Landscape Architecture: Maximizing the Economic Benefits of Nature-based Solutions Through Design

Thornton Creek Water Quality Channel Seattle, Washington

Carved out of a parking lot, the Thornton Creek Water Quality Channel treats urban stormwater runoff from 680 acres within a necklace of channels, pools, and terraces designed to mimic the performance of a natural creek. Landscape architects with MIG uncovered a buried creek, demonstrating how to design with nature. Image credit: MIG

Opportunity: Transform the Built Environment

The built environment—landscapes, buildings, infrastructure, and transportation systems—is responsible for 70 percent of annual global greenhouse gas emissions[1], and "three-quarters of the infrastructure that will exist in 2050 has yet to be built."[2] This presents an opportunity to transform the built environment into a climate solution through landscape architecture.

The World Bank's *Next Generation Infrastructure* report emphasizes the benefits of using nature-based solutions to climate challenges.[3] If planned and designed with communities, these solutions can provide many benefits:

- Reduced flooding[4]
- Carbon sequestration[5]
- Enhanced biodiversity[6]
- Better livelihoods[7]

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The Value of Nature-Based Solutions

The World Bank estimates that a $1 investment in nature-based adaptation for climate change – such as restoring wetlands to manage floods or planting trees to sequester carbon and reduce temperatures – results in $4 of environmental, social, and economic benefits through avoided losses and reduced risk.[8]

Research also finds that access to green space:

- Improves mental and physical health[9] [10] [11]
- Reduces heat stress[12]
- Enhances social cohesion and community well-being[13] [14] [15]

More Financing for Nature-Based Solutions is Needed

Annually, $7 trillion in global development financing flows to projects that deplete nature. We can think of this as nature-negative finance. This is approximately 140 times the amount invested in nature-based solutions each year.[16]

The UN Environment Program calls for realigning global investment to protect and enhance nature. Scaling up investment in nature-based solutions can help achieve global goals.

$1 investment in nature-based solutions

↓ **YIELDS**

$4 benefits (environmental, social, and economic)

> "But getting money to where it matters – including support to scale up Nature-Based Solution initiatives at the local level – will be a challenge given the track record in climate and biodiversity finance. Only 10 percent of climate finance reaches the local level, and climate finance is not systematically directed to where needs are highest. A 2020 review of biodiversity finance by the Organisation for Economic Co-operation and Development found that countries' expenditures on biodiversity and landscape protection ranged from <0.001 to 0.6 percent of total annual government spending. Meanwhile, it is estimated that Indigenous Peoples and local communities (IPLCs) conserve at least 22 percent of the world's key biodiversity areas and at least 21 percent of the world's land, but less than two percent of global climate finance is reaching small farmers and IPLCs in developing countries."[17]

– **Najma Mohamed,** *Head of Nature-based Solutions at UN Environment Program World Conservation Monitoring Centre (UNEP-WCMC)*

Nature-Based Solutions and the American Society of Landscape Architects
Landscape architecture strategies increase environmental, social and economic value by employing nature-based solutions in project design.

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. These design decisions can provide benefits in five key areas. For each of these key benefit areas, the University of Maryland Environmental Finance Center summarized findings from national and international reports on nature's value.[18]

Thornton Creek Water Quality Channel Seattle, Washington. Landscape architects at MIG "daylighted" water systems, which involves unburying creeks and rivers covered by development. Reconnecting communities to nature increases health and well-being. Image credit: MIG

Benefit 1: Increased Biodiversity

ASLA View: Nature-positive landscapes are the foundation of terrestrial ecosystems helping to protect at least 30 percent of terrestrial, coastal, and ocean ecosystems by 2030 (30x30) and achieve 10% net biodiversity goals, restore global ecosystems, and increase and protect biodiversity.

Global economic activity depends on nature's services. Biodiversity refers to the variety of all living organisms, including the diversity within species (genetic variation), between species, and of ecosystems. The economic value of natural resources[20] is estimated through market goods (e.g., fishing and timber) and non-market services (e.g., water filtration by wetlands or carbon sequestration from forests).

Many landscape architects enhance biodiversity by restoring, conserving, and protecting habitats–even in urban areas. They can design with native plant communities, remove invasives, and prioritize the use of green infrastructure.[21] Nature-positive design can reduce the negative impacts of development on biodiversity.[22]

Investing in nature-based solutions such as ecological restoration, natural flood management systems, and pollinator habitat can yield substantial economic returns:

- Every dollar invested in ecosystem restoration returns $5 to $28 in benefits, depending on the ecosystem.[23]
- Preserving biodiversity contributes to pollinators' economic value, estimated at $301 billion annually (US$ 2024).[24]

$5 to $28

of estimated benefits for every dollar invested in ecosystems

$301 Billion

of economic value from pollinators

Image credit: (Left) Cortex Commons. St. Louis, Missouri. SWT Design, Inc. (Right) Cortex Commons. St. Louis, Missouri. SWT Design, Inc. / Jim Diaz

Cortex Commons, St Louis, Missouri. Landscape architects with SWT Design transformed Cortex Commons, a former warehouse district, by designing a central open space that captures stormwater. Originally planned as a conventional monoculture grass turf basin, the landscape architects reimagined it through a collaborative design process, creating a biodiverse environment at the heart of the Cortex Innovation Community. They infused the space with green infrastructure, diverse herbaceous vegetation, and pavement systems that support large tree growth while effectively capturing and infiltrating stormwater runoff.[19]

Benefit 2: Improved Health and Livability

ASLA View: Accessible public landscapes, such as parks and recreation areas, provide proven physical and mental health benefits that reduce healthcare costs and increase community cohesion.

Human Health

Nature-based solutions provide significant health benefits in urban areas.[27] Urban forests and green spaces help reduce air pollutants like particulate matter, nitrogen dioxide, and sulfur dioxide. Improved air quality can lead to lower rates of respiratory and cardiovascular diseases.[28] The value of ecosystem services from urban green spaces, which contribute to mental and physical health, improve air quality, and provide recreational opportunities, can range from $500 to $1,600 per acre per year ($1,300 to $3,900 per hectare, US$ 2024).[29] Urban and rural forests provide an estimated $2.2 to $19 billion (US$ 2024) in air pollution removal benefits (one-year modeled estimate in the U.S.).[30]

Heat Island Effect Mitigation

Green infrastructure can lower urban temperatures by cooling through shade and evapotranspiration, reducing the urban heat island effect by 2-9 degrees C.[31] This temperature decrease can ease the financial burden of increased healthcare costs due to hospitalizations, emergency room visits, and treatments for heat-related illnesses.[32] Between 1,300 and 12,000 heat-related deaths occur annually in the U.S.[33] Research shows tree cover can mitigate these deaths.[34]

Ecosystem services from urban green spaces provide value—from

$500 – $1,600

per acre per year

Dune Peninsula, Tacoma, Washington. For 100 years, an American Smelting and Refining Company copper smelter provided jobs for the local community. But the health of workers[25] and the land was negatively impacted by plant operations. The site became a U.S. EPA Superfund in 1983 because of heavy metals in the soil. Landscape architects at Site Workshop worked with Metro Parks Tacoma and many other project partners.[26]They transformed the site into a multilayered recreational space that renews the land. Most surveyed visitors report engaging in physical activity and experiencing restorative and positive feelings. Image credit: (Left) Tacoma Public Library, BU13886 (Right) Site Workshop

Image credit: Stuart Islett

Benefit 3: Going Beyond Net-Zero

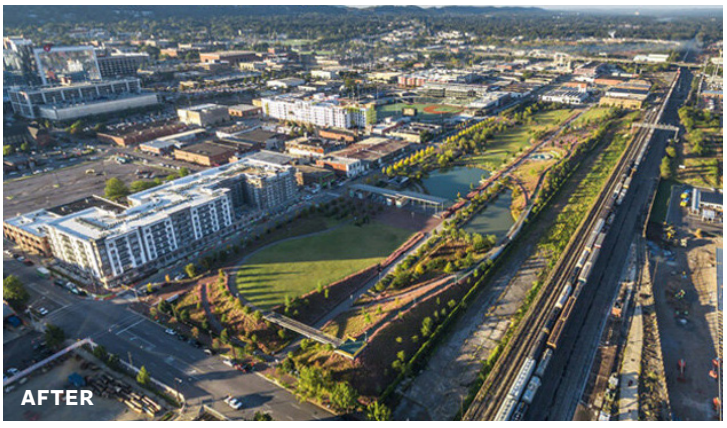
ASLA View: Landscapes are the most efficient way to store carbon, achieve zero embodied and operational emissions, and double carbon sequestration by 2040.

- Urban trees provide approximately $88 billion (US 2024$) in carbon sequestration annually.[36]
- Through conservation, restoration, and improved land management, nature-based solutions are estimated to sequester the annual greenhouse gas equivalent of 5 billion average passenger vehicles.[37] This represents 37% of the greenhouse gas reduction required for a 66% probability of limiting global warming to below 2 degrees Celsius.[38] These solutions can be highly cost-effective — under $13 (US$ 2024) per metric ton of CO2.[39]

Nature-based solutions sequester the annual greenhouse gas equivalent of

5 billion passenger vehicles

and at a cost of less than $13 per metric ton of CO2.



Railroad Park, Birmingham, Alabama. This site was a wetland before the steel industry and railroad altered the landscape. At Railroad Park, landscape architects with Tom Leader Studio and Macknally Land Design reimagined the site as a green oasis.

They connected the city's northern and southern halves through a green corridor and planted 531 new trees of 20 different species, sequestering approximately 20,800 lbs of atmospheric carbon annually, which is equivalent to driving a single passenger vehicle 21,000 miles. Image credit: TLS Landscape Architecture

Benefit 4: Strengthened Resilience

ASLA View: Healthy, biologically diverse landscapes that store carbon in trees, plants, and soils also increase people's resilience to climate impacts, such as extreme heat, flooding, drought, and sea level rise.

Increased resilience to secure water supplies

The value of water regulation services provided by watersheds, rivers, and lakes in natural and designed landscapes is significant. Healthy and restored rivers and lakes provide fresh drinking water and recreational benefits. The value of these services is estimated to be in the range of $1,000 to $8,000 per acre per year ($2,700 to $20,000 per hectare 2024 $US).[39]

Increased resilience to flooding

Restoring and protecting natural systems like wetlands and coastal systems also provides significant flood management benefits. Landscape architects can restore and preserve these systems, to provide benefits like moderation of extreme events, property protection, water filtration, recreation, and tourism. The value of the benefits from coastal and freshwater wetland ecosystems is between $200 and $76,000 per acre per year ($500 and $188,000 per hectare, US$ 2024).[40]

Increased cost efficiency

At the community scale, nature-based solutions such as rain gardens, bioswales, and green roofs help effectively manage stormwater. These solutions provide additional benefits, such as energy savings, reduced flooding, and improved water quality, better than traditional gray infrastructure.[41] These features of the built environment can be constructed for 5-30 percent less and maintained for 25 percent less than conventional gray infrastructure.[42]

Green infrastructure projects can **be built for**

5%–30%

less and **maintained for 25% less** than gray infrastructure projects

Dutch Kills Green, Queens, New York. To improve pedestrian and bike access, WRT and Margie Ruddick Landscape transformed a dangerous space at the end of Queensboro Bridge into a multifunctional landscape with environmental, social, and economic benefits. Green stormwater features combine artist Michael Singer's modular system of permeable pavers and native plants tolerant of drought, salt, and pollution. Green infrastructure prevents 20.2 million gallons of stormwater from entering the combined sewer — avoiding an estimated $3.4 million in capital costs for gray infrastructure. The plants selected reduce irrigation needs by 786,500 gallons per year, saving approximately $3,500 in annual irrigation costs compared to a standard lawn. Image credit: WRT

Benefit 5: Expanded Investment and Sustainable Livelihoods

ASLA View: When woven into communities, nature-based solutions become resilient assets that increase investment in housing, infrastructure, and public amenities and create sustainable local livelihoods.

In surveys issued in 2021 and 2024, ASLA members indicated a significant increase in demand for landscape architecture projects that increase resilience to climate impacts, such as extreme heat, flooding, sea level rise, and drought.

These projects include:

- Parks and plazas
- Green streets
- Green stormwater management systems
- Pedestrian and bicycle transportation infrastructure

These projects expand investment in sustainable livelihoods by generating economic opportunities through job creation and improved business revenue.

The Trust for Public Land reports that investments in parks and green space can generate between $4 and $11 for every dollar invested, due to increased tourism, improved property values, and enhanced community health.[44]

Addressing climate challenges through sustainable design can create nearly 20 million U.S. jobs in grounds maintenance, sustainable urban planning, development, renewable energy, construction, and green technology.[45]

$1

invested in parks and green spaces

GENERATES

+ $4 to $11

from increased tourism, property values, and enhanced community health

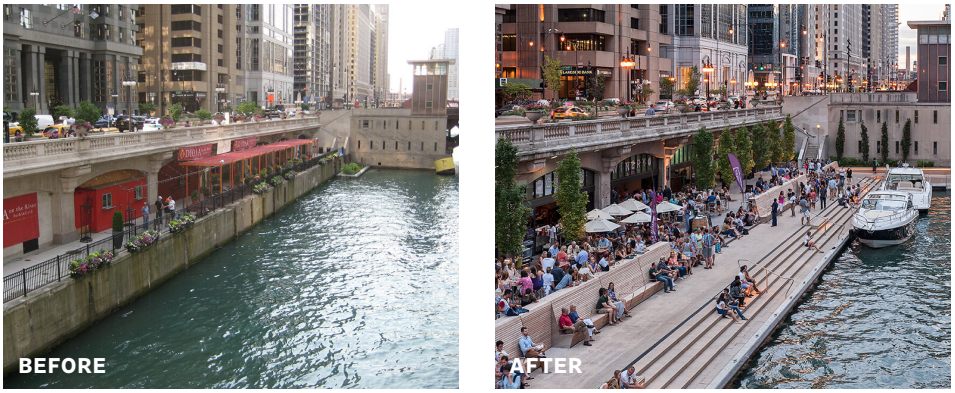


Image credit: (Left) ASLA 2018 Professional General Design Honor Award. Chicago Riverwalk | State Street to Franklin Street. Sasaki and Ross Barney Architects / Sasaki (Right) ASLA 2018 Professional General Design Honor Award. Chicago Riverwalk | State Street to Franklin Street. Sasaki and Ross Barney Architects / © Christian Phillips Photography

The Riverwalk, Chicago, Illinois. For years, the riverwalk was uninviting, with narrow paths, limited vendors, and no direct engagement with the Chicago River. Landscape architects with Sasaki reimagined the riverbank as a destination, with flood-resilient pedestrian promenades that connect to the water and increase space for amenities. The design has revitalized recreation and economic activity along the river. The Riverwalk doubled the number of vendors, increased profits by 164%, and generated nearly $50 million in revenue in 2018.

A study released by Friends of the Chicago River and Openlands in 2023 estimated that every $1 spent on water quality improvement and public access returned $1.77 in benefits. The study found that a riverfront development approach that is friendly to people, wildlife, and the environment would create an additional $192 million in total economic benefits and support 1,614 jobs annually over a 15-year timespan.[43]

Image Credit: ASLA 2018 Professional General Design Honor Award. Chicago Riverwalk | State Street to Franklin Street. Sasaki and Ross Barney Architects / © Christian Phillips Photography

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