

# The Urban Forest and Community Sustainability

Of course trees clean the water and the air, but did you know they help prevent violence and make roads last longer, while improving property values, reducing accidents and more? Is this key part of your infrastructure getting the attention it deserves?

by Pamela C. Louks,  
Urban Forestry Coordinator

**W**alk through a city park or along an urban river trail. Linger in a pocket park with leafy trees above. Walk, bike or drive through a neighborhood whose overarching tree canopy filters sunlight into playful, shifting patterns. Take a deep breath. You are enjoying the urban forest, the trees in metropolitan, suburban, or ex-urban areas, along highways, in cemeteries, parking lots, public and private woodlands, and along urban water corridors.

The urban forest is part of the urban infrastructure and contributes to any community's economic and ecological sustainability. Trees in urban areas clean the air and water and reduce the amount of energy we use. As green multi-purpose tools they contribute to economic and environmental health in so many ways it is surprising every city is not actively seeking ways to use them.

Yet in all the scenarios, solutions and dollars that are spent on mitigating economic and environmental woes, trees figure too seldom. Many community environmental and economic problems can

able to offer their full measure of ecological and economic benefits.

### Trees clean the air

Over 113 million Americans live in cities with polluted air. Vehicles on roads and highways and in parking lots produce one-third to one-half of the smog (ozone, nitrogen dioxide and small particulates) in most metro areas. Smog triggers asthma attacks and research from the University of Southern California has shown that it may actually cause asthma. A [study](#) in 2002 found that healthy children with prolonged exposure to smog developed new cases of asthma. Those that were most active out-of-doors were three times more likely to develop asthma than those that played indoors.

Asthma is expensive. According to the [Center for Disease Control](#), one in 20 Americans suffer from it, resulting in 1.5 million emergency room visits, 500,000 hospitalizations, and over 5,500 deaths annually. Moreover, asthma is increasing for all age, sex and racial groups.

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be addressed by trees. While not the total solution, they can be significant players.

Joe Wright, Mayor of Beech Grove, Indiana, sees trees as an essential component of the overall plan for his city:

*"Our trees... are a sustaining element of not only the greening and aesthetic value of our community, but our urban forestry program strongly relates to our three community goals. Trees enhance citizens' quality of life, increase citizens' personal wealth by serving as an economic development tool in showing the environmental health of our City to attract residents and new businesses, and finally, trees are effective in promoting community pride and ownership."*

Wright, whose city received the Municipality of the Year award from the Indiana Urban Forest Council, added, "A healthy, vibrant community has a healthy and vibrant urban forest."

A healthy urban forest includes trees of all ages and of diverse species. Ideally, it is maintained so as to allow the trees to live to their normal life span as much as possible. In that way, trees of all ages will be

Trees help. Trees clean the air by collecting particulate matter, and through shade and reduced temperatures they reduce smog formation.

### Large trees do more

Large, mature, healthy trees provide more benefit than newly planted trees. Newly planted trees are very important to ensure that the urban forest continues to thrive, and to ensure that when trees die or are removed there are others to take their place. However, a newly planted tree does not truly begin offering ecological services until it has been in the ground and established for 7 to 10 years.

Given that reality, there's a strong case for cities and towns to preserve and conserve large trees and woodland tracts. Cities that are going green most effectively either have tree preservation/conservation ordinances for public and private lands, or are looking at them.

Urban forestry consultants stress this concept as they work with developers and cities to protect trees during construction projects. "Taking sustainabil-

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## Core Question

How can urban forests contribute to community sustainability?

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### Working conclusions

- Mature trees clean the air and water, reducing air pollution and stormwater costs.
- Locate and plant trees where they will have the most impact on energy conservation, air and water quality, and attracting economic activity.
- Urban trees attract the retail, business, industrial and residential sectors. They provide a sense of community and sense of place that businesses consider when relocating or establishing.
- Engage all stakeholders in the current and future sustainability of a community in planning for the future of the urban forest. Create partnerships and make long range plans to ensure growth and protection of existing trees.
- Woodlot parcels clean more air and water than individual trees along the street and provide a greater economic contribution. Support legislation to conserve and protect wooded parcels for economic and ecological sustainability.
- 85% of the urban forest is on private property. Promote the value and importance of the urban forest and encourage private landowners to protect wooded parcels.
- Correctly select, plant and maintain trees to grow to maturity so they contribute maximum benefits.

### Community sustainability challenge

- Create and enforce tree conservation and protection ordinances for public and private property.
- Consider utilizing woodland management techniques for publicly owned parcels.
- Plant new trees and protect existing trees where they will make the most significant contribution environmentally and financially.



## Benefits of Trees

1. Trees help purify the air we breathe by absorbing pollutants.
2. Trees increase property values and improve the tax base in communities.
3. Trees improve neighborhood appeal, attracting businesses, shoppers and homeowners.
4. Trees cool our cities and towns by reducing heat generated by buildings and paved surfaces.
5. Tree shade, properly placed, can save an average household up to \$250 annually in energy costs.
6. Trees reduce the amount of pollutants in sewer systems, saving communities millions of dollars in water treatment costs.
7. Trees soften harsh building lines and large expanses of pavement, making urban environments much more pleasant.
8. Trees provide habitat for birds and other wildlife, maintaining a balance with nature even in urban areas.
9. Trees reduce the amount of waterborne pollutants that reach streams and rivers.
10. Trees reduce levels of domestic violence and foster safer, more sociable neighborhood environment.

—MiniFlier from USDA Forest Service

## Urban Forestry Program Coordinators

A systematic urban forestry program is necessary to gain full benefit from trees. Each US state and territory has an urban forestry program coordinator who offers technical assistance to cities and towns in these ways:

- Ordinance development and samples of ordinances
- Urban forestry management including tree inventory tools
- Selecting, planting and maintaining trees correctly
- Pest and disease controls
- Grants and funding guidance
- Help in becoming a Tree City USA

Urban forestry coordinators can be accessed via the [National Arbor Day Foundation](#).



ity seriously goes beyond planting more trees. It means proactively managing and maintaining them to maximize their useful lives and the benefits they provide over time. The greatest benefit-producing ability of trees comes during maturity, when their canopies are the largest," said Joe Gregory, Coordinator of Urban Forestry Services for Davey Resource Group.

It makes sense. The larger and healthier the tree, the more capacity it has to sequester carbon and collect and retain particulate matter from the air. Researchers have demonstrated that 100 healthy, mature trees remove 37 tons of carbon dioxide and 248 pounds of other pollutants annually.

Strategically planting new trees and caring for existing ones in highly polluted areas will, in the long term, reduce costs related to these issues.

## Trees save energy

Trees reduce our heating and cooling needs and thereby help prevent carbon dioxide from entering the atmosphere. They do this by:

- Shading, which reduces the amount of radiant energy absorbed and stored by built surfaces.
- Evapotranspiration, which converts liquid water in leaves to vapor, cooling the air.
- Reducing the velocity of wind, which slows the infiltration of outside air into inside spaces.

By using trees as a tool for energy conservation, municipalities can lower

heating and cooling bills, reduce energy consumption and atmospheric carbon dioxide. The US urban forest **sequesters** approximately 800 million tons of carbon.

## Trees clean the water

A raindrop hits the pavement, sidewalk, or other surface, and flows. It picks up air and ground level pollutants, metals, oil, gas, fine particles of trash. It gains momentum and joins with other raindrops, which have picked up their own pollutants. They tumble along into streams, creeks, rivers, lakes, and reservoirs—into the water supply.

Trees can help reduce stormwater runoff. Their leaves filter the rush of rain so that instead of pelting, compacting, and rolling off soil, it filters through slowly. The tree's twigs, bark, trunk and roots intercept the rain, with its pollutants, and filter them out before they reach the water supply.

Cities that preserve trees along stream, creek, river, lake, and reservoir corridors have cleaner water and lower storm water costs. In addition, it makes economic and environmental sense to design new storm water systems with less gray hardscape and with more trees and plants.

One hundred mature trees can catch about 139,000 gallons of rainwater per year. Water supplies are cleaner with trees in place to reduce soil erosion, reduce storm water runoff, and keep streams and waterways healthy by moderating their temperatures.



## More value from trees

While clean air and water are the primary benefits trees generate, by planting new and caring for existing trees, cities can go green by actually having the color green permeate their out of doors, and realize green dollar savings as well.

US Forest Service researchers along with help from Minneapolis, Minnesota Tree Trust urban forestry volunteers, and the MN Department of Natural Resources Urban Forestry program, have calculated the individual and collective value of trees. Using the free **i-Tree** software suite, they found that one yard tree in its 20th year after planting has benefits of \$96 with costs of \$36, making a net benefit of \$60; 100 trees have \$364,000 in benefits with \$92,000 in costs, with a 40-year net benefit of \$272,000. This is for residential trees with a 60% survival rate over 40 years.

Apply these numbers to Midwestern trees in parks and woodlots and the dollar and environmental benefits compound with interest. Urban trees properly cared for are valuable and growing **assets** worth three times their initial investment.

In addition, thanks to new technologies and research, trees continue to prove themselves as the ultimate multi-purpose green tool:

- Street trees 32 ft. tall can reduce stormwater runoff by 327 gallons.
- 74% of consumers prefer establishments with trees and spend 12% more on goods in tree-lined areas.
- Trees add to the sales appeal of commercial land.
- Buildings with trees and other plants have a higher occupancy rate.
- Developers maximize profits by retaining existing trees and/or replanting.
- Homes with trees increase property value by 6%.
- Property lots with trees increase in value by 5-20%.
- A California study showed that shading caused by trees increases pavement life by 40-60%.

New trees, properly placed, and existing trees, well-maintained, make pedestrians safer and reduce vehicle accidents. Trees **slow down traffic** and create safer walking environments. They do this by

forming and framing visual walls, providing distinct edges to sidewalks. These factors cause drivers to assess their speed and reduce it.

National leaders promote walking or riding bicycles to reduce our reliance on

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gasoline-powered vehicles, yet vehicular traffic produces 33% of the national total of ground level ozone and 49% of particulate matter. Air quality affects the health of walkers and bicyclists and poor air quality can be a deterrent to using these modes of transportation.

Walkers who have trees to shade them, block them from traffic, clean the air, and infiltrate storm water pollutants, are healthier, as we all are. Moreover, costs of maintaining services for energy consumption, air cleaning campaigns, stormwater costs, and an overall unhealthy environment are reduced.

## Benefits of the urban forest

**Center for Urban Forest Research**  
Current, science-based, easy-to-understand, ready-to-use urban forest research.

**Human Dimensions of Urban Forestry and Urban Greening**  
Research showing how trees positively influence behavior and community economics.

**Landscape and Human Health Laboratory**  
Vivid, free, downloadable factsheets connecting trees to human health and behavior (left column).

## Environmental practices

**American Forests-Urban Forests**  
Ecosystem services of the urban forest. Determine tree canopy coverage goals, learn how many trees will offset your carbon footprint and calculate the air quality for your community.

**Center for Watershed Protection**  
Trees are the new urban hydrology. Learn how they clean the water we drink.

**Urban Watershed Forestry**  
Resources and links. Three colorful, easy to use, downloadable tool box manuals on using trees to protect and restore urban watersheds.

## Establishing urban forestry programs

**American Society of Consulting Arborists**  
Consulting arborists advise in challenging urban forestry and arboriculture situations. Website helps locate the appropriate tree care professional.

**International Society of Arboriculture; Trees are Good**  
Consumer publications on trees' benefits, selection, planting and all arboriculture practices. Also contact information for Certified Arborists in specific locales.

**National Arbor Day Foundation; Tree City USA program**  
Tree City USA is a national recognition program for communities with urban forestry programs.

**Urban Natural Resources Institute**  
Webcasts and e-learning. Regular, free instructional webcasts on the latest urban forestry trends and technologies featuring USDA Forest Service researchers and a broad array of urban forestry experts.

## Interactive tools

Learn how much pollution your trees are removing: **American Forests Air Quality Calculator**.

Find out how many trees your community needs to plant to mitigate its carbon footprint: **AmericanForests.org**.

i-Tree is a free software suite from the USDA Forest Service, providing urban and community forestry analysis and benefits assessment tools.

## More information

Urban Street Trees, 22 Benefits

*Developing and Managing an Urban Forestry Program for Public Works;*  
*American Public Works Association, 2007*

## Preserve urban woodlots

Too often, woodlots and edges are bulldozed to make way for development or because they are in the way of a construction project. Communities might consider identifying key wooded parcels in the community and actively seek their protection and management. A public woodlot, instead of being sold and developed, could be managed as a forested parcel. This may result in periodic timber sales resulting in dollars to manage the urban forest, plant more trees and enhance wildlife, water, and air quality. Wooded parcels identified, inventoried and managed properly might participate in the carbon emissions exchange market for financial sustainability of that forest.

## Reducing stress, violence, ADHD

Finally, trees contribute to the psychological and social health of a community. Research has proven that workers who can view trees along their driving route experience less stress, and workers who have a view of trees while at work report less absenteeism. Research from Drs. Kuo and Sullivan, University of Illinois at Urbana-Champaign, has shown that inner city

**violence can be reduced** with trees and tree plantings, that domestic violence is reduced, and that being outside with trees lessens the issues associated with Attention-Deficit/Hyperactivity Disorder.

## Trees are key

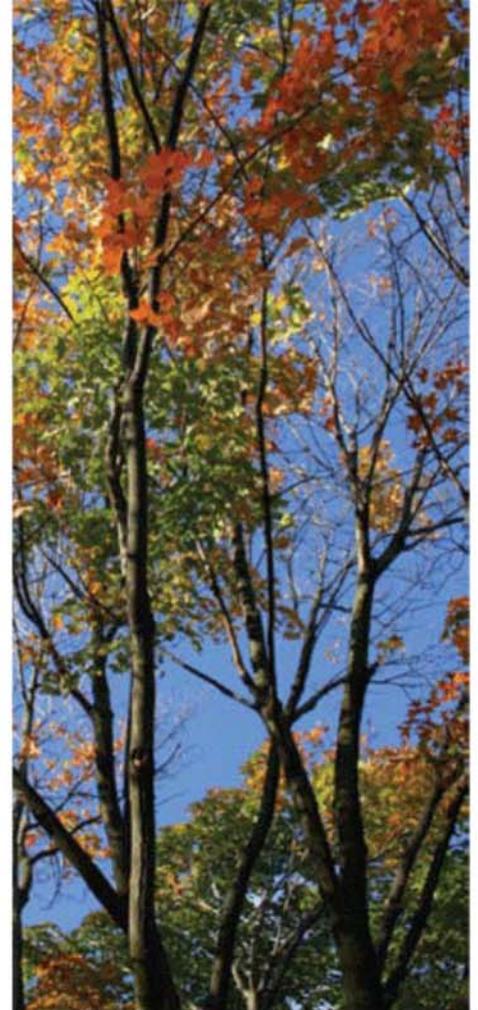
A strong urban forestry program and making trees an integral part of planning for any city project are essential if trees are to contribute as much as they can to economic sustainability and to a community truly becoming green.

The urban forest is a fundamental part of the infrastructure, and is key to a healthy, vibrant, economically sound community that current and future residents, retail, corporate entities, and industry will be proud to call home. ❖



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