

Urban Forest Benefits

Trees are important to the community. Environmentally, they help conserve and reduce energy use, reduce global carbon dioxide (CO₂) levels, improve air quality, and mitigate stormwater runoff. Additionally, trees provide a wealth of well-documented psychological, social, and economic benefits related primarily to their aesthetic effects. Trees make good sense, continuously providing these benefits and are one of the few community assets that appreciate in value over time. Trees provide the following benefits:

Energy Savings - Trees modify climate and conserve energy in three principal ways:

- Shading reduces the amount of radiant energy absorbed and stored by hardscape surfaces, thereby reducing the heat island effect.
- Transpiration (a natural process of water movement through trees and evaporation of water from leaves) converts moisture to water vapor, thereby cooling the air by using solar energy that would otherwise result in heating of the air.
- Reduction of wind speed and the movement of outside air into interior spaces and conductive heat loss where thermal conductivity is relatively high (e.g., glass windows).

Atmospheric Carbon Dioxide Reduction - As environmental awareness continues to increase, governments are paying particular attention to global warming and the effects of greenhouse gas emissions. The community forest provides a significant reduction in atmospheric carbon dioxide (CO₂) for a positive environmental and financial benefit to the community in two ways:

- Directly- through growth and the sequestration of CO₂ in wood, foliar biomass, and soil
- Indirectly - by lowering the demand for heating and air conditioning, thereby reducing the emissions associated with electric power generation and natural gas consumption

At the same time, vehicles and other combustion engines used to plant and care for trees release CO₂ during operation. Additionally, when a tree dies, most of the CO₂ that accumulated as woody biomass is released back into the atmosphere during decomposition, except in cases where the wood is recycled. Each of these factors must be considered when calculating the net CO₂ benefits of trees

Air Quality Improvement - Urban trees improve air quality in five fundamental ways:

- Absorption of gaseous pollutants such as ozone (O₃), sulfur dioxide (SO₂), and nitrogen dioxide (NO₂) through leaf surfaces
- Interception of particulate matter (PM₁₀), such as dust, ash, dirt, pollen, and smoke
- Reduction of emissions from power generation by reducing energy consumption
- Increase of oxygen levels through photosynthesis
- Transpiration of water and shade provision, resulting in lower local air temperatures, thereby reducing ozone (O₃) levels

Stormwater Runoff Reductions - Rainfall interception by trees reduces the amount of stormwater that enters collection and treatment facilities during large storm events. Trees intercept rainfall in their canopy, acting as mini-reservoirs, controlling runoff at the source. Healthy urban trees reduce the amount of runoff and pollutant loading in receiving waters in three primary ways:

- Leaves and branch surfaces intercept and store rainfall, thereby reducing runoff volumes and delaying the onset of peak flows.
- Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and reduce overland flow.
- Tree canopies reduce soil erosion and surface flows by diminishing the impact of raindrops on bare soil.

Aesthetic, Property Value and Socioeconomic Benefits - Trees provide beauty in the urban landscape, privacy to homeowners, improved human health, a sense of comfort and place, and habitat for urban wildlife. Research shows that trees promote better business by stimulating more frequent and extended shopping and a willingness to pay more for goods and parking. Some of these benefits are captured as a percentage of the value of the property on which a tree stands. To determine the value of these less tangible benefits, i-Tree Streets uses research that compares differences in sales prices of homes to estimate the contribution associated with trees. Differences in housing prices in relation to the presence (or lack) of a street tree help define the aesthetic value of street trees in the urban environment