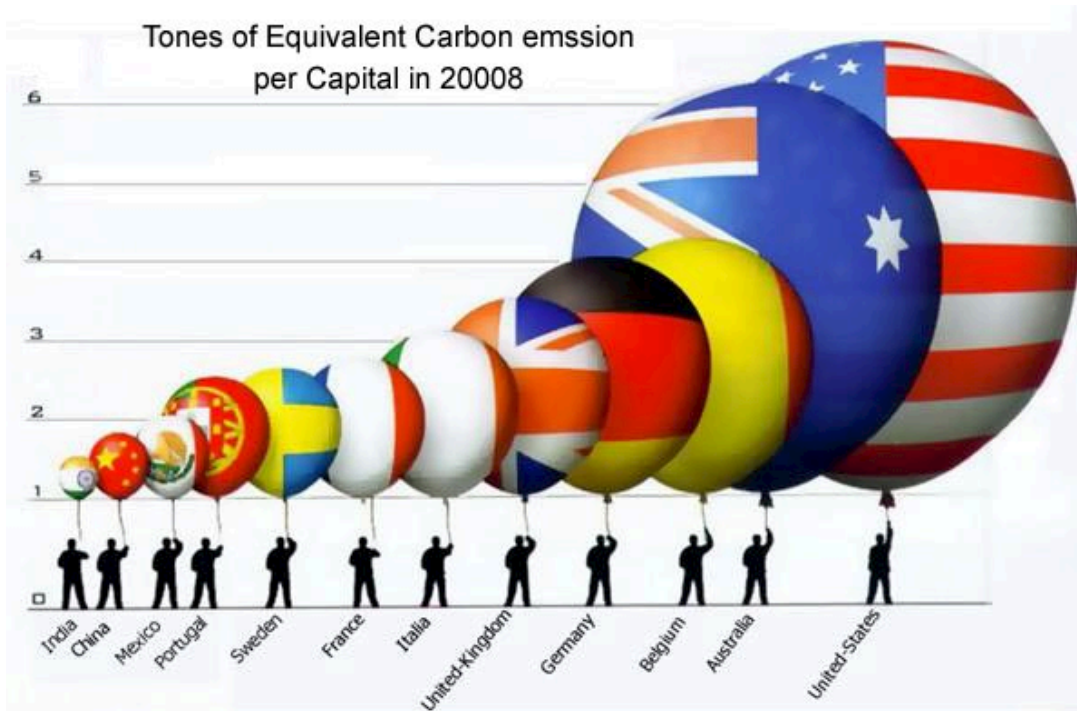
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Carbon Dioxide & Climate Change

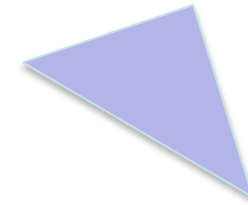


Image courtesy of the Center for Urban Forest Research

Reducing Atmospheric Carbon Dioxide



**emissions
sources?**



**carbon
emissions**

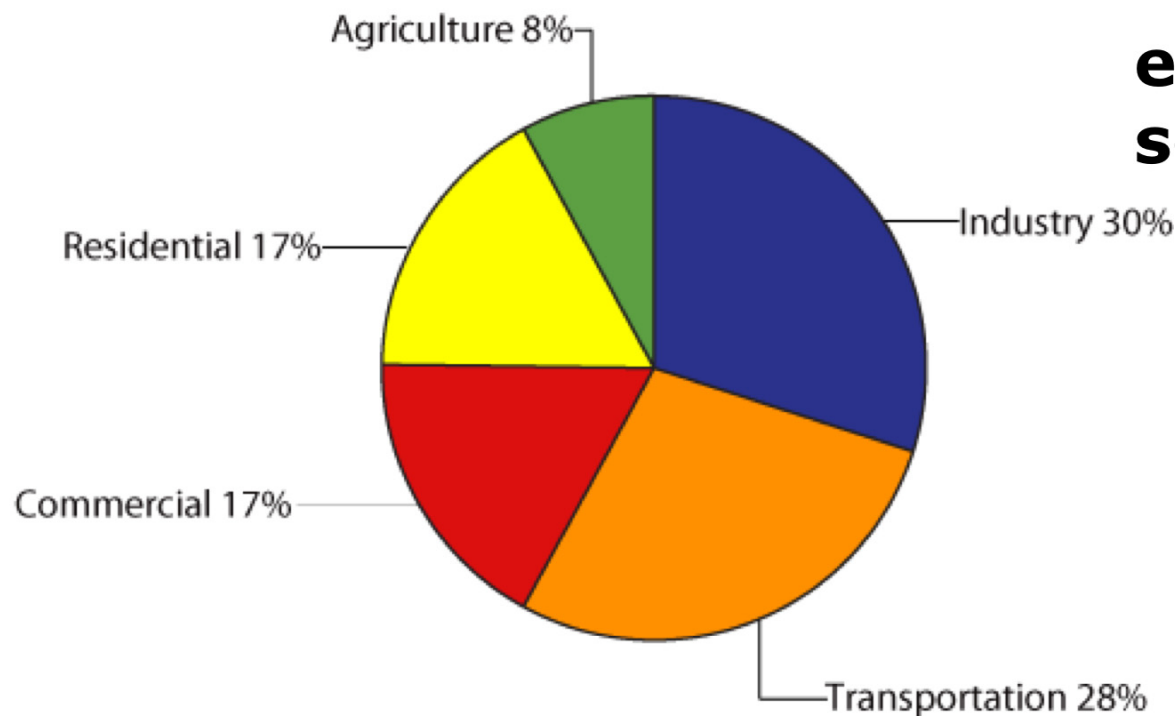


**plant more
trees!**

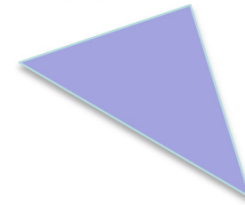
Reducing Atmospheric Carbon Dioxide

Greenhouse Gas Emissions by Sector

United States, 2004



emissions sources?



carbon emissions



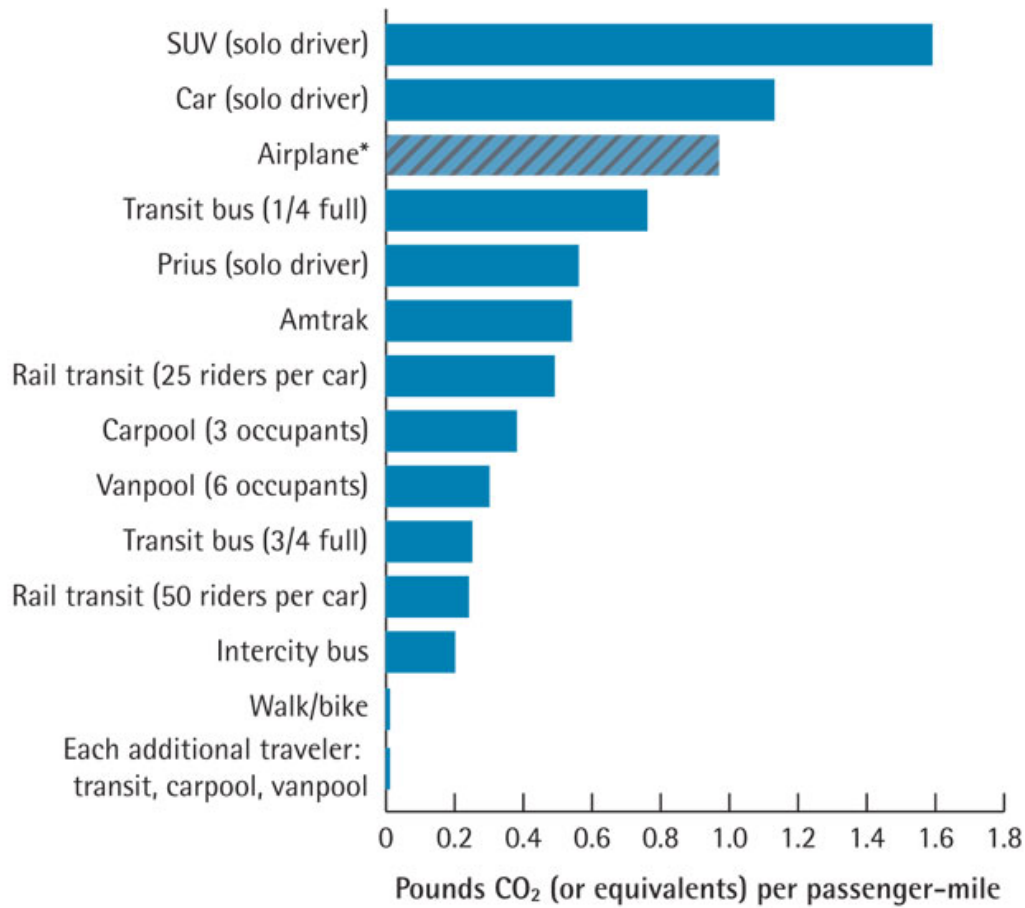
plant more trees!

Total Emissions* = 7,074 MMT CO₂E

* Net Emissions (Sources + Sinks) = 6,204 MMT CO₂E

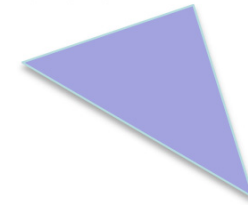
** High GWP Gases include: HFCs, PFCs, and SF₆

Reducing Atmospheric Carbon Dioxide



**Aircraft emissions are the most variable. Use an online calculator, such as Atmosfair.com, to estimate the climate impacts of your flight.*

**emissions
sources?**

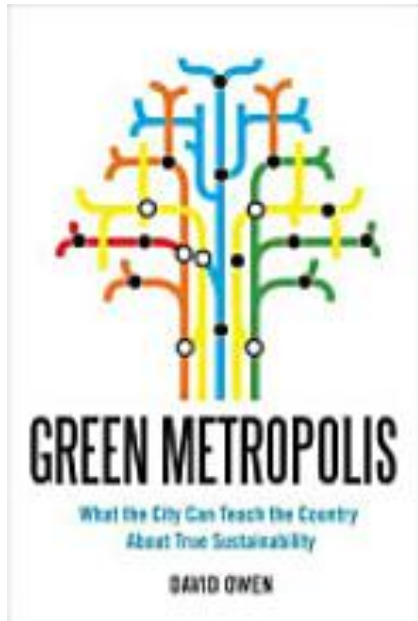


**carbon
emissions**

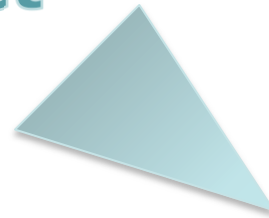


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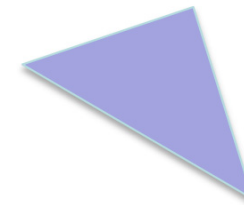
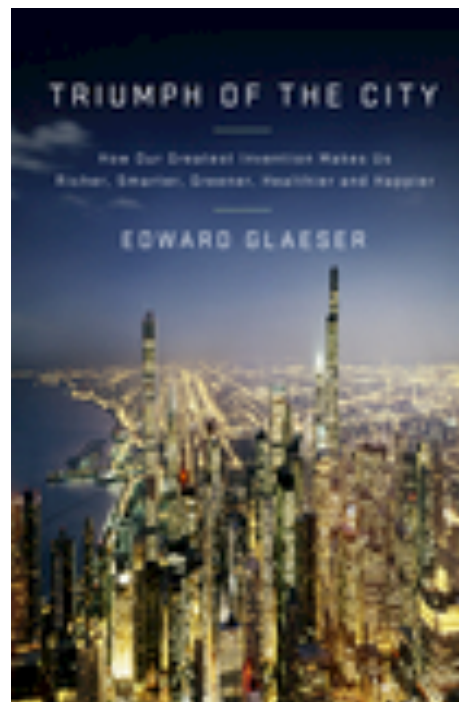
Reducing Atmospheric Carbon Dioxide



compact
cities!



reduced
emissions
sources!



carbon
emissions



plant more
trees!

Reducing Atmospheric Carbon Dioxide

compact
cities!

**Green
Cities:
Good
Health**



**reduced
emissions
sources!**

**carbon
emissions**

plant more
trees!



Trees & Nature Benefits



- messages • livability • quality of life •
- community competition • public values •

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 . . .

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