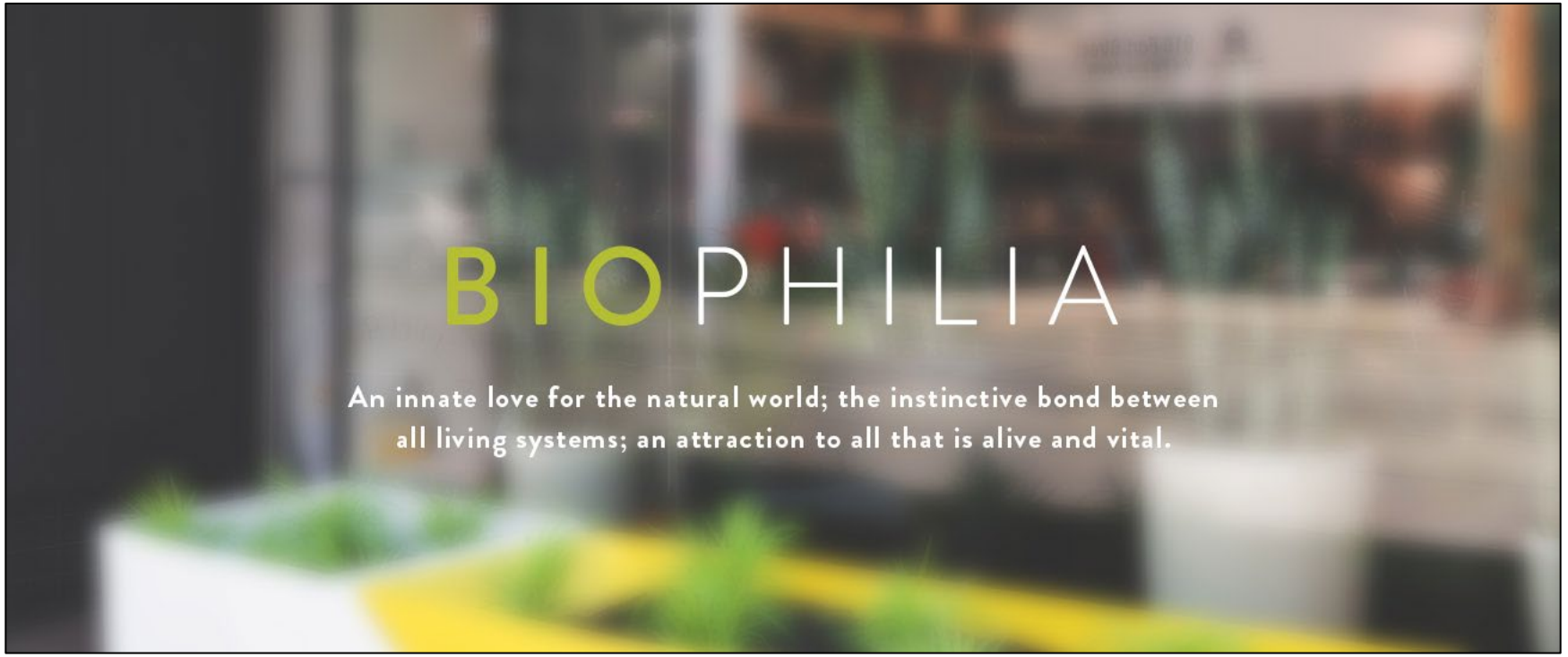
Beautification's Impact on Property Values

Dr. Charlie Hall, Texas A&M University, charliehall@tamu.edu

The Power of Plants!



ellisonchair.tamu.edu -- Benefits of Plants

The natural environment can help with the major health problems facing society.

Indirect benefits	Direct benefits
Reduced health inequalities	Moderating impact from extreme weather
Improved mental health	Shelter from UV, noise, wind
Improved physical activity	Carbon sequestration
Reduced obesity	Improved water and air quality
Enhanced social cohesion	Food

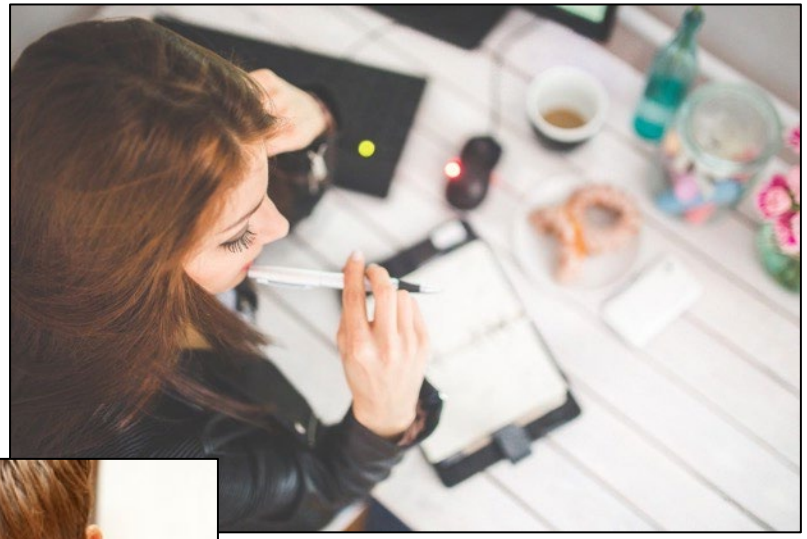
Green spaces improve mental health.

- Nature reduces stress, provides attention restoration, provides a sense of belonging and self worth, and reduces symptoms of aggression and crime.

When we come into contact with nature, our concentration levels are dramatically improved.

- The natural environment allows us to **restore our concentration** levels and **boost our concentration** better than indoor or urban settings because of:
  - In nature, we are **away** from day-to-day routine.
  - We have opportunities to be **fascinated** when in nature.
  - It gives us a feeling of **exploration & adventure**.

The benefits occur in the right frontal cortex of the brain



ADD/ADHD
symptoms
are reduced

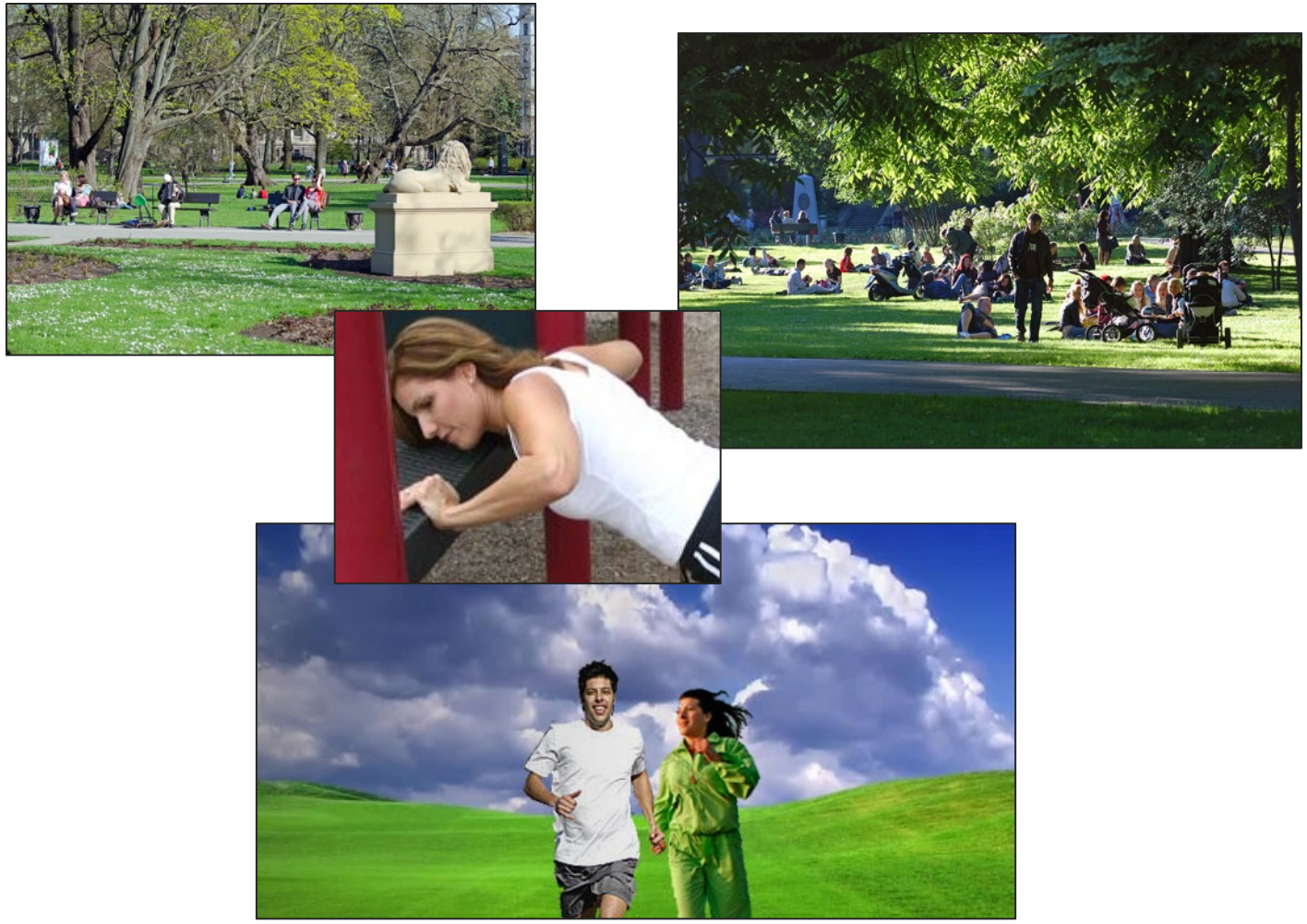
Perform better

Remember more

ALZHEIMER'S WING IN HOLT, MICHIGAN:
STUDIES UNDERTAKEN AT THE FACILITY REVEALED THAT EXPOSURE TO NATURE NOT ONLY HELPS PATIENTS, BUT STAFF TOO. EMPLOYEES WHOM ARE LESS PRONE TO BURNOUT CAN IMPACT HR COSTS.

Patients who have access to healing gardens are **less likely** to display aggression or experience injuries as well as **improved sleep** patterns, **balanced hormones**, and **decreased agitation**.

Green spaces increase physical activity.



Shelter from UV Noise and Wind

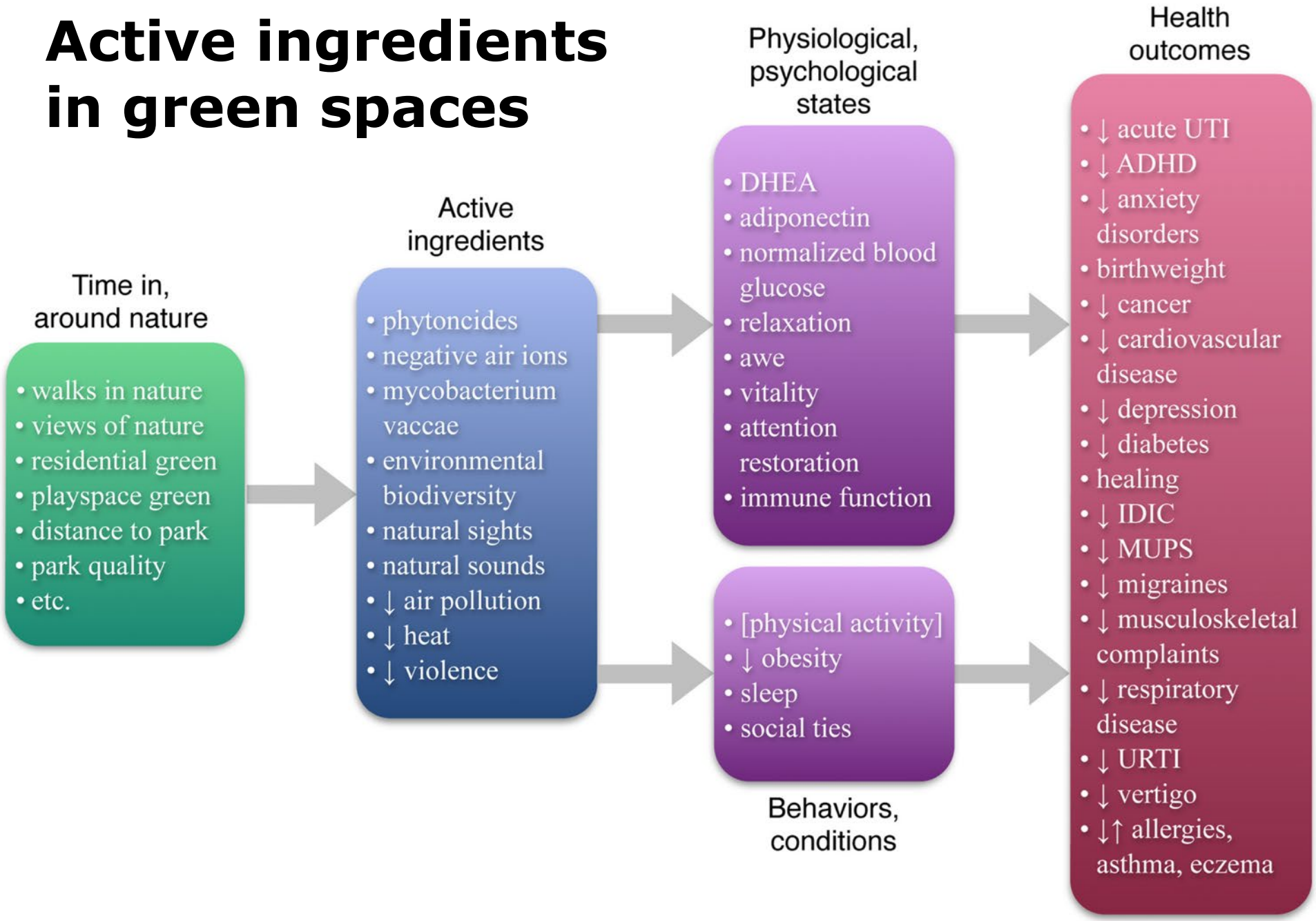
- Chronic exposure to noise (such as that from airplanes) is associated with hearing impairment and impacts on mental health.

- The trees and vegetation in green spaces provide shelter from **UV**, reduce **noise pollution**, and the **effects of wind**.

Reduced Obesity

Greenness counters the adverse effects of stress on energy metabolism, insulin secretion, and inflammatory pathways; stimulates the release of anti-diabetic hormones adiponectin and DHEA, and normalizes elevated blood glucose.

Active ingredients in green spaces



Green spaces encourage social interactions.

Disaster resilience

The highway from one merchant town to another shall be cleared so that no cover for malefactors should be allowed for a width of two hundred feet on either side; landlords who do not effect this clearance will be answerable for robberies committed in consequence of their default, and in case of murder they will be in the king's mercy. —
Statute of Winchester of 1285, King Edward I

Crime Busting Effects

Provides career training.

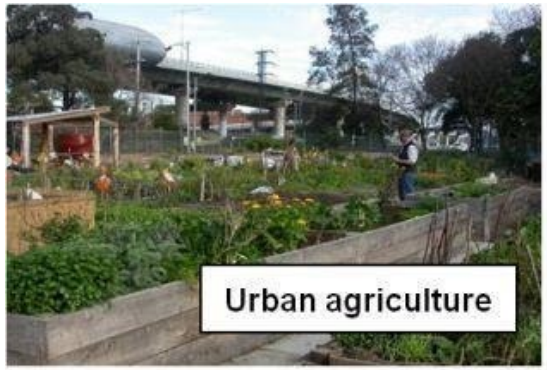
Reduced recidivism rates.

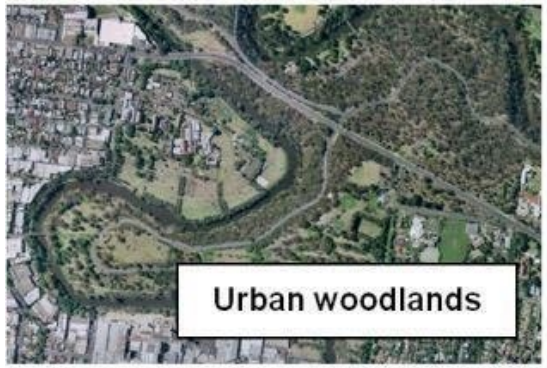
CONCLUSION?

There is strong correlation between environment and health.

Protecting and improving the environments in our communities protects and improves the health of its citizens.

Urban green infrastructure





Office plants decrease sick time by 14%.

$2,200 reduction in average annual health care costs per adult.

The results of an eight-year study showed that women living in areas with more vegetation had a **12% lower mortality rate** than women living in areas with the least vegetation.

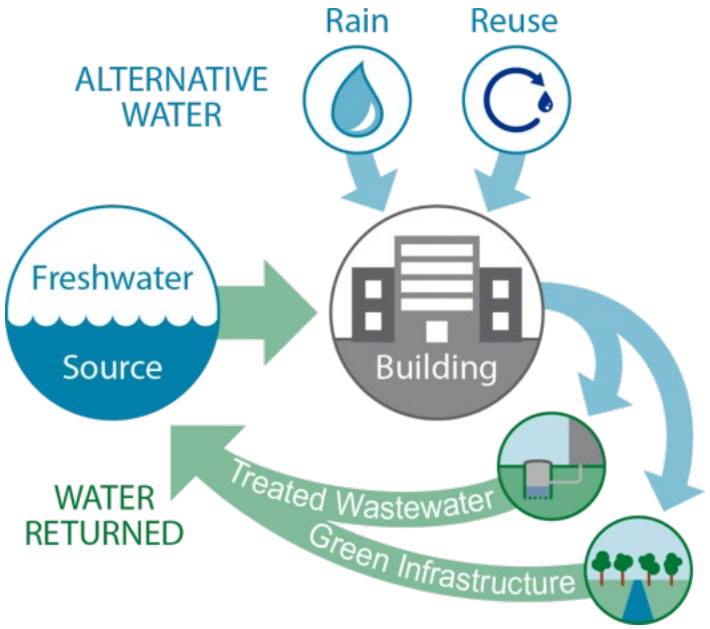
Remediation of air pollution by trees

Pollutant	Removal (metric tons)	Value (million US $)
Ozone (O_3)	305,100	2,060
Particulate Matter (PM_{10})	214,900	969
Nitrogen dioxide (NO_2)	97,800	660
Sulphur dioxide (SO_2)	70,900	117
Carbon Monoxide (CO)	22,600	22
TOTAL	*711,300*	*3,828*

Source: (Nowak, Crane, & Stevens, 2006).

Estimated Value of Trees in U.S. Urban Parks

- Structural value = $300 billion
- Air temperature reduction = unknown, but likely in the billions of dollars per year
- Air pollution removal = $500 million per year
- Reduced ultraviolet radiation = unknown, but likely substantial
- Carbon storage (trees): $1.6 billion
- Annual carbon removal (trees): $50 million per year



Net zero water use

Alternative Water use

+

Water Returned

Total Water Use

A 25-foot tree reduces the annual heating and cooling costs of a typical residence by 8-12%

Tree canopy reduces 1” rain runoff by 17%


Shade provided by trees reduces the need for maintenance and repaving. A study from US Davis found that, 20% shade on a street improves pavement condition by 11%, which is a 60% savings for resurfacing over 30 years.


Greetings from
LANCASTER
PA.

Benefit measurement & evaluation: WATER

Green roofs

Tree planting

Bioretention & infiltration

Permeable pavement

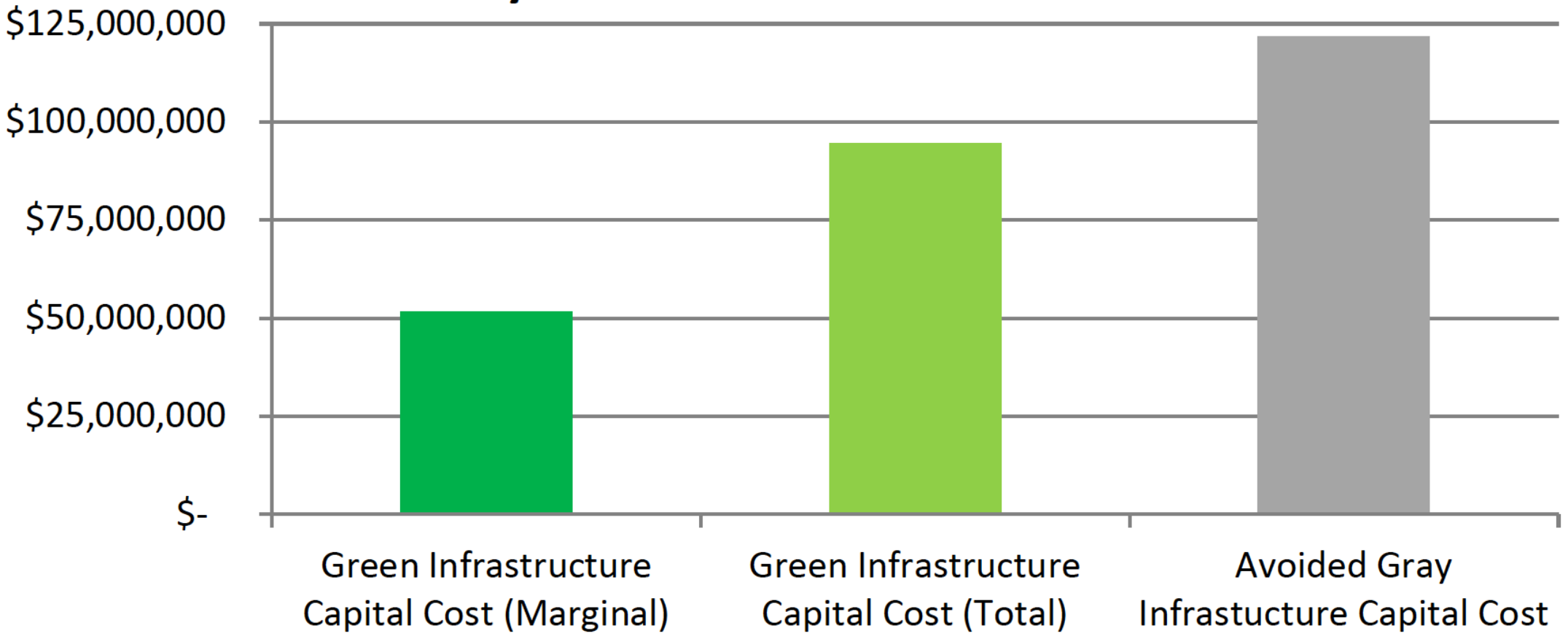
Water harvesting

Reduced water treatment needs

Reduced gray infrastructure needs

Improved water quality

Reduced flooding



Estimated Value of Avoided Costs for Wastewater Treatment & Storage at 25-Year Implementation*	
Reduced Pumping and Treatment Costs (per year)	$661,000
Reduced Gray Infrastructure Capital Costs	$120,000,000

Benefit measurement & evaluation: Energy

Green roofs

Tree planting

Reduced water treatment

} Reduced heating & cooling

Reduced electricity usage

Estimated Value of Reduced Energy Use at 25-Year Implementation	
Reduced Electricity Use (kWh)	$592,000
Reduced Natural Gas Use (Btu)	$1,776,000
TOTAL (per year)	**$2,368,000**

Benefit measurement & evaluation: Air Quality

Green roofs
Tree planting
Bioretention & infiltration

} Reduced criteria pollutants
Climate change benefits

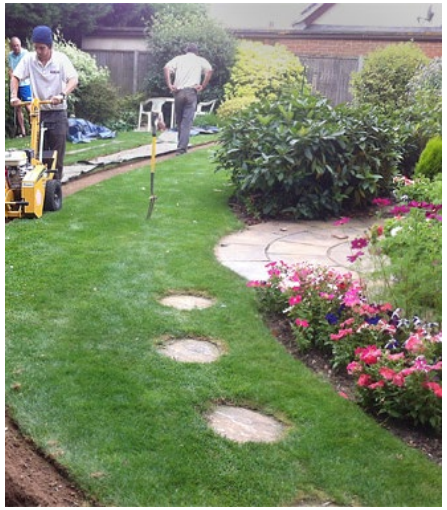
Estimated Value of Reduced Air Pollutants at 25-Year Implementation	
Reduced NO_2	$285,000
Reduced O_3	$171,000
Reduced SO_2	$238,000
Reduced PM-10	$329,000
TOTAL (per year)	**$1,023,000**

Total Calculated Benefits (at Long-Term 25-Year Implementation)	
Estimated Value from Water Benefits Reduced CSS Gray Infrastructure Capital Costs (one-time) Reduced Pumping and Treatment Costs (per year)	 $120,000,000 $661,000
Estimated Value from Energy Benefits (per year)	$2,368,000
Estimated Value from Air Quality Benefits (per year)	$1,023,000
Estimated Value from Climate Change Benefits (per year)	$786,000
Estimated Value from other Qualitative Benefits	Not calculated
TOTAL **Avoided Capital Costs** **Annual Benefits**	 **$120,000,000** **$4,838,000**

Shoppers spend 9 to 12% more.

Shoppers' WTP = +17% more.

7% higher rental rates + higher occupancy rates



2.31 million jobs in the U.S.

ECONOMIC BENEFITS

1. **Property Value**
   Adding value to the site or adjacent properties

2. **Operations & Maintenance Savings**
   Reducing ongoing costs associated with operations and upkeep

3. **Construction Cost Savings**
   Reducing one-time costs associated with project implementation

4. **Job Creation**
   Providing employment as part of construction or ongoing operations

5. **Visitor Spending & Earned Income**
   Generating revenues from those who visit and use the site

6. **Tax Revenue**
   Generating revenues through property and sales taxes

7. **Economic Development**
   Catalyzing real estate and business investment

EVALUATING LANDSCAPE PERFORMANCE

A Guidebook for Metrics and Methods Selection
2018

LANDSCAPE ARCHITECTURE FOUNDATION

AT&T Performing Arts Center: Sammons Park | SmithGroup
(Photo: SmithGroup)

Photo: John Gollings/Hargreaves Associates

Renaissance Park

Chattanooga, Tennessee | Hargreaves Associates, 2006

Catalyzed a 821% increase in aggregate land value within a quarter mile of the park between 2005 and 2013, compared to a 319% increase within the same North Shore Neighborhood but further from the park over the same period.

Project Overview

Renaissance Park is a 22-acre urban brownfield redevelopment project within Chattanooga's nationally-recognized Tennessee River Park. The project transformed a blighted post-industrial site known to be leaching contaminants into surface and groundwater resources into a celebrated public park that has been a catalyst for reinvestment in Chattanooga's growing Northshore neighborhood.

Photo: SmithGroup

Carmel Clay Central Park

Carmel, Indiana | SmithGroup, 2007

Saves $54,000 in annual maintenance costs by introducing native plant species in open areas instead of turf.

Project Overview

The town of Carmel has the second-largest concentration of commercial office space in Indiana but had no parks before the Parks District was formed 21 years ago. As real estate pressures expanded, residents expressed a desire for a park on the site of the last remaining local farm. Clay Central Park is a 161-acre park that is now known as the "crown jewel" of the park system and includes 60 acres of woodland, 40 acres of restored prairie, 6.5 acres of wetlands, and more than four miles of trails. The park provides opportunities for recreation and relaxation for the city's 80,000 residents and draws visitors from neighboring Indianapolis and other cities.

Photo: Kodiak Greenwood

Cavallo Point

Sausalito, California | Office of Cheryl Barton, 2008

Saved nearly $140,000 in earthwork costs during construction by using the building pads of 14 demolished non-historic buildings to support new structures.

Project Overview

This "post-to-park" transformation of Fort Baker to Cavallo Point was designed to reduce the environmental and economic burdens on the new owner, the National Park Service. Reusing existing infrastructure and reverting much of the landscape to native plantings helped reach the client's goal of financial sustainability. Adaptive reuse of this National Landmark District resulted in a state-of-the-art conference center, the restoration of endangered habitat, and the regeneration of public open space.

Photo: OJB Landscape Architecture

Klyde Warren Park

Dallas, Texas | OJB Landscape Architecture, 2012

Creates 8 full-time and 5 part-time jobs in maintenance and operations, in addition to approximately 68 temporary jobs that were created during design and construction.

Project Overview

Klyde Warren Park is a landmark central open space that spans the eight lane, sunken Woodwall Rogers Freeway, bridging Dallas' Uptown and Arts District neighborhoods. It is the world's largest suspended infrastructure to contain a park and provides new programmed public space that physically, socially, and culturally connects two bustling districts. Complex technical engineering solutions structurally support massive loads above the busy freeway while allowing for an open, flexible park layout with sufficient soil to support a variety of trees and plantings.

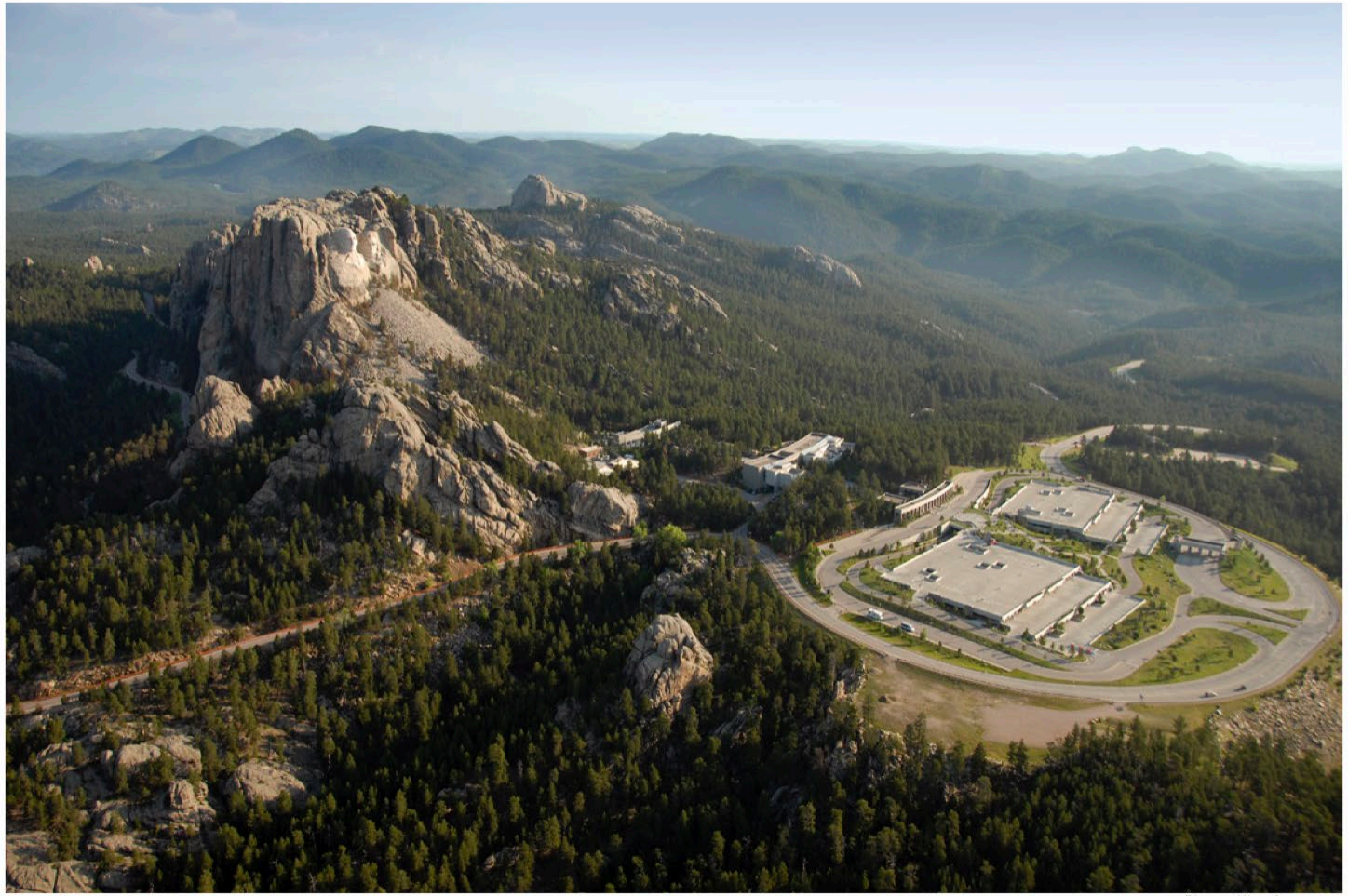


Photo: Wyss Associates

Mount Rushmore Visitor Services Redevelopment

Keystone, South Dakota | Wyss Associates & DHM Design, 2001

Generates an average of $3,895,000 in annual parking revenue and contributes to Mount Rushmore's impact on the regional economy, totaling $346 million in visitor spending annually.

Project Overview

Located in the Black Hills of South Dakota, the iconic Mount Rushmore National Memorial attracts nearly 2 million visitors per year. Prior to the redesign of the Visitor Services area, the memorial was being "loved to death" as its infrastructure was inadequate for both predicted and desired visitorship, particularly parking accommodations, pedestrian and vehicular circulation, and access to the sculpture. The redesign created low-profile terraced parking that increased the number of parking spaces from 120 to 600, added new interpretive facilities, and widened trails to accommodate users of all abilities and welcome a steadily increasing flow of visitors to the memorial.

Photo: D.A. Horchner/Design Workshop

Bagby Street Reconstruction

Houston, Texas | Design Workshop, 2013

Contributed to a $53 million (26%) increase in collected property taxes from 2013 to 2015.

Project Overview

The Bagby Street Reconstruction is a 12-block transformation of a vehicular road that connects downtown to the medical district in the heart of Houston. The neighborhood is mixed-use with numerous multifamily and commercial developments. Instead of following the conventional approach of a universal cross-section for the entire corridor, the design uses block-by-block context-sensitive design solutions tailored to each specific location with common materials, planting, lighting, and signage providing continuity along the entire corridor. The Bagby Street Reconstruction has established a new benchmark for streets in Houston and beyond.

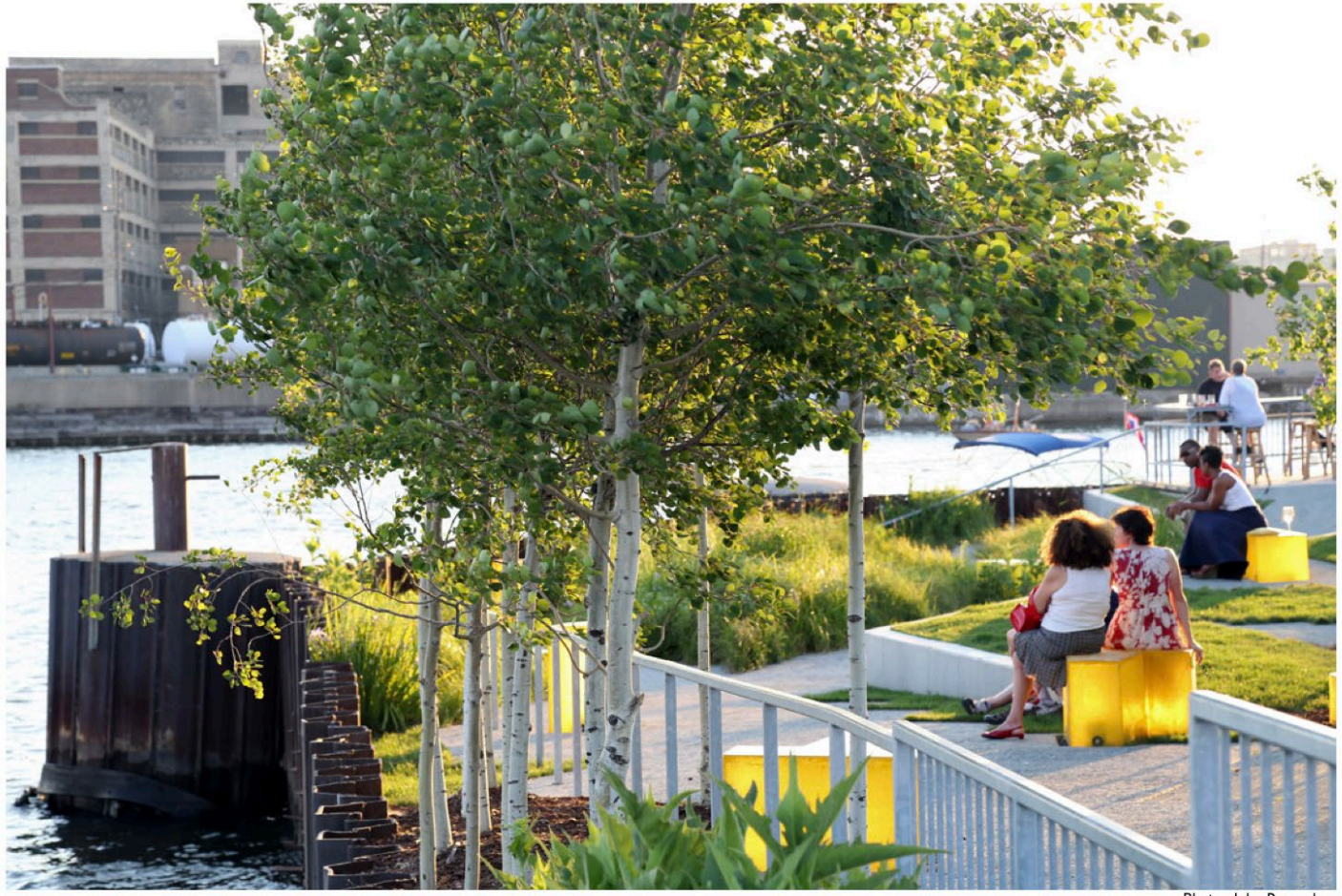


Photo: John December

Erie Street Plaza

Milwaukee, Wisconsin | Stoss Landscape Urbanism, 2010

Contributes to the economic development of the expanding Third Ward district, with 243 condominium units planned and adjacent mixed-use development attracting more than $120 million in investment capital in a previously derelict area.

Project Overview

Erie Street Plaza is a former parking lot at the confluence of the Milwaukee River and the Federal Channel that has been turned into one of a series of civic spaces along the Milwaukee Riverwalk, a three-mile pedestrian and bicycle corridor that connects downtown Milwaukee to the emerging Third Ward and Beerline Districts and lakefront. The plaza is a well-used, inventive, and ecologically-sensitive public space.

- **$1.09 per $1.00 invested**
- **Adjacent to parks +8 to 20%**
- **Trees = +3 to 15%**
- **Color = 4 to 1 ROI**

DELIVERING URBAN RESILIENCE

Table C. Detailed summary of the present value of costs and benefits for each city studied

CATEGORY	PRESENT VALUE OVER 40-YEAR ANALYSIS PERIOD (2015)		
	Washington. D.C.	**Philadelphia**	**El Paso**
Costs	**$838 M**	**$2.38 B**	**$1.62 B**
First Cost	$543 M	$1.56 B	$1.01 **B**
Operations And Maintenance	$191 M	$491 M	$412 M
Additional Replacements	$104 M	$334 M	$193 M
Employment Training	$803 K	$3.2 M	$1.4 M
Benefits	**$2.648 B**	**$5.959 B**	**$2.155 B**
Energy	$348 M	$1.33 B	$700 M
Financial Incentives	$65.6 M	$225 M	$85.5 M
Stormwater	$1.17 B	$185 M	$39 M
Health	$523 M	$2.28 B	$344 M
Climate Change	$434 M	$1.47 B	$806 M
Employment	$104 M	$471 M	$181 M
Net Present Value	**$1.81 B**	**$3.575 B**	**$538 M**

Undergraduate
Research Scholars

LAUNCH: UNDERGRADUATE RESEARCH

The Paradox of Urban Green Spaces and Their Potential Contribution to Green Gentrification

Macy Fetchel

Dr. Charlie Hall

Methodology

Property Value Literature Review

- Data set: 2000-2021
- 27 citations
- Associated price increases and premiums on real estate from proximity and presence of green space.

Environmental Gentrification

- Date Set: 2006-2022
- 39 citations
- Dominant methods and models for measuring
- Policy and mitigation efforts

Methodologies for Determining Property Value Premiums

TEXAS A&M UNIVERSITY

- Hedonic Pricing Method
- Hierarchical Linear Model
- Repeat-Sales
- Evolutionary Polynomial Regression
- Matched-Pairs
- Fuzzy-Delphi
- Surveys and Interviews

Property Value Premiums

Price increases from presence of variable (within radius)				
Author/date	**Price increase**	**Green Variable**	**Type of home**	**Radius**
Hobden (2004)	2.90%	Greenway border	Single-family	
	6.90%	Local small park	Single-family	
	6.50%	Park or greenway with minor easements	Single-family	1000-foot
Jim (2006)	7.10%	Green space view	Single-family	
Voicu (2008)	7.50%	Community garden	Single-famliy	
Shin (2011)	5.18%	Connectivity to mean greenway	Single-famliy	
Kovacs (2012)	9.00%	Nearby park	Single-family	250-meter
Pandit (2013)	4.27%	Broad leaved trees on street verge	Single family	
Panduro (2013)	6.00%	View of park	Apartment	0.05 mile
Gibbons (2014)	0.36%	Proximity to wetland	Single-family	250-meter
	3.25%	Located in greenbelt area	Single-family	250-meter
McCord (2014)	15.70%	Public green space	Semi-detached	500-meter
	41.93%	Public green space	Terraced	250-meter
	38.80%	Public green space	Apartment	250-meter
	24.16%	Public green space	Detached	
Morano (2019)	46.19%	Resident-only green areas	Apartment	
	46.19%	Garden in courtyard	Apartment	

Resources

ECONOMIC BENEFITS OF GREEN INFRASTRUCTURE

Resources available regarding the benefits of plants, gardens, and improved landscapes

Summary publications:

1. Economic, Environmental, and Health/Well-Being Benefits Associated with Green Industry Products and Services: A Review (Journal of Environmental Horticulture 29(2):96-103.)
2. An Update of the Literature Supporting the Well-Being Benefits of Plants: A Review of the Emotional and Mental Health Benefits of Plants (Journal of Environmental Horticulture 37(1):30–38.)
3. An Update of the Literature Supporting the Well-Being Benefits of Plants: Part 2 Physiological Health Benefits (Journal of Environmental Horticulture 37(2):63-73.)
4. An Update of the Literature Supporting the Well-Being Benefits of Plants: Part 3 Social Benefits (Journal of Environmental Horticulture 37(4):136–142.)
5. An Update of the Literature Supporting the Well-Being Benefits of Plants: Part 4 Available Resources and Usage of Plant Benefits Information (Journal of Environmental Horticulture 38(2):68–72. June 2020)
   These articles can be gleaned for benefits-related information to include in marketing materials and social media posts.

Popular websites summarizing plant benefits:

Plant Benefit Factsheets produced by The Green City – *These factsheets are 4-color and are excellent ready-to-use marketing materials.*
All-America Selections / National Garden Bureau – *Their Facebook page is full of 4-color posting about the benefits of plants.*
Green Cities: Good Health – *Click on a research theme for Fast Facts that are perfect for social media sharing.*
America in Bloom – *This website talks about the benefits of local beautification efforts to Main Street businesses and the entire community. See the Surprising Side of Plants brochure!*
Children and Nature Network – *The C&NN library is one of the best I have seen. You can search by topic and each citation contains a 2-3 paragraph summary. And it's all about the*

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RECENT BLOG POSTS

https://aiph.org/green-city/

We lead global thinking on the successful integration of nature into the built environment

Through Green City we promote the essential role of plants in creating vibrant urban areas in which people and businesses can thrive. Our environment, human wellbeing, social cohesion and economies are all improved by intelligently designed green space.

LANDSCAPE PERFORMANCE SERIES

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The Landscape Performance Series is the online set of resources to help designers, agencies, and advocates evaluate performance, show value and make the case for sustainable landscape solutions.

Renaissance Park

Active Living >

Resilience >

Biodiversity >

Frontier Project

Revitalization >

Social Equity >

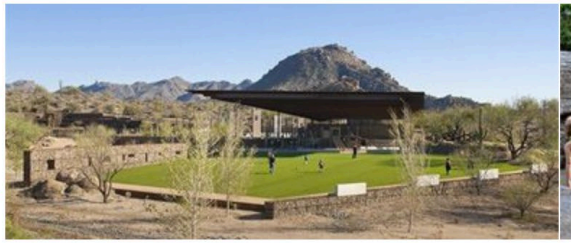
Water Management >

Health & Wellbeing >

Carbon & Climate >

Urban Agriculture >

org/case-study-briefs/renaissance-park



Doc Cavalliere Park

Teardrop Park

NICH

NATIONAL INITIATIVE FOR CONSUMER HORTICULTURE

#PlantsDoThat

Horticulture: The Art, Science, & Business of Plants

Horticulture contributes $196 billion to the US economy across a diverse array of businesses. But the story doesn't end there. Horticulture benefits the wealth and health of every citizen and every community in the US.

Produced by
National Initiative for Consumer Horticulture

ConsumerHort.org

Where We LIVE

A 25-foot tree reduces annual heating and cooling costs for typical homes by 8-12%.

Our homes represent 25% of our personal wealth. Well-landscaped homes are more valuable.

Improvements to your landscape pays off! The return on investment for landscape upgrades is 109%.

1/4 of American homes grow berries, veggies, or fruit trees.

Where We WORK

Green roofs provide beauty and moderate rooftop temperatures, reducing heat loads and lowering energy costs.

Office plants reduce employee sick time by 14% and improve work productivity and speed.

Upkeep and preservation of urban green habitats creates new jobs, boosts local economies, and adds to community prosperity.

Horticulture creates 2 million jobs across a diverse array of businesses.

Where We SHOP

Stores with landscaped areas have expanded sales resulting from longer shopping occassions and can charge more due to higher perceived quality.

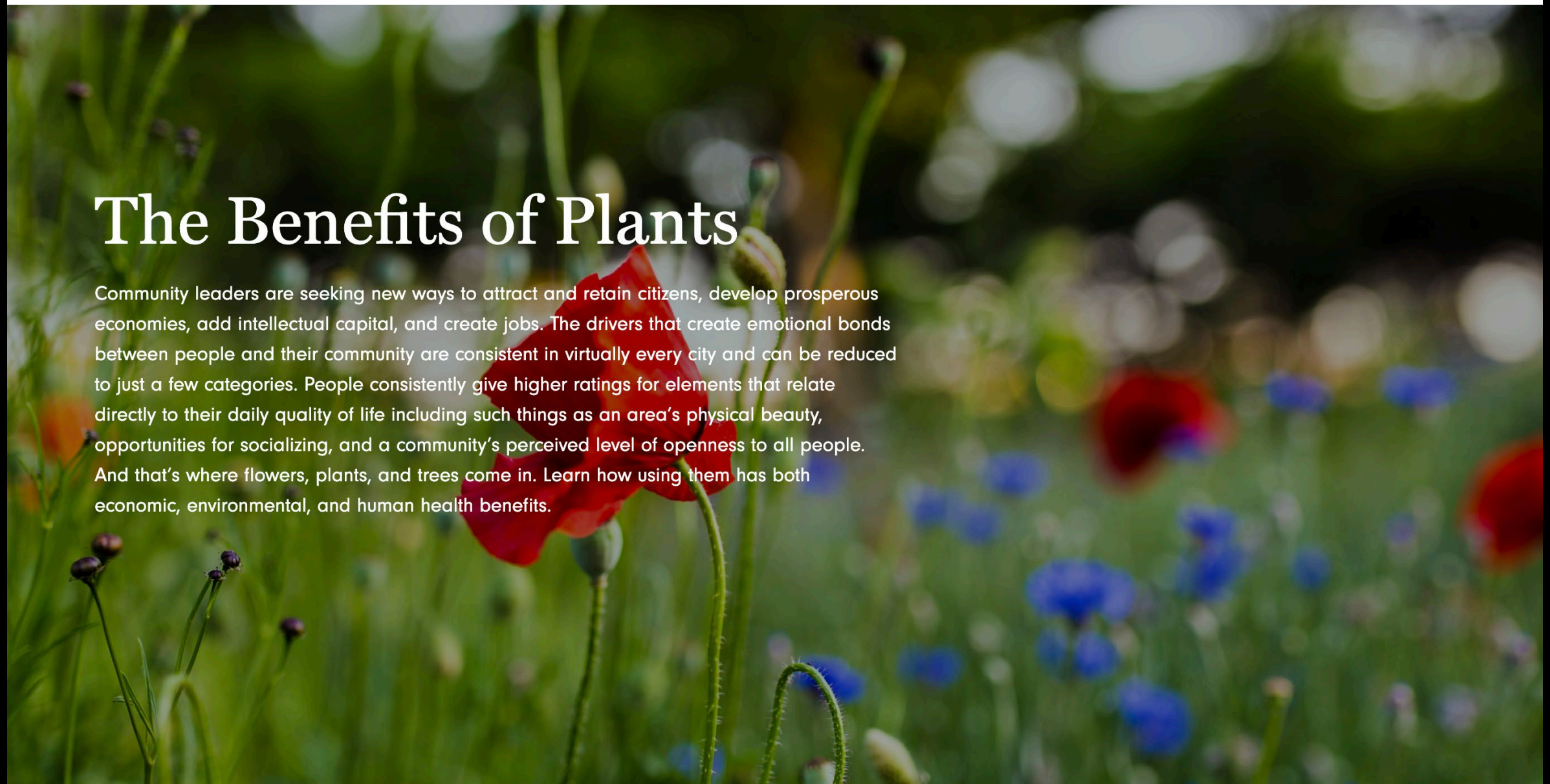
Where We PLAY

America's public gardens are key tourist destinations and contribute $2.3 billion in community tourism spending.

Parks provide cities and citizens significant value. In Philadelphia, parks generate $23 million in city revenue, $16 million in municipal cost savings, and $1.1 billion in cost savings for citizens.

There are 4 million miles of US roadways. Street trees preserve paved surfaces. Shaded roads save up to 60% of repaving costs. Trees also improve driver safety and result in fewer traffic accidents.

Trails and greenways increase property values and make adjacent homes sell faster.



The Benefits of Plants

Community leaders are seeking new ways to attract and retain citizens, develop prosperous economies, add intellectual capital, and create jobs. The drivers that create emotional bonds between people and their community are consistent in virtually every city and can be reduced to just a few categories. People consistently give higher ratings for elements that relate directly to their daily quality of life including such things as an area's physical beauty, opportunities for socializing, and a community's perceived level of openness to all people. And that's where flowers, plants, and trees come in. Learn how using them has both economic, environmental, and human health benefits.