# An Analysis of Benefit Values: 175 Landscape Architecture Case Studies in the U.S.

**Dequindre Cut Greenway, Detroit, Michigan**

The Dequindre Cut Greenway provides a safe space for Detroiters to walk and bike, reducing auto trips by an estimated 15,218 round-trip weekday commutes and greenhouse gas emissions by an estimated 38,000 pounds annually. The greenway increases access to recreation and local businesses. It's also in an area identified by the EPA's Environmental Justice Screening and Mapping tool as a community with environmental justice concerns. Image credit: SmithGroup

## Overview

Landscape architecture strategies increase environmental, social and economic value by employing nature-based solutions in project design.

The American Society of Landscape Architects (ASLA) finds that:

> Nature-based solutions to climate change and biodiversity loss are more than mangroves, forests, and grasslands. Landscape architecture strategies weave them into places where people live. That way, people can access the benefits of nearby nature in parks, recreation areas, greenways, resilient coastal infrastructure, and more.
>
> Landscape architects use inclusive design strategies to create outdoor spaces accessible to people of all ages, genders, and abilities. These spaces provide people with even more significant benefits and support the healthy urban ecosystems they rely on.

According to ASLA, landscape architects make design decisions that can maximize the economic benefits of nature-based solutions.

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These design decisions can provide benefits in five key areas:

- Increased Biodiversity
- Improved Human Health and Livability
- Going Beyond Net-Zero
- Strengthened Resilience
- Expanded Investment and Sustainable Livelihoods

For each of these key areas, we estimated high-level economic benefit values.[1]

**Research Overview**

There are 77,000 landscape architects worldwide, designing and building hundreds of thousands of projects annually.

The University of Maryland Environmental Finance Center evaluated 175 of the Landscape Architecture Foundation's (LAF) *Landscape Performance Series* Case Study Briefs of landscape architecture projects in the U.S.

We have highlighted some of the benefits from a small portion of these case studies. Depending on the benefit category, we assessed 30-70 case studies.

- The annual value of benefits ranges from $662 to 884 million.[2] (US$ 2024).

The science of benefit valuation only allows us to estimate specific benefits. Quantifying benefits can present challenges.[3] Dollar values are approximate and based on methods and assumptions used in the analysis. These benefits are only a fraction of the economic value generated by these projects and the landscape architecture community.

We summarize the benefits these landscape architecture projects provide. There is a brief explanation of:

- Benefits assessed within ASLA's key areas
- How many LAF case studies were assessed
- Summary figures

Then, we include a project example highlighting the benefits of designing with nature-based solutions. It should be noted that each case study quantifies more than one benefit.

**Methodology**

The Landscape Architecture Foundation Landscape Performance Series (LAF LPS) Case Study Briefs include 200 case studies of exemplary built projects with quantified environmental, social, and economic benefits, with 172 in 36 states and 28 in nine other countries.

Benefits were derived from project assessments conducted through LAF's Case Study Investigation (CSI) program, which funds faculty-student research teams to work with practitioners to document the impacts of exemplary, high-performing landscape projects. The Case Study Briefs include descriptions and estimates of the projects' environmental, social, and economic outcomes and features.

The case studies are searchable by:

- Landscape performance benefit categories (33 as of August 2024)
- Project features (32 as of August 2024)
    - Examples: native plants, trails, greywater reuse
- Project types (32 as of August 2024)
    - Examples: parks, open spaces, courtyards
- Location
- Climate zone
- Size
- Budget
- Year completed
- And year evaluated

Data for all Case Study Briefs is publicly accessible.

The project team listed the benefit categories corresponding to the ASLA key areas below.

Data was extracted and aggregated from benefit categories to estimate the benefit values. The data was sorted in Excel; some were summarized and sorted in ChatGPT.[4] For example, the Excel database records acres of "Habitat creation, preservation & restoration" that were summed for total acres. ChatGPT summarized categories of benefit values such as carbon sequestered and carbon avoided.

After sorting and summarizing data, seven benefit categories were used for benefit valuation.

The project team's prior work in environmental benefit valuation helped determine which categories could be translated into monetary values using environmental economic techniques.

For example, the LAF LPS database reports the number of visitors in case study data. The project team categorized these numbers based on the project's recreational access types and the seasonality of potential recreational time. Recreational benefit values from the Oregon State Recreational Value database were used to estimate the monetary value of recreation (walking) based on the number of visitors.

| ASLA Key Areas | LAF LPS Benefit Categories | |
|---|---|---|
| Biodiversity | **LAND**<br>Land efficiency/ preservation | **HABITAT & BIODIVERSITY**<br>**Habitat creation, preservation & restoration**<br>Habitat quality<br>Populations & species richness |
| Human Health | **SOCIAL**<br>**Recreational & social value**<br>Cultural preservation<br>Health & well-being<br>Safety<br>Educational value<br>Noise mitigation<br>Food production<br>**Scenic quality & views**<br>Transportation<br>Access & equity | **CARBON, ENERGY & AIR QUALITY**<br>Air quality<br>Temperature & urban heat island |
| Beyond Net Zero | **CARBON, ENERGY & AIR QUALITY**<br>Energy use<br>**Carbon sequestration & avoidance**<br>Soil creation, preservation & restoration<br>**Reused/recycled materials**<br>Waste reduction | |
| Resilience | **WATER**<br>Shoreline protection<br>**Stormwater management**<br>**Water conservation**<br>Water quality<br>Flood protection | |
| Sustainable Livelihoods | **ECONOMIC**<br>Property values<br>Operations & maintenance savings<br>Construction cost savings<br>Job creation<br>Visitor spending<br>Increased tax revenue & economic development | |

## Benefit 1: Increased Urban Biodiversity

Landscape architecture can mitigate biodiversity loss, which threatens ecosystems' ability to provide human goods and services. Biodiversity is assumed to have value because it provides a wide range of ecological, economic, cultural, and social benefits to people. Monetary values are extremely difficult to estimate for this vast subject; however, how people view changes in biodiversity offers some lower-bound estimates of value.

- 70 urban case studies assessed
- Increased urban biodiversity in over 18,500 acres (US)
- Benefitted 2.7 million people

Estimated benefit value for 70 designed landscapes that increase urban biodiversity: $242 million per year

**Methodology**

Increasing biodiversity includes preserving and increasing habitat and land for species to survive and thrive.

To estimate the value of projects that include biodiversity, we extracted location data from the LAF LPS case studies that documented the following benefit categories:

- Land efficiency and preservation
- Habitat creation
- Preservation and restoration
- Habitat quality

Biodiversity is exceptionally complex; valuation is typically specific to projects and species. However, economists survey people and ask how they value the biodiversity gain by increasing the species' population.

To provide a simple, high-level biodiversity value, we assessed LAF LPS Case Study Briefs that protected land and preserved or restored habitat and estimated the population of people in the project area by zip code. The benefit value is the number of people in the project's zip code multiplied by the willingness to pay for an increase in biodiversity. That number was derived from literature.[5]

## Benefit 2: Improved Health and Livability

Landscapes can be designed to encourage people to engage in physical activities such as walking, jogging, and cycling. Regular physical activity has numerous health benefits, including reduced risk of obesity, heart disease, stroke, and diabetes.[6] Landscape architects also incorporate green space and can restore natural environments. Studies have shown that exposure to nature can reduce symptoms of depression and anxiety, improve mood, and enhance overall psychological well-being.[7]

- 34 urban case studies assessed
- Access to green space provides passive and active opportunities for an estimated 8.8 million people in 18 US states annually

Estimated benefit value of 34 urban-designed recreational and scenic landscapes: $330 million per year

**Methodology**

Economic benefit values for human health rely on proprietary health data, and few studies have been conducted regarding the monetary values and direct links between nature and health. Empirical studies link how people's time spent in parks and exposure to green space and natural areas is vital to our health. Research shows that walking, running, and spending time in nature improve physical and mental health. Economists value nature by studying where people recreate and the value they place on recreation.

Environmental economists estimate recreational and scenic values by collecting data on consumer surplus, which is the difference between what consumers are willing to pay for a good or service and what they actually pay. Economists' benefit value data is obtained from surveys, experiments, or observing market data. This helps them understand how people value experiences in beautiful areas.

To estimate recreational and scenic values, reported visitor numbers from the LAF LPS Case Study Briefs were multiplied by values from the literature. Seasonal types of activity—for example, different values for "walking" and "scenic views"—were summarized.

## Benefit 3: Going Beyond Net-Zero

Projects that sequester and remove carbon from the atmosphere help mitigate the effects of climate change.

Landscape architects can :

- Use low-carbon materials
- Integrate renewable energy
- Create walkable and bikeable streets to reduce greenhouse gas emissions from vehicles
- Plant and conserve trees and vegetation to sequester carbon

- 74 case studies assessed
- Carbon avoided by recycling and reusing material and reducing fossil fuel use: 638,000 metric tons (one-time). This equates to removing 138,696 cars from the road for one year.[8]

Estimated benefit value of 74 designed landscapes that avoid carbon emissions: $33 - $118 million (one-time)

- 74 case studies assessed
- Carbon sequestered through tree planting, preservation, and vegetation restoration: 1.6 million metric tons annually. This equates to removing 347,826 cars from the road for one year.[9]

**Above:** The Houston Arboretum and Nature Center in Houston, Texas, designed by landscape architects with Design Workshop and Reed Hilderbrand, minimizes costs while preserving the carbon sequestration of older trees. The design also leverages the natural carbon sinks of grasslands and riparian areas. Image Credit: Brandon Huttenlocher/Design Workshop

Estimated benefit value of 74 designed landscapes that sequester carbon:
$81 - $296 million per year

**Methodology**

The case studies document numerous ways to reduce carbon through sequestration (annual dollar value) and avoided emissions (one-time dollar value). For example, landscape architecture projects may involve:

- Tree planting and preservation
- Vegetation restoration
- Reducing, recycling, and reusing materials
- Less fuel use through reduced mowing
- Installing energy-efficient practices
- Renewable energy

The estimates of carbon reductions were summed and multiplied by the Social Cost of Carbon (SCC). The SCC measures the economic harm caused by emitting one ton of carbon dioxide (CO2) into the atmosphere. It represents the dollar value of the damages caused by a ton of CO2 emissions over its lifetime, including impacts on agriculture, human health, property damage from increased flood risk, and changes in energy costs.[10] The SCC varies from $51 per ton, the value used across the U.S. federal government and in several states, to $185, which is in published literature.[11]

Understanding the SCC helps governments and organizations implement policies that reduce carbon emissions, aiming to mitigate climate change impacts. For instance, if the SCC is high, it suggests that the benefits of reducing emissions are substantial, justifying investments in green technologies and stricter environmental regulations.

## Benefit 4: Strengthened Resilience

Resilience takes many forms, and managing water resources is vital to resilient communities. Landscape architecture projects that provide clean and plentiful water are one way cities can become more resilient.[12]

Major U.S. cities' persistent challenges are combined sewers and excess stormwater runoff. When too much stormwater enters the system, combined sewers overflow. Raw sewage contaminates local waterways in densely populated areas, increasing the likelihood of human health impacts. Conserving water is essential in more arid regions; sustainable landscape designs can save many gallons of water.

Landscape architects can design systems to reduce stormwater runoff in urban areas, improving water quality and reducing disease potential.

**Stormwater Reduction**

- 33 case studies assessed
- 34.5 million gallons of stormwater prevented from entering combined sewer systems annually, which equates to approximately 52 Olympic swimming pools.[13]

Estimated benefit value of 33 designed landscapes that reduced stormwater:
$7 –$13 million per year

**Water Conservation**

- 68 case studies assessed
- 1.1 billion gallons of water are conserved annually through capture, reuse, and eliminating the need for irrigation. This is about 10,000 years of water for an average American household.

The estimated benefit value of 68 designed urban landscapes that conserve water:
$1.6 – $3.3 million per year

**Methodology**

Climate change is altering the amount of water communities can access, creating too much water in some cities and too little in others. Improving water management in urban areas helps strengthen communities' resilience.

The LAF LPS flood reduction category lacked sufficient data to estimate how projects helped with flooding.

### Stormwater Management

A legacy urban water quality problem is the combined sewer system. An estimated 772 combined sewer systems exist in the U.S. If too much stormwater enters these systems, they can overflow and release raw sewage and other pollution into waterways. Stormwater management is vital in older cities with these systems. Reducing sewer overflows helps improve water quality in urban areas.

The economic benefits of landscape architecture projects that manage stormwater are estimated by the costs in dollars per gallon of conventional gray infrastructure methods. The cost of treating stormwater that would have otherwise flowed to a waste treatment facility or constructing a capture system like a tunnel provides a way of estimating the dollar values of alternate treatment.

The LAF LPS Case Study Briefs included an estimate of the gallons of stormwater managed. The number of stormwater gallons reduced by projects in cities with combined sewer systems was summed and multiplied by the cost of treating the stormwater through a different approach: a lower dollar value per gallon for a wastewater treatment facility and a higher dollar value per gallon to build tunnels to divert the excess stormwater. These are gray infrastructure techniques used to estimate the value of reducing the stormwater in a system.

### Water Conservation

Conserving water also helps save fresh water for essential uses. Landscape architecture projects can be designed to reduce water use through rainwater capture and plant choices.

For water conserved, the estimated number of gallons in the LAF LPS Case Study Briefs was summed and multiplied by the average cost of potable water ($/gallon) in the U.S.

## Benefit 5: Expanded Investment and Sustainable Livelihoods

Landscape architects design with nature-based solutions to create parks, natural spaces, and other green infrastructure projects that promote sustainable livelihoods.

Landscape architecture is shown to:

- Boost local economies
- Increase property values
- Conserve scarce resources (water)
- Improve employment rates (full-time, part-time, and temporary jobs, including educational and maintenance roles)

The LAF LPS Case Study Briefs document how several projects enhanced local economies, attracted substantial private investments, and spurred the creation of new businesses and housing units.

Examples of cost savings:

- Sustainable landscape design reduced construction costs in 25 projects.
- Tens of millions of dollars were saved across 24 case studies by creatively reusing on-site materials and reducing hauling and landfill fees.

Examples of job creation:

- Menomonee Valley Redevelopment and Community Park has a nationally renowned stormwater treatment system, trails, fourteen new businesses, and approximately 1,400 new jobs.[14]
- The Riverwalk project in Chicago, Illinois, generated 295 jobs, including seasonal and permanent positions.[15]
- Spaulding Rehabilitation Hospital in Charlestown, Massachusetts, created 64 jobs associated with landscape construction, four year-round jobs, and eight seasonal jobs for landscape and grounds care.[16]

Examples of economic development:

- The Dallas Arts District in Dallas, Texas, which includes four major real estate developments, added 392 residential units, 500,000 square feet of office space, and 20,000 square feet of retail space.[17]
- In Atlanta, Georgia, over $638 million in new private real estate investment was made in the Atlanta BeltLine Tax Allocation District.[18]
- In Chicago, Illinois, Millennium Park has generated economic impact:[19]

- $490 million investment in  park design and construction
- $ 2.45 billion in new construction near the park
- 70,070 direct, indirect, and induced jobs created by new construction in the area
- 57% increase in new residential units near the park (3,587 units since 2005)
- 29% premium on park units sold with views of the park
- 5 million annual visitors, which generates $1.29 billion in tourism dollars
- $5.9 million in annual operations costs that support the local economy
- 11% increase in hotel rooms (751 rooms) near the park

**Methodology**

The LAF LPS Case Study Briefs estimate several economic benefits, such as increased property values and cost savings during project construction. The value of landscape architecture projects was directly reported and summarized; no separate methods were used to describe the economic benefits.

**The ASLA Fund commissioned this research.**

## References


1. "Placing a value on nature's ecosystem services should not be misconstrued as 'putting a price onnature'" TEEB: Challenges and Responses. 2014. p8. https://teebweb.org/publications/other/challenges-and-responses/

2. Out of many benefits described in the LAF LPS database only case studies that had numerical estimates for the benefit categories were used.

3. The total value of ecosystem services, including both market and non-market aspects, is difficult to determine due to the complexity of the social science involved. Environmental economists face challenges in calculating total value because different methods are used and only partial values are captured for ecosystems, which often have multiple values. Additionally, there are ethical concerns about putting a value on human life. Valuation is used to estimate the cost of preventing losses, such as avoiding deaths from pollution, flooding, and other environmental issues that nature can help reduce.

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7. Ibid. Lwasa.

8. According to the US Environmental Protection Agency (EPA), the average passenger vehicle emits about 4.6 metric tons of CO2 per year. (https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle)

9. See footnote above for estimate calculation assumption.

10. For more information on how SCC is estimated and concepts like discounting that impacts the calculation see Resources for the Future Social Cost of Carbon 101.(https://www.rff.org/publications/explainers/social-cost-carbon-101/)

11. Rennert, K., Errickson, F., Prest, B. C., Rennels, L., Newell, R. G., Pizer, W., ... & Anthoff, D. (2022). Comprehensive evidence implies a higher social cost of CO2. Nature, 610(7933), 687-692.

12. For example, Philadelphia's Green City, Clean Waters program, developed with landscape architects in the City of Philadelphia government, is anticipated to save the city $200 million in water treatment and infrastructure costs. Philadelphia has implemented extensive green infrastructure like bioswales and rain gardens to reduce stormwater runoff and pollution to waterways. (U.S. Environmental Protection Agency. 2011. Reducing stormwater costs through low-impact development (LID) strategies and practices. EPA)

13. An olympic-sized pool holds 660,000 gallons of water.

14. Menomonee Valley Industrial Center & Community Park. 2024. https://www.thevalleymke.org/mvic

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