



Invest from the Ground Up! Economics of City Trees & Greening

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Ecosystem Services

ECOSYSTEM SERVICES	
Supporting Services Nutrient cycling Soil formation Primary production	Provisioning Services Food (crops, livestock, wild foods, etc...) Fiber (timber, cotton/hemp/silk, wood fuel) Genetic resources Biochemicals, natural medicines, pharmaceuticals Fresh water
	Regulating Services Air quality regulation Climate regulation (global, regional, and local) Water regulation Erosion regulation Water purification and waste treatment Disease regulation Pest regulation Pollination Natural hazard regulation
	Cultural Services Aesthetic values Spiritual and religious values Recreation and ecotourism

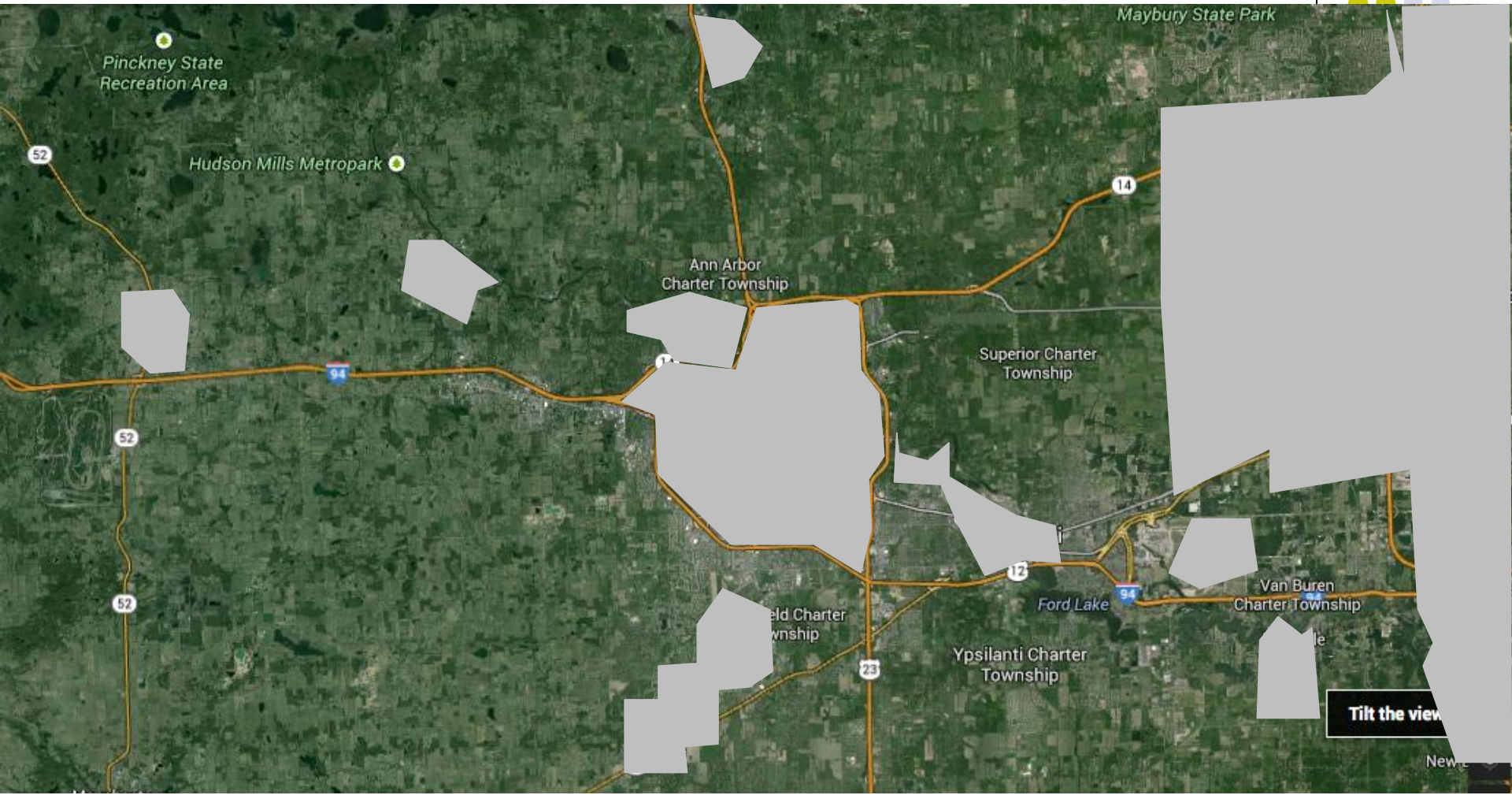
**Millennium
Ecosystem
Assessment**

2005

The value of the world's ecosystem services and natural capital

Robert Costanza^{*†}, Ralph d'Arge[‡], Rudolf de Groot[§], Stephen Farber^{||}, Monica Grasso[†], Bruce Hannon[¶], Karin Limburg^{#☆}, Shahid Naeem^{**}, Robert V. O'Neill^{††}, Jose Paruelo^{‡‡}, Robert G. Raskin^{§§}, Paul Sutton^{|||} & Marjan van den Belt^{¶¶}

- **1997**, *Nature* 387:6630, 253-260
- ecosystems provide at least US \$33 trillion dollars worth of services annually
- about 38% of the estimated value comes from terrestrial systems, mainly from forests

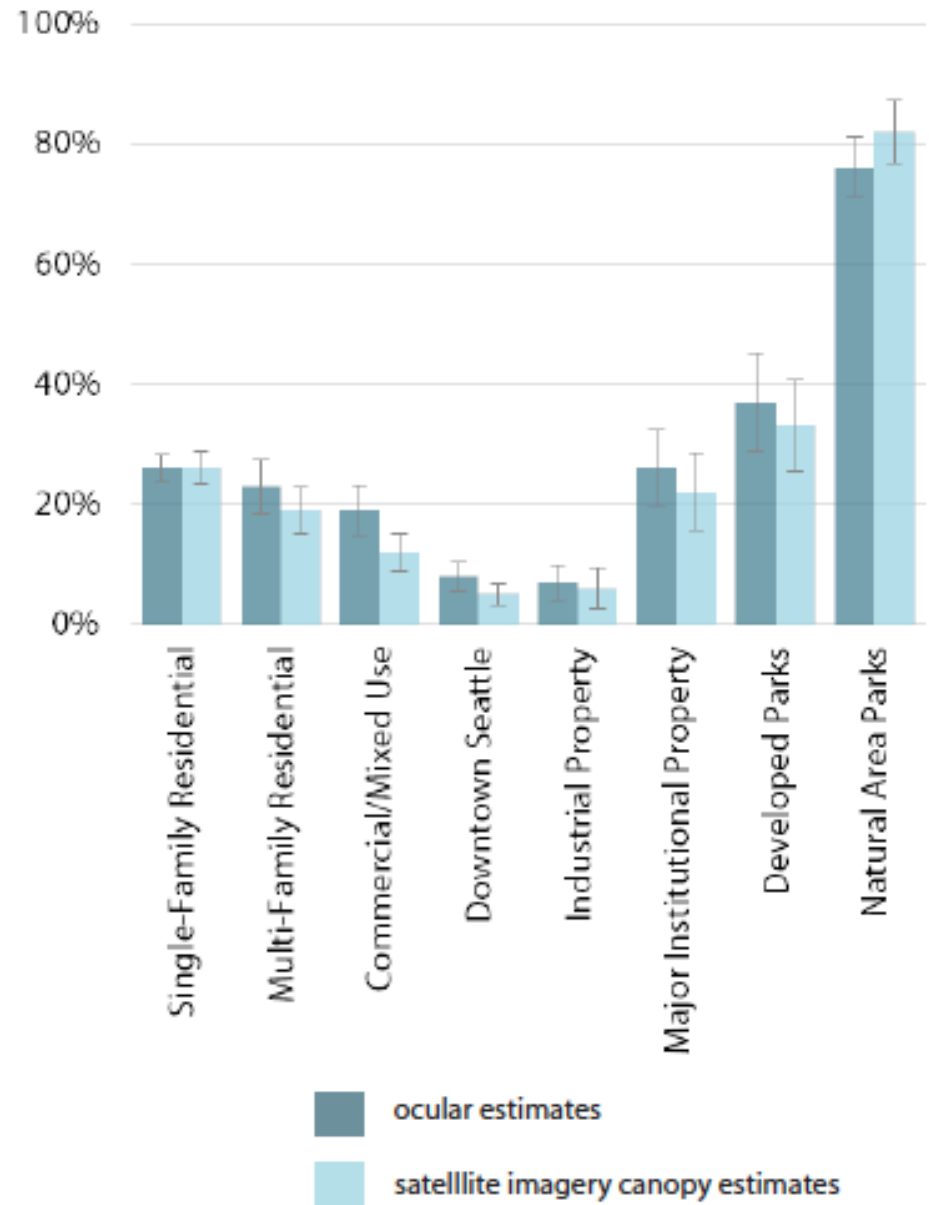


Tilt the view

Urban Forest Canopy Cover by Land Use

Seattle USA data ::
distribution probably similar to many (northern) cities

CANOPY ANALYSIS COMPARISONS





What are the economic values of urban trees and urban greening?



More...

Map

Satellite

Terrain

John Smith Rd



462



Fording Island Rd

278

Nickle Plate Rd

388





Hilton Head, SC



Reducing Stormwater Runoff

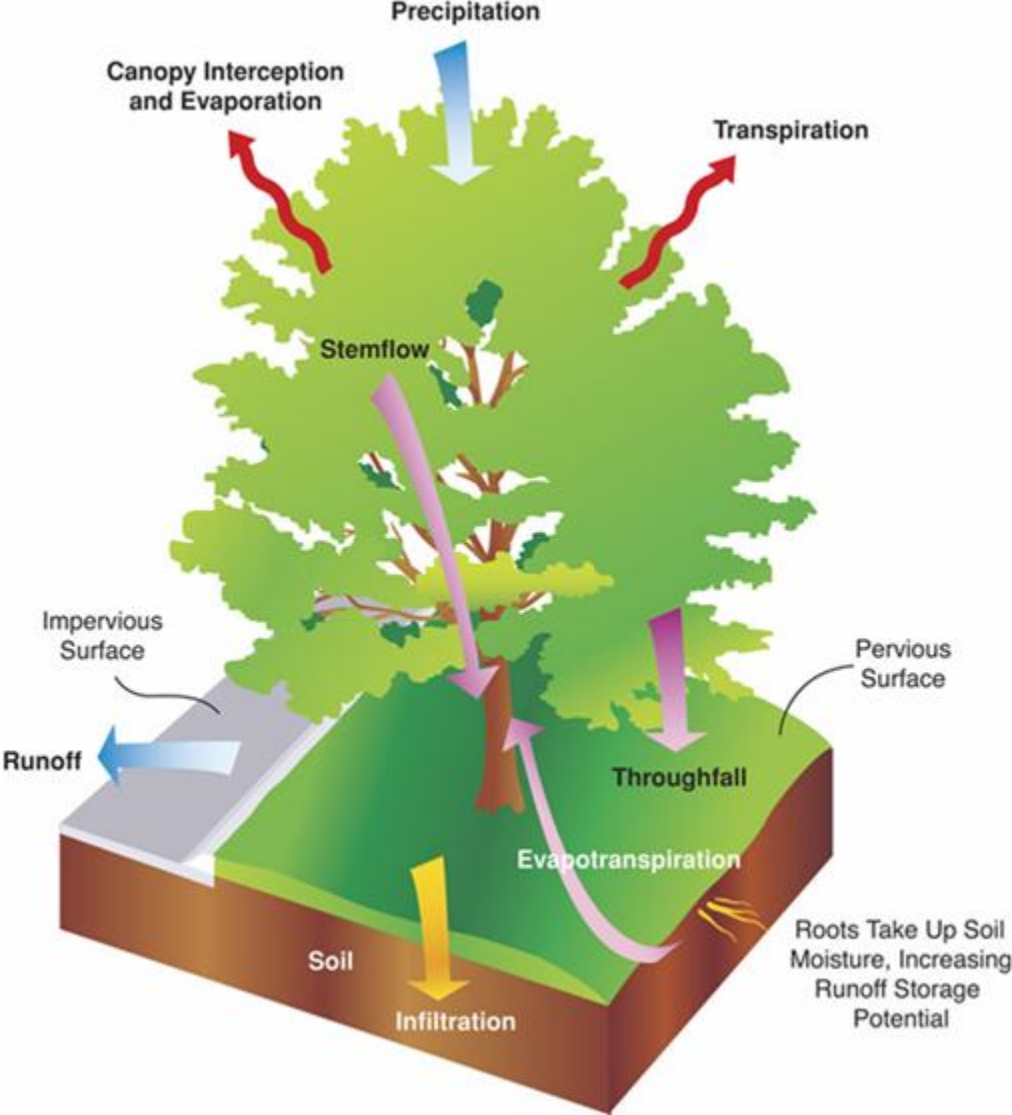
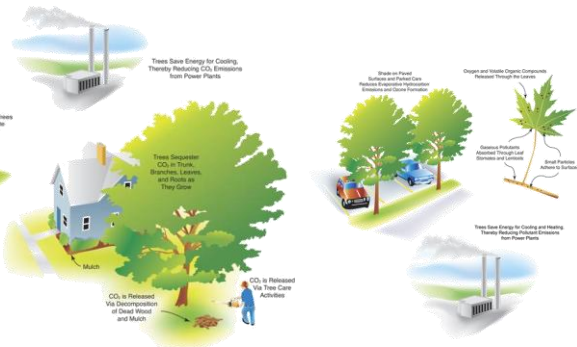
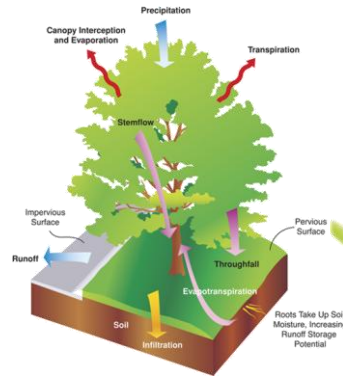


Image courtesy of the Center for Urban Forest Research



Eco (UFORE)
 Streets (STRATUM)
 Hydro
 Vue
 tools provided
 by USDA
 Forest Service

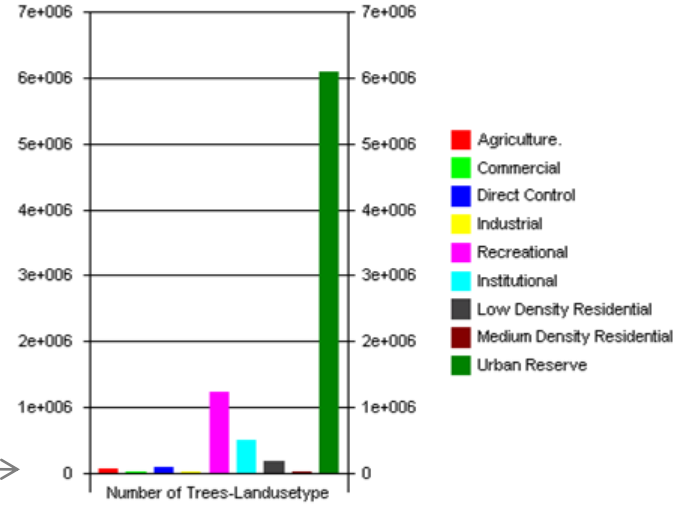
STRUCTURE FUNCTION



VALUE



MANAGEMENT





Residential Properties

hedonic valuation



Yard & Street Trees

Value

Increase

Condition

2%	mature yard trees (greater than 9-inch dbh)
3%	larger street trees (up to 100' away)
3-5%	trees in front yard landscaping
6-9%	good tree cover in a neighborhood
10-15%	mature trees in high-income neighborhoods

Tree Retention In Development



Value

Increase

Condition

18%

building lots with substantial mature tree cover

22%

tree-covered undeveloped acreage

19-35%

lots bordering suburban wooded preserves

37%

open land that is two-thirds wooded

Parks & Open Space

proximate principle – John Crompton



Value

Increase

Condition

10%

inner city home located within 1/4 mile of a park

17%

home near cleaned-up vacant lot

20%

home adjacent to or fronting a passive park area

32%

residential development adjacent to greenbelts



Local Government Benefits

***Civic Investment – Public Goods
like schools, emergency response, roads***

- street trees average positive effect on house values
- added up across Portland, Oregon
- yields a total value of \$1.35 billion US
- potentially increasing annual property tax revenues \$15.3 million US

Donovan & Butry. 2010
Landscape and Urban Planning



Tree Canopy & Consumer Environments

NATIONAL BESTSELLER



WHY WE BUY

THE SCIENCE
OF SHOPPING

"A testament to the nobility, the courage—yes, even the heroism—of the average shopper. . . . At last, here is a book that gives this underrated skill the respect it deserves." —Patricia T. O'Conner, *The New York Times*

PACO UNDERHILL

social science
of consumer
behavior

'atmospherics'

Trees & Retail Environments Research



Trees & Shopper Environments Research

- Research Questions •

 - trees and visual quality?

 - trees and consumer behavior?

 - trees and product pricing?

- **Methods:**

 - mail out/in surveys**

 - national or local sample**

 - residents/nearby city residents**

partners: U of Washington, NGOs, business organizations
funded by USDA Forest Service

Image Categories (sorted by ratings)

**Pocket Parks
mean 3.72
(highest)**



**Scale : 1=not at all,
5=like very much, 26
images**



**Full Canopy
mean 3.63**

**Enclosed
Sidewalk
3.32**



**Intermittent
Trees
2.78**



No Trees
mean 1.65
(lowest)

(high - 3.72)



1. Place Perceptions

- Place Character
- Interaction with Merchants
- Quality of Products

2. Patronage Behavior

- travel time, travel distance
- duration & frequency of visits
- willingness to pay for parking

3. Product Pricing

- higher willingness to pay for all types of goods
- higher in districts with trees – 9-12%



Place Marketing

**Relationship
Marketing**

Shopping Area Two

Refer
survey!



View "A"



View "B"



View "C"

Shopping Area One

Use the
survey



View "A"



View "B"



View "C"

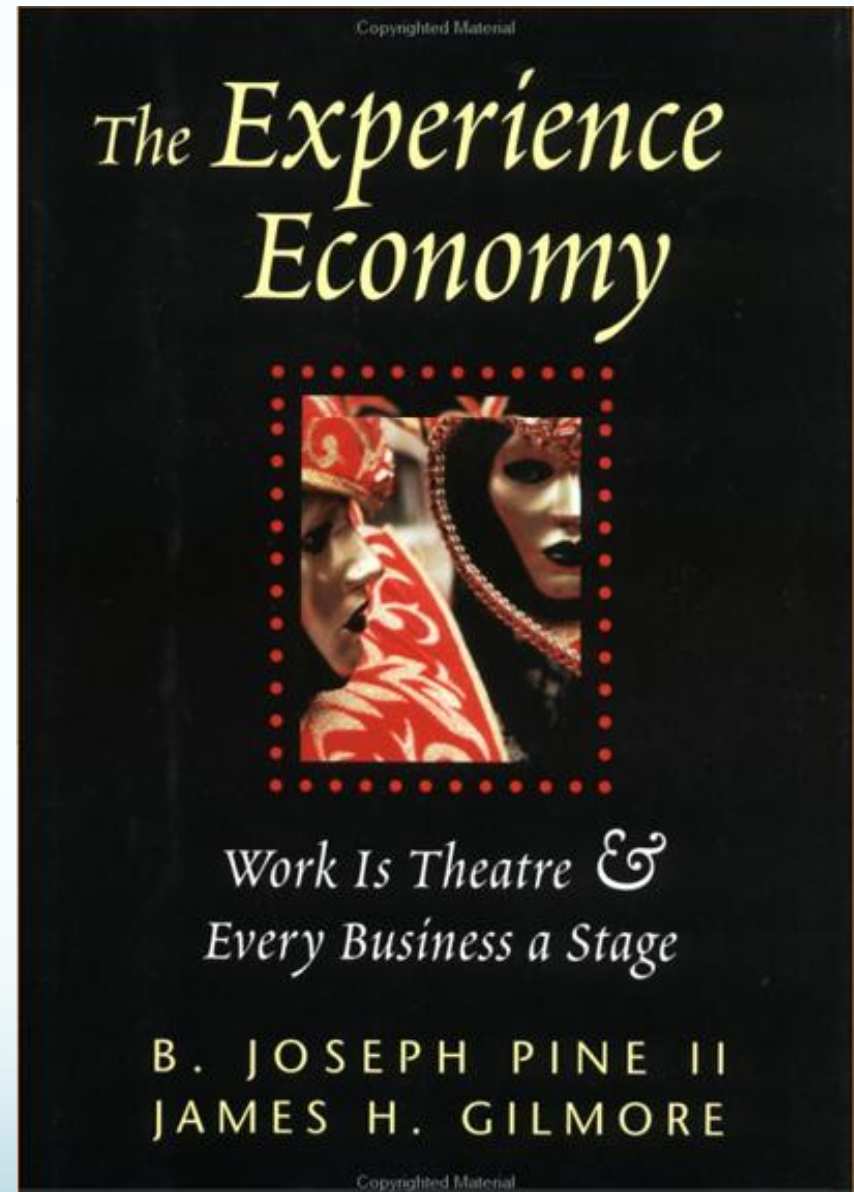
strip malls

vegetation
edited in

shopper
survey

**retail & place
marketing**

**“Companies stage
an experience when
they engage
customers in a
memorable way.”**





Human Health & Well-Being wellness & productivity valuation

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



summaries
nearly
complete

additional
products

study of
economic
valuation

www.greenhealth.washington.edu

Research Review and Summaries



Sponsors:
University of Washington
USDA Forest Service, U&CF Program
NGO partners

**thanks to U of WA
students:**
Katrina Flora
Mary Ann Rozance
Sarah Krueger

Urban Forestry/Urban Greening Research

Green Cities: Good Health

U.S. FOREST SERVICE
W UNIVERSITY OF WASHINGTON

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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



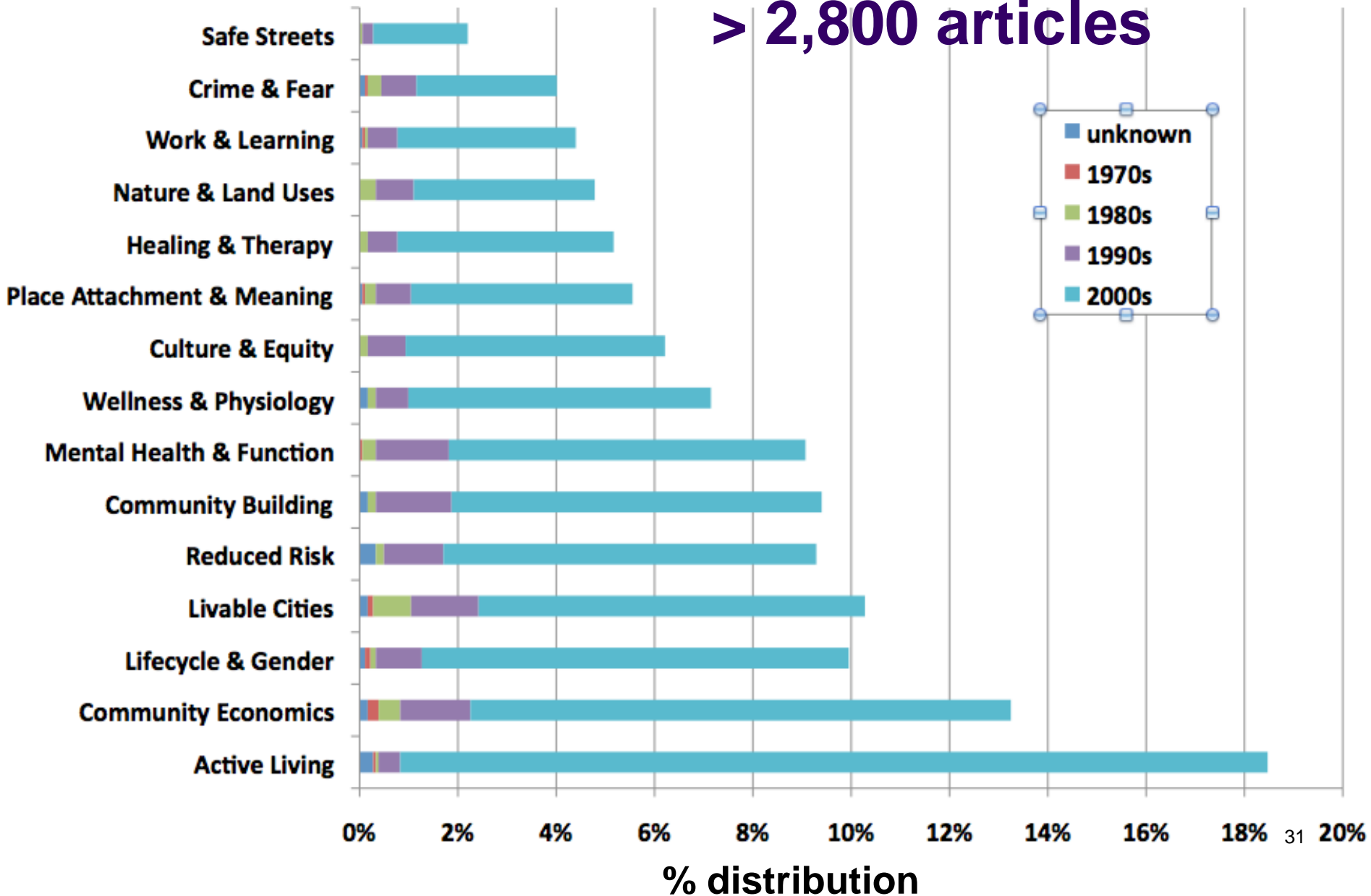
street trees boost market value of houses, providing tax revenue for communities



Urban Green :: Public Health & Well Being



> 2,800 articles





Urban Greening & Health Evidence Framework

biophilia
outcomes





Urban Forests and Newborns

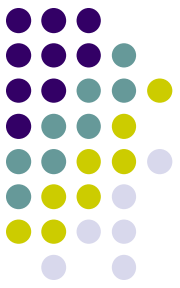
the natural environment may affect pregnancy outcomes . . .

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



Walkable Neighborhoods & Elder Mortality



- Environments: Neighborhood Streets (Tokyo)
 - “treatment’ - tree-lined & parks
 - control – little green
- Outcomes: Elderly People
 - less illness
 - lower mortality over 5 years



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

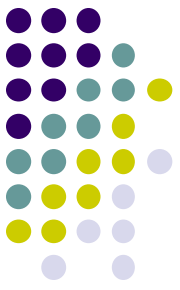


Conclusions

ecosystem services pristine landscapes



ES of city trees & 'nearby nature' 40 years of study . . .



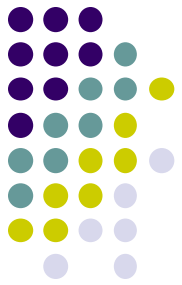


Summary

- **urban ecosystem services**
- **benefits research & evidence!**
- **environmental, social, community**
- **economic valuation**
- **formative economics methods**
hedonic to health
- **benefit to cost analysis**
- **biophilia values? more to do!**







Human Dimensions of Urban Forestry and Urban Greening

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 . . .

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.

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