Trees for An Urban Future

Human Health & Well-Being

“Creating the Liveable City!”

Dr. Kathleen Wolf
College of Forest Resources, University of Washington
September 2008
Global Urbanization
1900 - 14% of humanity lived in urban areas, 2000 - 47%
Japan compact cities
dynamic street life
public & non-motorized transportation
civic forests
sacred forests
native species & cultural stewardship
forest symbols
U.S. Urbanization

time series modeling - past to future

Nowak, J. Forestry, Dec. 2005
U.S. Urban Land Cover (2020)
U.S. Urban Land Cover (2030)
Small Changes, yet Big Change
Planning & Investment: Urban Ecology & Urban Forestry

- what?
- how?
- why?
City Trees & Nature
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
Wildlife Habitat

- including birds!
City Trees & Nature
Community Economics

- 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%
- Heating and cooling costs reductions
- Less frequent pavement replacement
- Improved consumer environments in business districts - 9-12% product spending
Research Question:
What is the response of consumers/shoppers to trees in CBD streetscapes?

Measures:
- Visual preference
- Place perceptions
- Patronage behavior
- Product pricing

research program, U of Washington
Wolf & collaborators, funded by US Forest Service
Image Categories (sorted by ratings)
(cities of 10-20 K population)

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

most measures higher with trees

3. Product Pricing
   - higher willingness to pay for all types of goods
   - higher in districts with trees - 9-12%
typical retail street in urban Japan
Namba Parks, Osaka
view from nearby hotel
small plazas, retail entry
passive nature experiences
interior
retail space
ground level
Namba Parks: retail success & nature experience benefits
City Trees & Nature

Human Health & Well-Being

- Improved surgery and illness recovery
- Higher job satisfaction and reduced absenteeism
- Lower crime rates in well landscape areas
- Stress & anxiety reduction in urban lifestyles
- Reduced violence and more constructive conflict resolution in domestic conflict
- Reduced ADHD symptoms
- Improved social ties in neighborhoods
Nearby Nature is necessary “human habitat”

source: UrbanPhoto
Nearby Nature
# Framework of Studies

<table>
<thead>
<tr>
<th>Passive experience of nature</th>
<th>Physical</th>
<th>Psychological</th>
<th>Social</th>
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<td>Active experience of nature</td>
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Benefits across:
- age
- place
- nature setting (large/small)
Pruning in Japan

- cultural practices
- less evidence-based
- ISA education efforts
● physically disabled & tree climbing!
recreational tree climbing (& tree therapy)
Human Dimensions of Urban Forests & Nature

- Evidence-based, science studies
- Psychological benefits
- Social benefits
- Human health & well-being
- Nature is a profoundly important for urban livability
Social Benefits

• studies at the University of Illinois,
  Landscape and Human Health Laboratory

Dr. Frances Kuo
Research Director
Chicago Public Housing with & without green spaces

Wm. Sullivan & F. Kuo
University of Illinois
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
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
directed attention
we all deserve a corner office!
bottom-line $$ benefits
Green Roof - Chicago City Hall

high-rise nature, preferred views
Tokyo Metropolitan Assembly Hall

- Ecos, Sept-Oct 2004
engineered nature & forests

social & market values?
Nashville, mixed use bldg  roof gardens/ecosystems
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

Healing Gardens - institutional design -
U of WA Hospitals Surgery Pavilion
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
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
to reduce risk factors 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

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Obesity Trends* Among U.S. Adults

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Obesity Trends* Among U.S. Adults

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Obesity Trends* Among U.S. Adults

1992

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No Data       <10%  10%-14%  15%-19%
Obesity Trends* Among U.S. Adults
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Obesity Trends* Among U.S. Adults

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(*BMI $\geq 30$, or $\sim 30$ lbs overweight for a 5’4” person)
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Obesity Trends* Among U.S. Adults

2004

(*BMI ≥30, or ~ 30 lbs overweight for 5’ 4” person)

Doubling of adult obesity rate since 1980.

Source: Behavioral Risk Factor Surveillance System, CDC.
Fat for Life?

Six Million Kids Are Seriously Overweight. What Families Can Do.

By Geoffrey Cowley & Sharon Begley
A brisk walk in the park keeps Marcy B in shape between dog shows. Her owner, Columbus resident Cathy Stumbo, gets up early to give her 5-year-old Doberman his regular workout. They typically log 18 miles in Berliner Park.
parks, open spaces & trails
make room for pedestrians
walkable places = health & happiness
Nature, Human Health & Walkable Neighborhoods

- Outcomes: Elderly People & Walking
  - less illness
  - lower mortality rate

- Environments: Neighborhood Streets (Tokyo)
  - tree - lined
  - parks

Complete the Streets
Streets are inadequate:

dangerous & ugly
Streets are inadequate

No room for people
Complete the Streets!
cars/pedestrians/bikes
Home Zones (Dutch “woonerf”)  
streets and nature in everyday life
Home Zones

traffic calming
green streets
festival planning
play spaces
multi-modal transport
Urban Forestry/Nature Programs
Involve the People!

- physical activity
- passive experience benefits
- social ties
- learning for sustainability
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- nature setting (large/small)
stewardship of city nature
ecological restoration

youth in meaningful community activity
green infrastructure & natural systems

- people recognize needs
- see opportunities
- assist with planning
- active in management
- over large spaces
High Line Railway - W Manhattan
3 VIEWS
Gansevoort Entry

PLANTING
A varied and wild mix of native grasses, flowering meadows and woody thickets.

Friends of the High Line
Community Gardens

- ecosystem services
- urban agriculture = food
- build community
Vertical Gardens - NY Times
Community Gardens as Parks

- good food & good design
NIRSによる園芸療法の基礎研究
—園芸が人の前頭連合野に与える影響—
Effects of gardening to frontal cortex

豊田正博¹), 杉原式穣¹), 柿木達也²)

TOYODA Masahiro, SUGIHARA Shiho, KAKIGI Tatsuya
University of Hyogo
Awaji Landscape Planning & Horticulture Academy

¹) 兵庫県立大学自然・環境科学研究所
兵庫県立淡路景観園芸学校
²) 兵庫県立西播磨総合リハビリテーションセンター
Program
実験1:
課題①: 2種の土を混ぜる
課題②: 土を鉢に入れる
課題③: 花を鉢に植える

方法

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<tr>
<th>课题①④</th>
<th>15</th>
<th>10</th>
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ベースライン | タスク | レスト | タスク | レスト | タスク | レスト

図．各课题の手顺（数字は秒）
方法

実験2:
課題④: 左右の腕を体の前で弧を描くように動かす

| 15 | 10 | 20 | 10 | 20 | 10 | 20 |

課題①

課題④（対照課題）
フォルダ装着位置は、額の正中位で且つ眉から1cm上とした
写真引用 福田正人、三國雅彦. 近赤外線スペクトロスコピーNIRSによる統合失調症と感情障害の診断.
園芸作業中のOxy-Hb濃度変化
School Yard

Parks & People Foundation
Baltimore, Maryland

asphalt to green
visions of landscape recovery
first phase - reading circle
nature recovery & schools
nature recovery & schools
planning skills & efficacy
Our ability to perceive quality in nature begins, as in art, with the pretty. It expands through successive stages of the beautiful, to values as yet uncaptured by language.

Aldo Leopold
Not just beauty . . . environment, economics, social benefits

“malleable mental accounting”
Cheema & Soman, 2006, J of Consumer Psych