Global & National Trends

Urbanization & Human Populations
Global Urbanization
1900 - 14% of humanity lived in urban areas, 2000 - 47%
About 80% US of population in urbanized areas (US Census)

Each year!
3 M people
1 M homes
10,000 miles road (NOAA 2004)
National Trends - Urbanization

time series model - past to future

Nowak, J. Forestry, Dec. 2005
U.S. Urban Land Cover (2040)
U.S. Urban Land Cover (2050)
hanging on to trees . . .
Scientific Research
What Do We Lose?
benefits and functions of trees in cities
Challenges to Our Urban Forests

- woodlot conversion
- topsoil loss
- infrastructure expansion
- use of unsuitable plant materials
- exotics/invasives/pests
- less water, more pollution
- policy & leadership
Common Ground!

Micro- to macro- scale
Long term time frame
Infrastructure approach - hierarchy, systems
Health and human welfare
Tangible and intangible issues & returns

Planning
Landscape Architecture
& Urban Forestry
Scientific Research
What Do We Lose!
benefits and functions of trees in cities
Economic Assets of City Trees

A Review of Scientific Studies
urban trees & forest - economic value?
Forest Products

- lumber and milled products
- chip board/oriented strand
- paper
- fiber
- bark mulch
- shakes and siding
Identification & Valuation of City Green?

- **Forest Products Industry**
  - Market goods
  - Excludable
  - Identifiable ownership
  - Expenses - revenues - profits

- **Trees/Forests in Cities**
  - Public goods
  - Non-excludable
  - Multiple "owners"
  - Expenses - returns? - profits?
Putting a price on nature is a crude, risky business

WHAT price would you put on the beautiful, musical and now extinct ivory-billed woodpecker? Of course, the entire gross planetary product could not bring the bird back. It’s gone.

But suppose you could fly the time machine back 50 years to the shrinking Southern swamps, where the last pairs were seen. And imagine someone said, placing a price tag on nature remains a risky business.

In his article titled, “What is Nature Worth?” Wilson doesn’t dismiss such calculating out-of-hand, although he’d rather be making a moral argument. But he finds that today’s economic-value assessments make for a crude measuring device. They tend to lowball the worth of a species over the long haul.

Consider the economic case for saving the endangered blue whale. The sensible environmentalist would make the following calculation in the United States:

... about 40 percent of the prescription drugs sold in...
Valuation of Tree Benefits & Functions

hypothesize a benefit or function

report results & outcomes

calculate full value

determine the potential number of units

define the extent of the B/F

quantify the value of a unit of the B/F
determine the potential number of units
calculate full value
report results & outcomes

hypothesize a benefit or function
as Maia says, “science rocks!”
Urban Trees & Forests
Environmental Services

- Air pollutants reduction
- Nitrogen, phosphorus and sediment interception
- Carbon emissions reduction & sequestration
- Urban heat-island cooling
- Reduced “bad” ozone
- Stormwater runoff reduction
- Wildlife habitat
Urban Nature

Community Economics

- Improved consumer environments in business districts - 9-12% product spending
- Residential real estate values - 3-7% with trees in yard
- Residential real estate values - 5-20%, proximity to natural open space
- Commercial property rental rates - 7%
- Air pollution mitigation
- Heating and cooling costs reductions
- Less frequent pavement replacement
Urban Nature

Human Functioning Benefits

- Improved surgery and illness recovery
- Higher job satisfaction and reduced absenteeism
- Lower crime rates in well landscape areas
- Stress reduction in urban lifestyles
- Reduced violence and more constructive conflict resolution in domestic conflict
- Reduced ADHD symptoms
Scientific Research
What Do We Lose!
benefits and functions of trees in cities
Trees and Property Values

- data from > 800 home sales, large front yard tree increase in sales price of home (0.88% or $1K per $115K home value) Anderson & Cordell, 1988

- various studies, buyers willing to pay 3-15% more for residential properties with ample trees
Parks and Property Values

- proximate principle

- assessed value of properties - 10 to 20% higher

- conditions for higher value: forested, passive use, good visibility, well maintained
Landscape and Office Bldg Rents
Landscape and Office Bldg Rents

- Building and landscape variations
  - 85 office buildings
  - landscape quantity, functionality, quality

- Positive Influences of landscape
  - quality landscape aesthetic
  - building shade

- Economic outcomes
  - 7% boost in rental rates
  - plants as visual screens reduce rates 7.5%
Trust for Public Lands

Economic Benefits of Parks and Open Space

The Economic Benefits of Parks and Open Space: How Land Conservation Helps Communities Grow Smart and Protect the Bottom Line. Communities around the country are learning that open space conservation is not an expense but an investment that produces important economic benefits. TPL's entire report on the economic benefits of open space is available in portable document format (pdf) or in text format by chapter.
How cities use parks for... Economic Development

Executive Summary

Parks provide intrinsic environmental, aesthetic, and recreation benefits to our cities. They are also a source of positive economic benefits. They enhance property values, increase municipal revenue, bring in homebuyers and workers, and attract retirees.

At the bottom line, parks are a good financial investment for a community. Understanding the economic impacts of parks can help decision makers better evaluate the creation and maintenance of urban parks.

Key Point #1
Real property values are positively affected.

Key Point #2
Municipal revenues are increased.

Key Point #3
Affluent retirees are attracted and retained.

Key Point #4
Knowledge workers and talent are attracted to live and work.

Key Point #5
Homebuyers are attracted to purchase homes.
i-Tree

Tools for assessing and managing Community Forests

Assessing Urban Ecosystems
Find out how to assess all the trees in your community.

Assessing Street Tree Populations
Learn how to assess just the street trees in your community.

Applications and Utilities
Access tools available for your tree management.

The i-Tree Tools help quantify the structure, function and value of tree populations. They provide a scientific process for data collection, analysis and quantification of the benefits.

Find out more >>
- Inner City Business Districts
- Small Town Business Districts
- Freeway Roadside Commerce
- Athens GA Case Study

4 national studies

National Urban and Community Forestry Advisory Council
USDA Forest Service
local community partners
Research Question:
What is the response of consumers/shoppers to trees in CBD streetscapes?

Measures:
- Visual preference
- Place perceptions
- Patronage behavior
- Product pricing
Message to shoppers?
Visibility = customer appeal?
“low maintenance”
Image Categories (sorted by ratings)

Pocket Parks
mean 3.72 (highest)

Full Canopy
mean 3.63

Scale: 1=not at all, 5=like very much, 26 images
Enclosed Sidewalk 3.32

Intermittent Trees 2.78
No Trees
mean 1.65
(lowest)
(high - 3.72)
1. Place Perceptions
   - Amenity and Comfort
   - Interaction with Merchants
   - Quality of Products
   - Maintenance and Upkeep

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%
Trees contribute to positive experience.
Trees in Business Districts

District visitors prefer (large) trees
Merchant interactions & product quality judged to be better
Willing to pay 9-12% more for products
Workplace Nature Views

- **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

Plants in Workplace

- **Productivity**
  - 12% quicker reaction on computer tasks
  - reports of being more attentive

- **Less Stress**
  - lower systolic blood pressure

Lohr et al. 1996. J. of Environmental Horticulture
employee health & the corner office:

bottom-line $$ benefits
Green Roof - Chicago City Hall

high-rise nature, preferred views
Valuation and Benefits Studies

transportation and driving
Roadside Landscape & Traffic Stress Response

- Roadside Features - Driving Simulations
  - Forest, golf course, strip mall

- Physiological Response
  - E.g. heart beat, blood pressure

- Results
  - Nature scenes - return to baseline faster, less response to new stressors
  - Immunization effect
Americans travel 2.3 billion miles per day on urban freeways & highways
Chicago Public Housing with & without green spaces

Wm. Sullivan & F. Kuo
University of Illinois
Human-Environment Research Laboratory
www.herl.uiuc.edu

lower levels of fear
less violent & aggressive behavior
fewer reported crimes
more self-discipline for girls
reduced ADHD symptoms
better neighbor relationships
better coping with life’s challenges
Wellness & Healing

- **Surgery Recovery**
  - shorter post-operative stays
  - less use of potent pain drugs, better attitude

- **Lifestyle Recovery**
  - attentional fatigue restored
  - relationships and career coping


Roger Ulrich. Texas A &M. Studies on nature and medical recovery
Healing Gardens
- institutional design -
U of WA Hospitals Surgery Pavilion
Urban Trees, Forests & Public Health

Greatest Generation?
The Biggest Generation!
An Urgent Issue!
Physical Inactivity & Obesity

- Majority of Americans not active enough
- Goal: 30 minutes per day of moderate activity
- Risk factor for chronic diseases (heart, stroke, cancer, diabetes)
- Significant costs to national health services

- 310-580,000 deaths per year
- $100 billion medical costs (1995)
- 9.4% of all U.S. medical costs
Obesity Trends* Among U.S. Adults
1985
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1986

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1987

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1988

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1989

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1990

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1991

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1992

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1993

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1994

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
1995

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1996

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
1997
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1998

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

1999

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
2001

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults

2002

(*BMI ≥30, or ~30 lbs overweight for 5’4” person)
Obesity Trends* Among U.S. Adults

2003

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)
Obesity Trends* Among U.S. Adults
2004
(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

Source: Behavioral Risk Factor Surveillance System, CDC.
Youth (6-11 & 12-19) overweight (1960s, 70s, 80s, 90s)

Adults (20-74) overweight and obese (1970s, 80s, 90s)
Fat for Life?
Six Million Kids Are Seriously Overweight. What Families Can Do.
By Geoffrey Cowley & Sharon Begley
Canine constitutional

A brisk walk in the park keeps Marcy B in shape between dog shows. Her owner, Columbus resident Cathy Steenbo, gets up early to give her 5-year-old Doberman his regular workout. They typically log 15 miles in Berliner Park.
parks, open spaces & and trails
make room for pedestrians
people value big trees and nearby nature
Human Dimensions of Urban Forestry and Urban Greening

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.

International Urban Greening
Scientific explorations of people and urban nature in other nations.

Urban Forestry and Human Benefits
More resources, studies and links . . .

Research Director
Kathleen L. Wolf, Ph.D.