

Environmental Benefits

A selection of facts and resources supported by research

2024

Overview

Trees, green spaces, and nature provide crucial environmental benefits to urban areas such as reducing air pollution, addressing heat island effect, providing critical habitat, and mitigating numerous climate change impacts. Trees and vegetation can improve air quality by removing pollutants and reducing air temperature, both of which contribute to smog. They also reduce energy needs for cooling, reducing the associated pollutant emissions from power plants.

Air Pollution

- **Trees absorb pollutants** like nitrogen oxides, ammonia, sulfur dioxide, and ozone, effectively purifying the air. Leaves also capture dust and smoke particulates (*Green Canopy, Better World: Exploring the Benefits of Trees*, n.d.).
- Air quality benefits significantly impact **respiratory illnesses**. A study found that trees removed 17.4 million tons of air pollution across the United States, which prevented 850 human deaths and 670,000 cases of acute respiratory symptoms (Nowak, 2014).
- According to the EPA, the US emits around 66 million tons of air pollution a year – trees are removing about 1/3 of that figure according to the study. The **human health effects** associated with pollution removal have been valued at 6.8 billion dollars (about \$21 per person in the US) (Nowak, 2014).

Reduce Greenhouse Gases

- Up to 60 billion new trees could be planted by 2040 if suitable land is used without reducing food production. These trees could remove up to 540 million tons of carbon dioxide annually from the atmosphere, equivalent to nearly 10% of the country's net greenhouse gas emissions (Rudee, 2020).
- Approximately **1.83 billion trees are planted globally** each year. That is a substantial effort to restore and expand green spaces. This translates to around 58 trees planted every second (McInerney, 2024).
- Trees do not just mitigate carbon, removing it from the atmosphere, they also sequester it – absorbing carbon dioxide during photosynthesis and then locking it up for centuries. In the United States **sequester some 22.8 million tons of carbon** each year (The Morton Arboretum, 2024).

Cooling

- Urban forests and green roofs can aid in reducing urban **heat island effects**. Cities are warmer than surrounding agricultural and forested areas due to the dominance of

- impervious surfaces and the fact that urban materials absorb and hold heat. This is called the urban heat island effect (Wolf et al., 2015).
- Parks can be up to 2°F cooler than the surrounding urban area in the day. Large numbers of trees and expansive green spaces across a city can **reduce local air temperatures** by up to 9°F (Wolf et al., 2015).
 - **Low-income neighborhoods** have on average **26 percent less tree cover** and are 7°F hotter. Neighborhoods with the highest concentration of people of color—regardless of income—have on average 38 percent less tree cover and are 10 degrees hotter (Daley, 2023).
 - A tree can cool the area underneath it by as much as 45 degrees F and studies have found trees can reduce cooling load in a home by more than 50 percent when placed in the right locations (Daley, 2023).

Water Conservation, Quality and Flooding

- Climate change is impacting the frequency and severity of flooding in our communities. Trees, green spaces, and nature play a vital role in **reducing flooding** by slowing down the flow of rainwater, absorbing rainwater and reducing erosion before hitting the ground (Woodland Trust, n.d.).
- Trees **reduce surface water run off** by 80% compared to asphalt (Wolf et al., 2015).
- Trees and soil **improve water quality** by removing harmful substances washed off roads, parking lots, and roofs during rain or snow events (Wolf et al., 2015).

Biodiversity and Wildlife Corridors

- Trees are foundational to many ecosystems, supporting biodiversity. They **provide habitat and food** for countless species from canopy to forest floor (Gardenia, n.d.).
- Green spaces create wildlife corridors in cities essential for the survival of urban wildlife. Moths, birds, bats, dormice, butterflies, fungi depend on woods, trees and hedges to feed, breed and thrive (Gardenia, n.d.).
- Urban ecologists have shown even small patches of genuinely biodiverse nature can re-invite and sustain multitudes of plant and animal species (Woodland Trust, n.d.).

Resources

(EPA) National Stormwater Calculator (<http://www2.epa.gov/water-research/national-stormwater-calculator>) can be used to estimate annual stormwater runoff, based on site-specific information. Other tools are available from the

[Forest Service Agroforestry Center Toolkit - https://www.fs.usda.gov/nac/resources/](https://www.fs.usda.gov/nac/resources/)

[Green Infrastructure Center Urban Forestry Self-Assessment Tool - https://gicinc.org/resources/tools/](https://gicinc.org/resources/tools/)

[Trees for Energy Conservation \(Cooperative Extension and Forest Service\) Resource Page- https://trees-energy-conservation.extension.org/](https://trees-energy-conservation.extension.org/)

Tree Planting Statistics - <https://www.gotreequotes.com/tree-planting-statistics/>

U.S. Department of Agriculture Forest Service tool to calculate ecosystem services provided by an urban forest canopy (if-Tree Eco; <http://www.itreetools.org/>) or by street trees (i-Tree Streets; <http://www.itreetools.org/streets/index.php>).

References

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