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

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Ecosystem Services

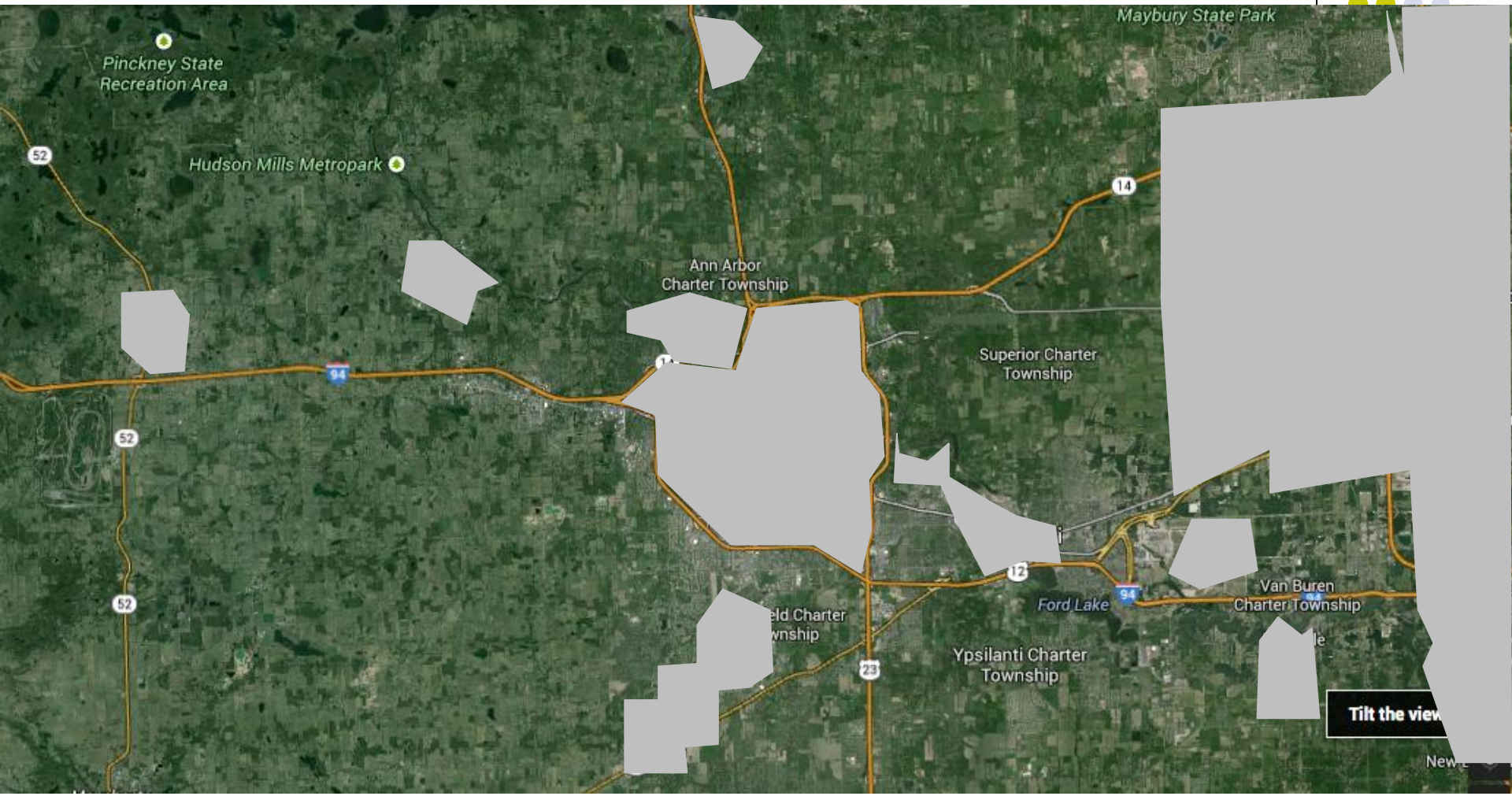
Millennium Ecosystem Assessment

2005

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

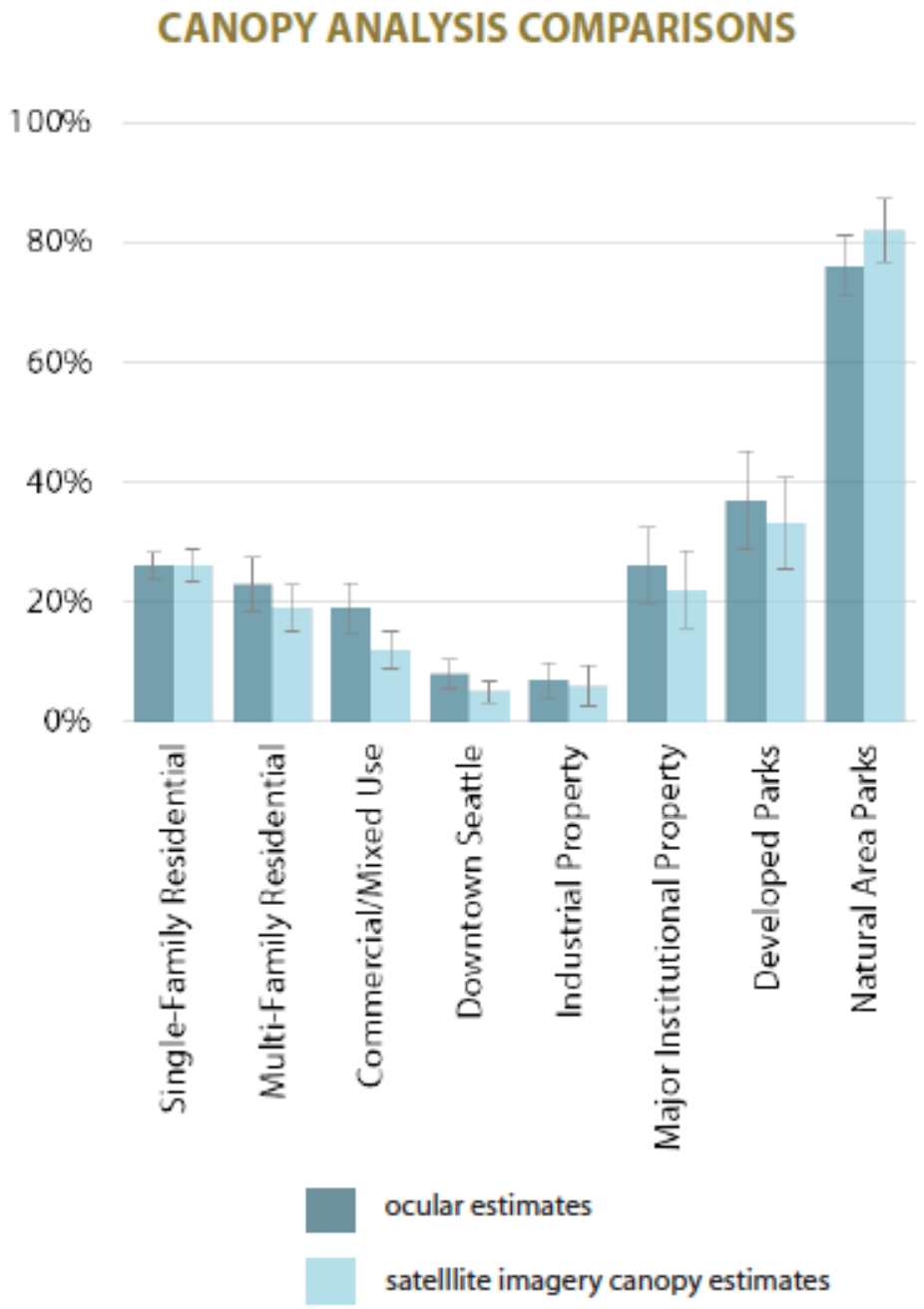
Robert Costanza*†, Ralph d'Arge‡, Rudolf de Groot§, Stephen Farber‖, Monica Grasso†, Bruce Hannon¶, Karin Limburg#☆, Shahid Naeem**, Robert V. O'Neill††, Jose Paruelo‡‡, Robert G. Raskin§§, Paul Sutton‖‖ & Marjan van den Belt¶¶

- **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

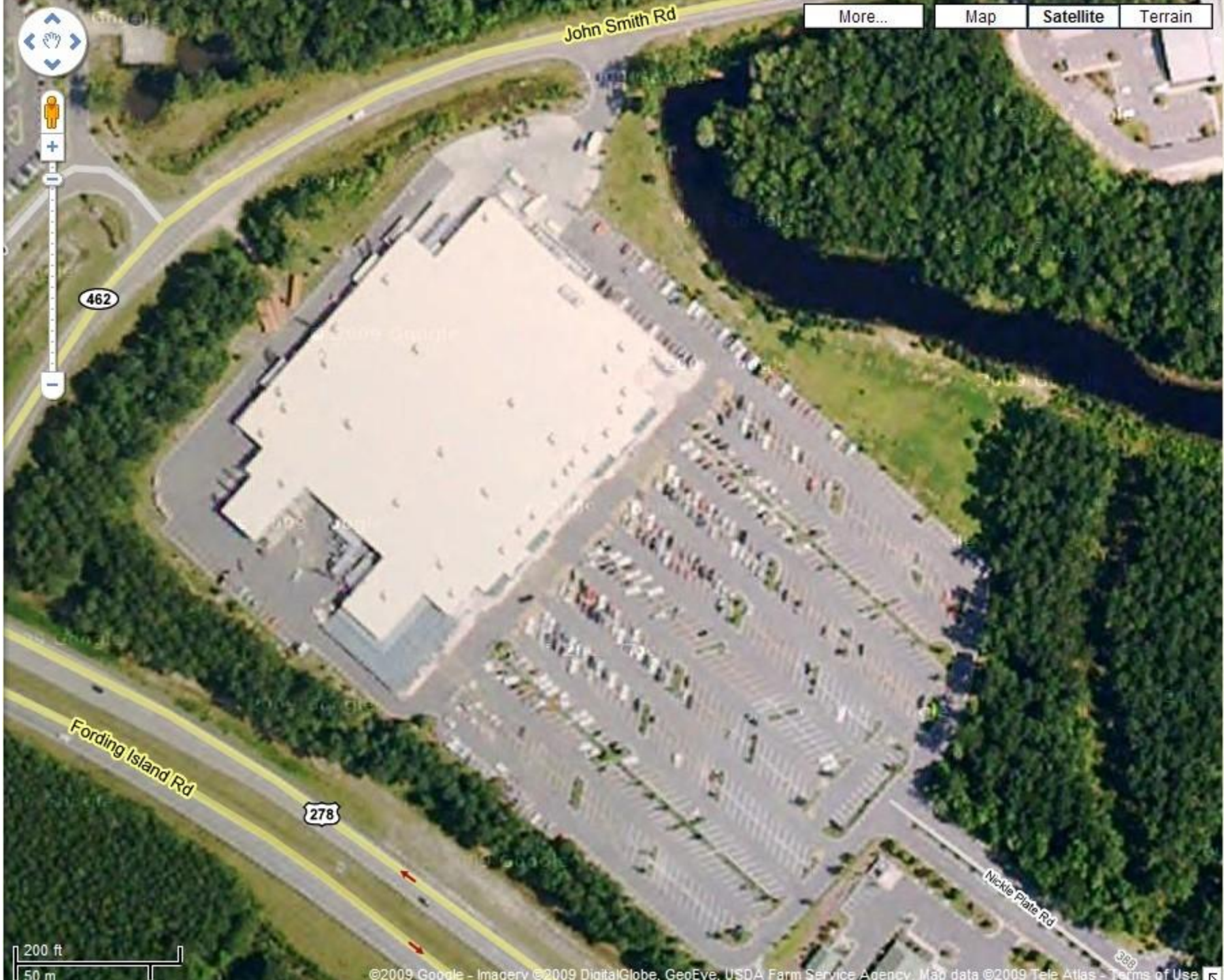

Maybury State Park
Pinckney State Recreation Area
Hudson Mills Metropark
Ann Arbor Charter Township
Superior Charter Township
Ford Lake
Van Buren Charter Township
Ypsilanti Charter Township
Tilt the view
52
94
14
12
23

Urban Forest Canopy Cover by Land Use

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



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
200 ft
50 m
©2009 Google - Imagery ©2009 DigitalGlobe, GeoEye, USDA Farm Service Agency, Map data ©2009 Tele Atlas - Terms of Use


Hilton Head, SC

Reducing Stormwater Runoff

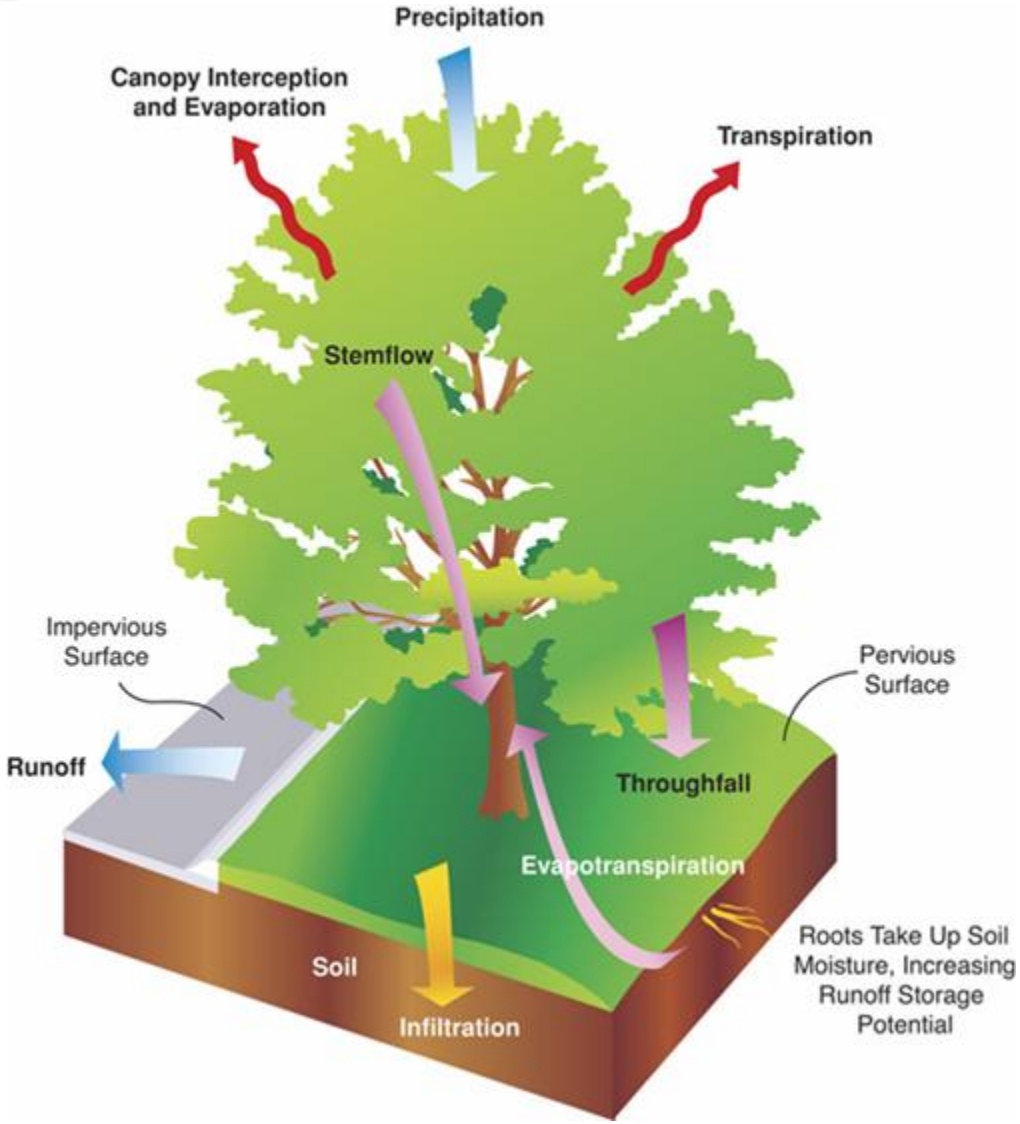


Image courtesy of the Center for Urban Forest Research

i-Tree™

Eco (UFORE)

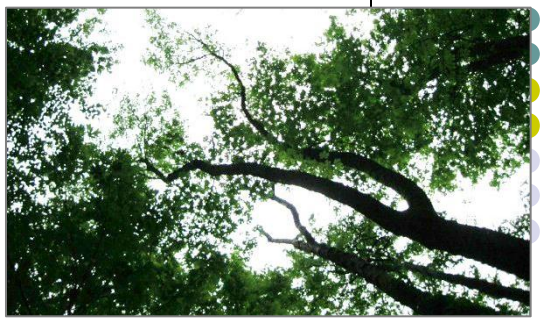
Streets (STRATUM)

Hydro

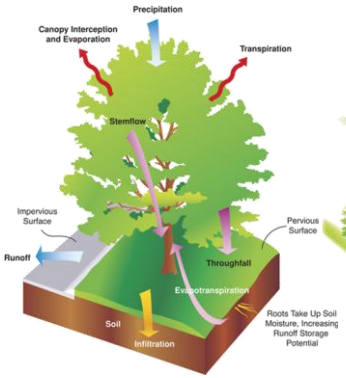
Vue

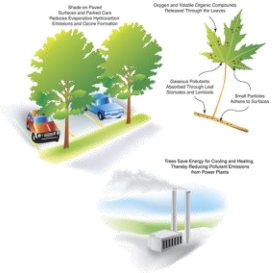
tools provided by USDA Forest Service

STRUCTURE

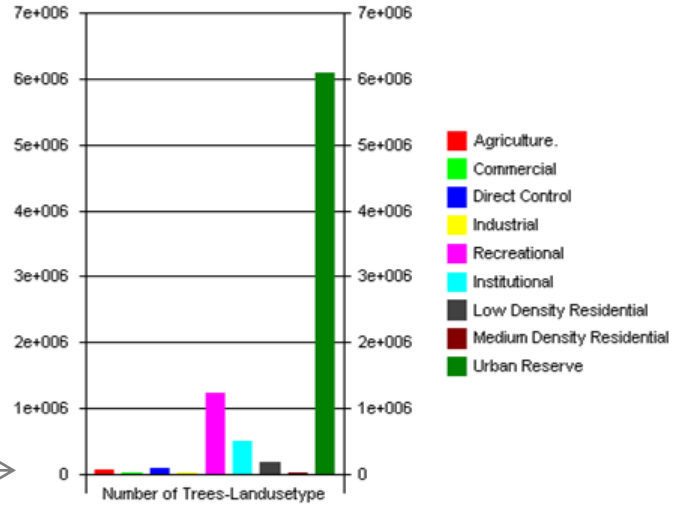


FUNCTION





VALUE



MANAGEMENT

photo credits: Seattle i-Tree Training by Al Zelaya

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

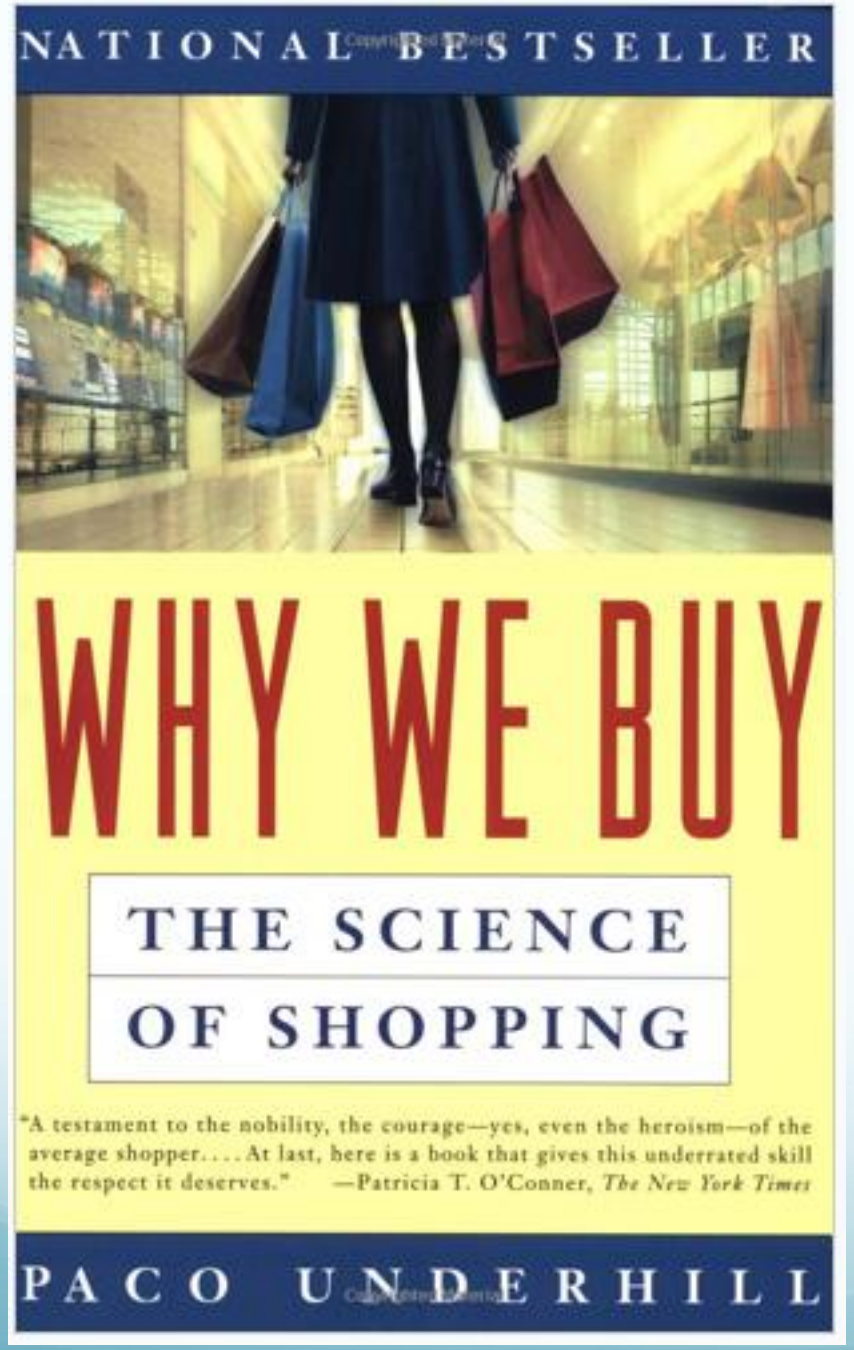
Civic Investment – Public Goods

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



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

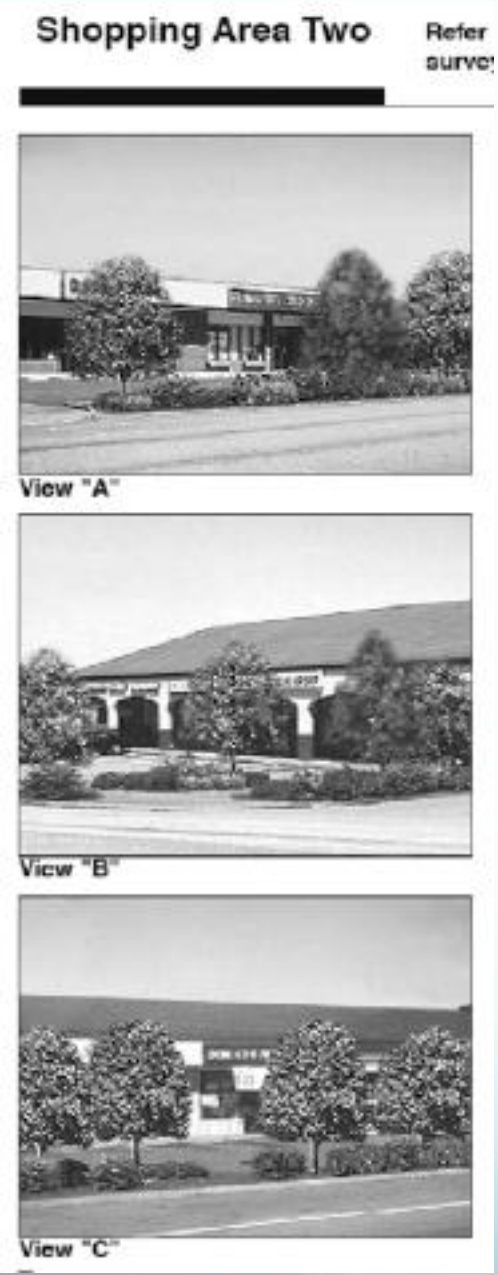
- travel time, travel distance
- duration & frequency of visits
- willingness to pay for parking

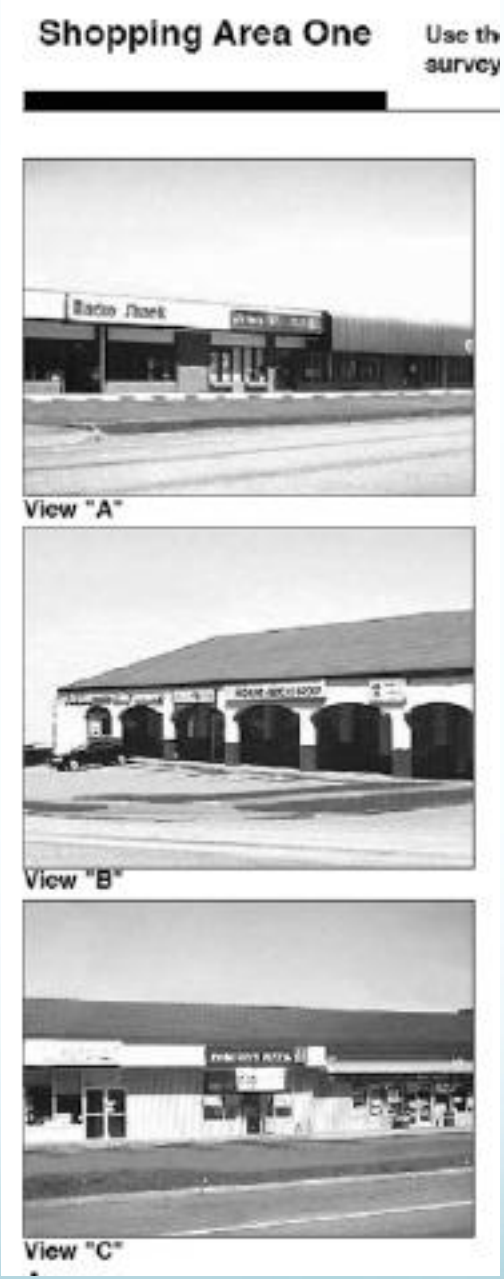
3. Product Pricing

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

Place Marketing

Relationship Marketing





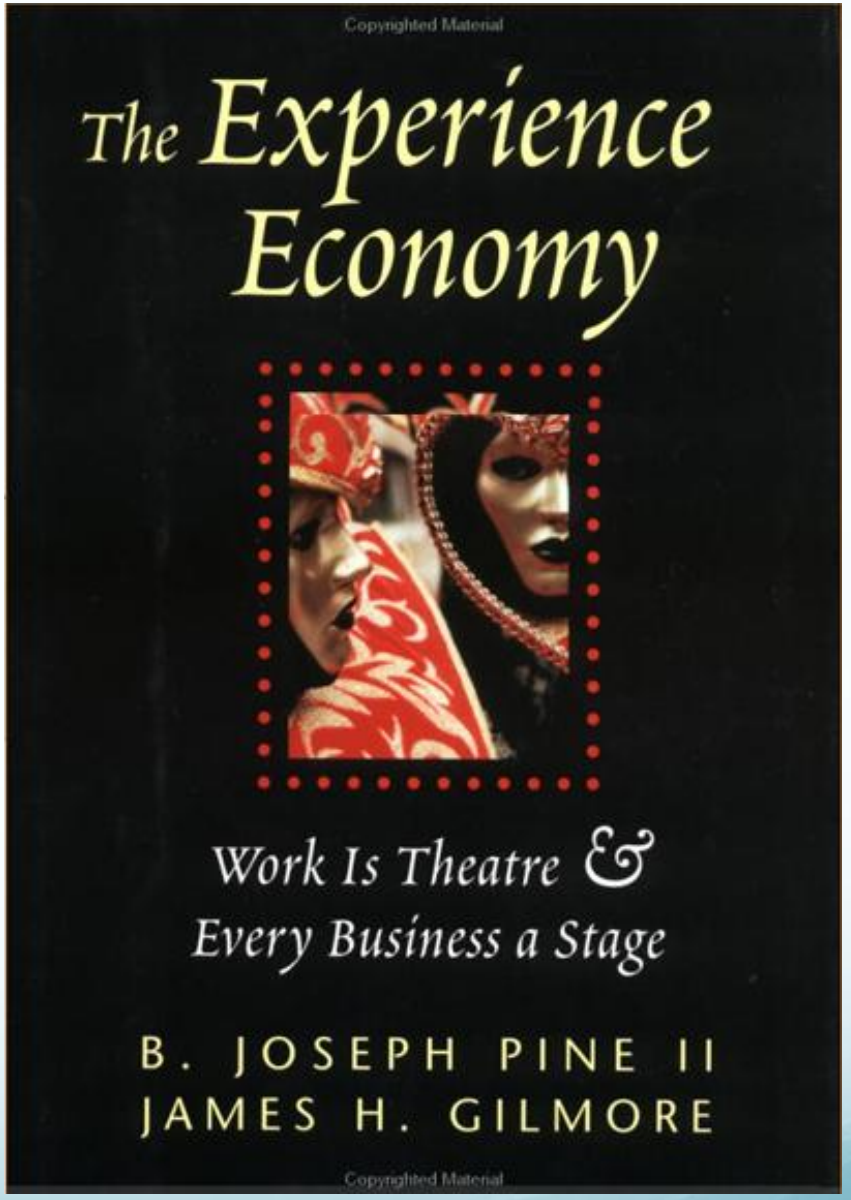
strip malls

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

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

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.

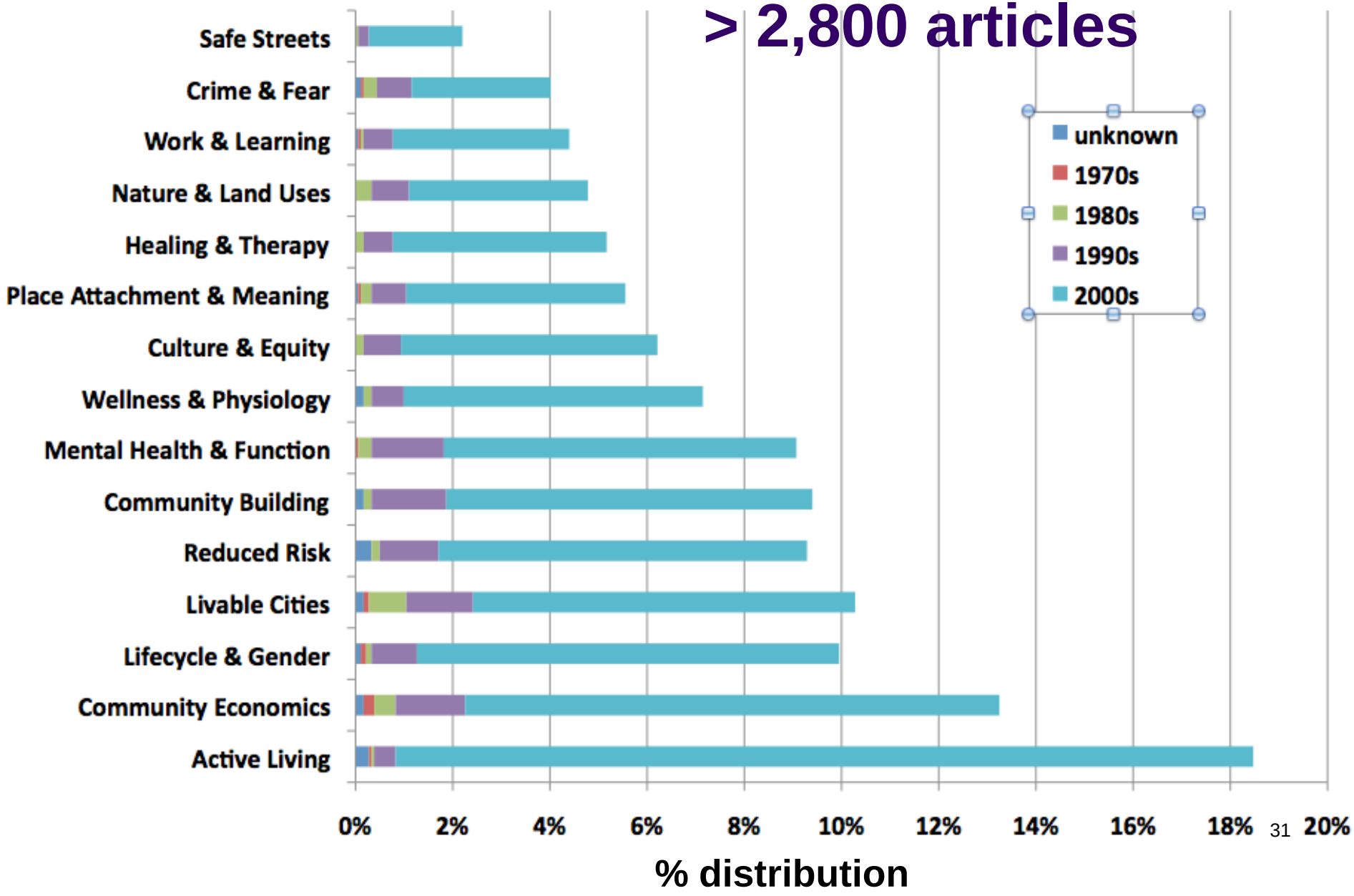
street trees boost market value of houses, providing tax revenue for communities

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]

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

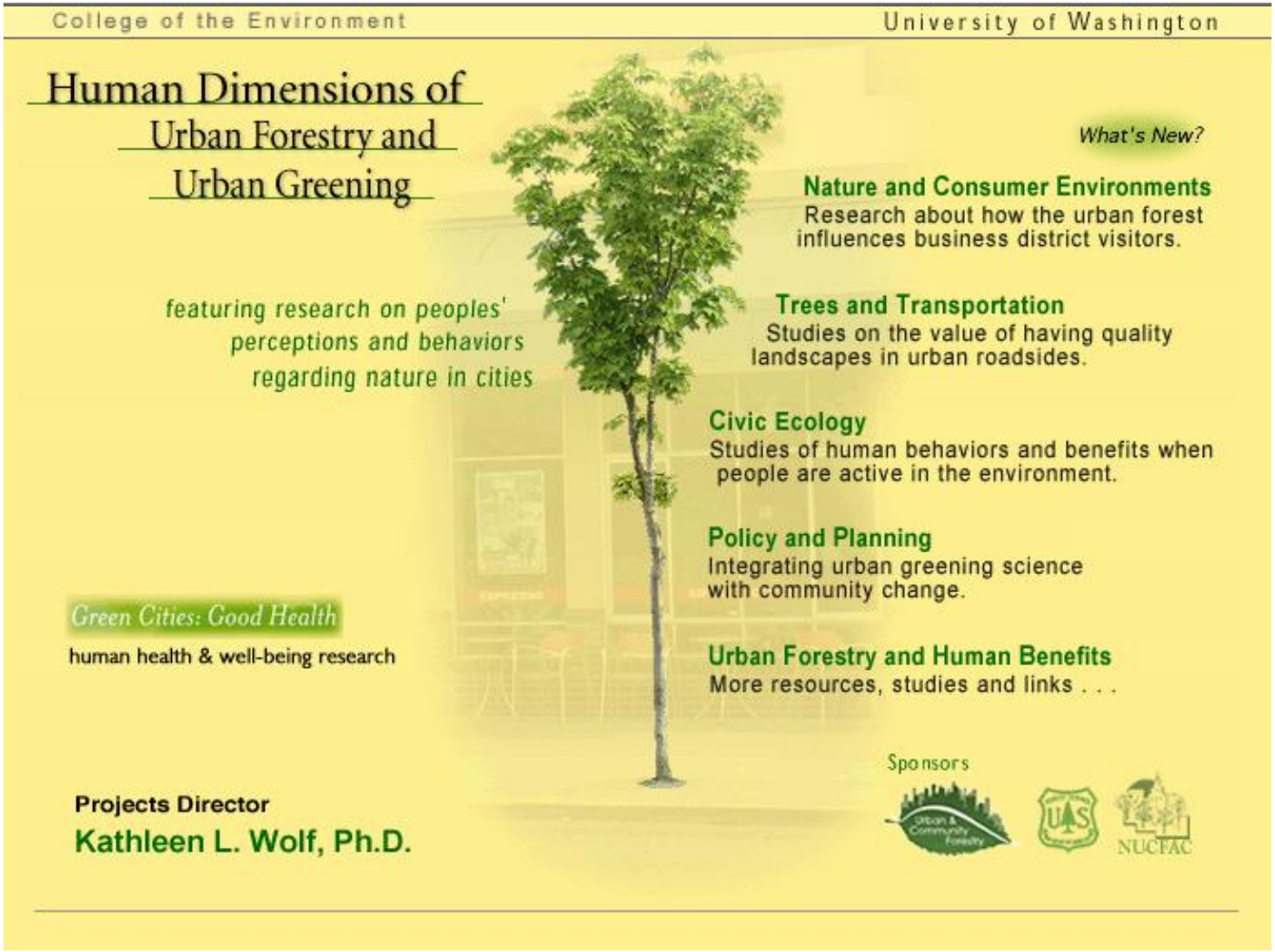
ecosystem services
pristine landscapes

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!



www.naturewithin.info