MANAGING NASHVILLE'S URBAN FOREST

A proposal from

metro tree advisory committee

June 2008

Achieving the valuable benefits of trees requires a long-term commitment to a healthy tree canopy on the part of city government and residents. Restoring and protecting our tree canopy requires caring for street trees, trees in parks, on school grounds, and in other public places.

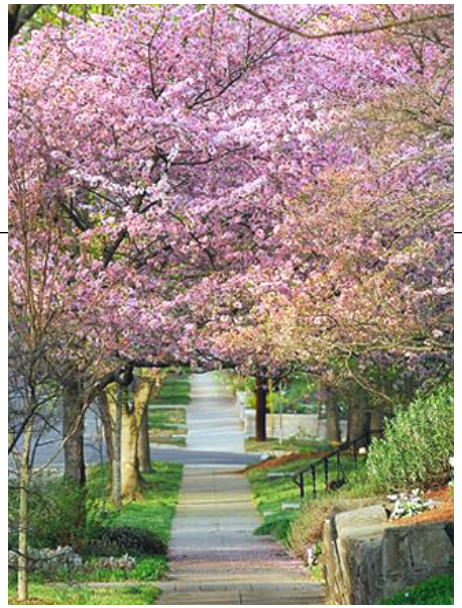
While a thriving urban forest delivers significant environmental and aesthetic enhancements to a city, many of the myriad benefits of trees are chiefly economic:

lowering energy costs,
providing health benefits,
reducing stormwater run-off,
increasing property values, and
boosting retail sales,

to name a few.

This return on investment translates preserving and enhancing the urban forest into good financial common sense.

Yet currently, most of the trees along the streets and public right-of-ways in Metropolitan Nashville Davidson County are unmanaged. That is, no department (with a few exceptions) has responsibility for planting or maintaining trees downtown or in any public spaces.



The Metro Tree Advisory Committee *- established by the Tree Ordinance to advise the public and Metro government* - has surveyed cities comparable to Nashville in size that have successful Tree Management programs and documented their best practices, using them as the basis for recommendations for designing a Tree Management for Metro Nashville. A successful Tree Management program will entail creating an Urban Forester position in the Department of Public Works, conducting surveys of existing public trees in Nashville, and developing a Master Plan for long-term sustainability. The scope of the program will focus on downtown trees (roughly, inside the Interstate loop) as a manageable first step, expanding into the rest of Davidson County as a long-term goal.

THE NEED

Davidson County's trees contribute to our lifestyle and local economy in a big way. An analysis by American Forests puts the value of Davidson County's trees at $3.8 billion per year in benefits and services. A resource as valuable as this demands our attention and protection!

Below are a few of the ways trees pay big financial dividends:

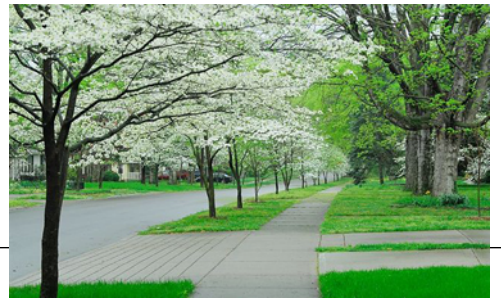
- Lower energy costs for office buildings, retail stores and homes -- increasingly important as the costs of heating and cooling continue to rise.
- Remove pollutants from the air and release fresh oxygen into the air. Better air quality reduces employee sick-days, lowers healthcare costs, and attracks new business and residents to Nashville.
- Reduce the amount of polluted stormwater runoff that reaches waterways, a huge and costly issue for Metro Nashville and comparable cities.
- Increase property values and retail sales, which feed two important tax bases for Nashville.
- Reduce noise and stress and improve mental health -- contributors to greater workforce productivity and quality of life.
- Contribute to community identity and pride, factors that contribute to Metro Nashville's position as a desirable place for businesses and residents to relocate.

(See Appendix A for more specific dollar- and resource-savings of trees.)

STORMWATER SAVINGS

A healthy tree canopy can help solve the current problem facing Metro concerning stormwater separation and treatment by tremendously reducing stormwater runoff, saving Nashville millions of dollars in infrastructure costs. Trees reduce runoff and improve water quality through interception, evapotranspiration, storage, and soil infiltration and stabilization.

- **One tree reduces 4000 gallons of storm water runoff annually.**
- **400 trees will capture 140,000 gallons of rainwater annually.**
- **That is, 4 million trees would save $14 million in annual stormwater runoff costs.**



WHERE WE NEED TO GO IN THREE TO SEVEN YEARS

1. Support strong tree policies.
Nashville needs comprehensive, detailed policies to guide the protection, maintenance, and restoration of trees and native woodlands throughout the county. A strong tree management policy embraces state-of-the-art environmental and "green development" standards, and coordinates tree-related activities among all Metro agencies and organizations.

Action Steps

♦ Implement the plan proposed by the Department of Public Works to create and fill *full-time urban forester* position. (See Appendix B.)

♦ Under the guidance of the urban forester, develop and *adopt an urban forest management plan* to coordinate urban tree and forest management activities on public lands managed by the Metro Nashville. The plan outlines comprehensive management strategies to maximize the ecological services a healthy urban forest can provide: stormwater control, air quality improvements, shading and heat island impacts, and economic, health, and social benefits.

♦ *Develop street tree standards*. Implement standards for tree box design, species selection, planting, pruning, removal, and tree protection during construction and utility work. Include provisions to add more tree spaces where possible and appropriate, and to increase the size of tree boxes to improve tree health and longevity. Tap into local and national expertise in developing the standards, and make provision for periodic updates to the standards.

♦ *Expand the Metro Tree Ordinance*. A strong Tree Ordinance is essential to protect and preserve large-canopy trees, which offer the most economic and lifestyle benefits. The current Metro Tree Ordinance, which protects trees on commercial developments only, must be expanded to promote tree preservation and planting on both public and private land, for commercial and residential areas.

2. Set and pursue urban tree canopy goals.
Assessing the current state is necessary to set realistic, attainable goals.

Action Steps

♦ *Assess the tree canopy* to set a baseline of information. This is necessary to determine the extent and condition of the existing tree canopy. At that point, communities, government agencies, businesses, neighborhood groups, non-profit organizations, and other interested parties can set specific tree canopy goals for each part of town.

♦ *Expand the tree database* and management system. Develop a Geographical Information System database to plan and manage tree planting and maintenance, and to track changes in city trees over time. Create partnerships between Metro agencies, utility companies, and non-profit organizations to develop a "live" database and management system for all Metro trees using GIS mapping. Include trees on Metro land, as well as along city streets.

3. Secure permanent funding.
Tree management costs must be considered capital expenditures to give the program secure long-term financing.

Action Steps

♦ *Establish line-item budget* amounts for tree management and care for all Metro agencies that manage or own land, including Dept. of Public Works, Dept. of Parks and Recreation, Metro Development and Housing Agency, and Metro Public Schools.

♦ *Establish dedicated, permanent funding* for tree management. When fully implemented, all tree management and care expenses will be covered by the urban forester's budget.

4. Plant, maintain, and restore trees.
As development proceeds at a rapid pace, attention must be paid to the health and strength of existing trees, as well as newly planted ones.

Action Steps

♦ *Protect natural areas*. Use tree-canopy assessments to identify, protect, and restore tree conservation areas. Merge this information into overlays with the Open Space plan for the Parks and Greenways Master Plan update.

♦ *Encourage development with trees in mind*. Direct commercial and residential developers first to redevelopment sites, rather than to areas with significant trees and forests. Require tree and green space planting and maintenance plans that are closely monitored both during and well past installation for all commercial, residential, and business development. Ensure strict enforcement of penalties for damage to city trees during all construction projects, even if the trees affected are small in size and number.

Summary of Tree Management programs in other cities

Metro Tree Advisory Committee contacted eight cities across the country and gathered information about their Tree Policies and Tree Management programs. The cities surveyed are:

- Asheville, N.C.
- Birmingham, Ala.
- Charlotte, N.C.
- Lexington, Ky.
- Louisville, Ky.
- Murfreesboro, Tenn.
- Reno, Nev.
- Seattle, Wash.

Metro Tree Advisory Committee gleaned the following information.

I. Organizational Structure

In most cases, the Department of Public Works has responsibility for city trees. Some cities have a single department with overall responsibility, while one city divides responsibility across six departments. One city has a whole department devoted exclusively to Tree Management.

Staff size varies from fewer than 20 to more than 260. Staff positions typically include an Urban Forester, an Arborist, an Inspector, and varying sizes of planting and maintenance crews.

II. Budget

City budgets generally cover supplies, labor and salaries as operating expenses, and tree purchases may be either capital expenditures or operating expense.

The size of annual budgets ranges from just under $250,000 to $10,400,000. The budgets are set as dedicated funding.

Two of the cities cooperate with corporate partners, non-profits, and property owners for fundraising and in-kind donations.

III. Urban Management Plan

All but one of the cities surveyed maintains a database of its tree inventory. About half of the cities set and distribute specific goals for achieving tree canopy coverage. Nearly all have a Tree Ordinance, one of them in effect for 25 years with updated overlays.

Six of the cities adhere to Street Tree Standards, with one city describing its standards as "Extensive." Only one city participates in masterplanning, and does so with an Overlay Zone but no planting details.

The area covered by each city's tree plan ranges in population from 54,000 to 550,000.

1. Air Quality

- Trees reduce carbon, ozone, particulate matter, sulfur dioxide, nitrogen dioxide, and carbon monoxide.

One acre of trees produces enough oxygen for 18 people to breathe each day, and eliminates as much carbon dioxide from the air as is produced from driving a car 26,000 miles.

- Tree leaves trap and remove tiny particles of soot and dust which otherwise damage human lungs.
- Trees reduce pollution by absorbing gaseous pollutants through leaf stomata, binding or dissolving water soluble pollutants onto moist leaf surfaces, intercepting and storing larger particulates on outer leaf surfaces, capturing and storing particulates on uneven branch and bark surfaces, and sequestering CO2 aboveground in woody tissue and below-ground in the roots.
- In one urban park, tree cover removed daily 48 pounds of particulates, nine pounds of nitrogen dioxide, six pounds of sulfur dioxide, and two pounds of carbon monoxide (valued at $136 per day value, based upon using pollution control technology) and 100 pounds of carbon.
- Forty trees remove 75 to 80 pounds of air pollutants annually.
- One 12-inch-diameter sugar maple along a roadway removes in one growing season 60mg cadmium, 140 mg chromium, 820 mg nickel, and 5200 mg lead from the environment.
- Trees can achieve up to a 60% reduction in street level particulates.
- Four million trees would save $20 million in annual air pollution cleanup.
- Trees cool ambient temperatures in cities, reducing emissions from generating power. Reductions in energy use resulting from shade trees can save up to 2.4 tons of CO2 emissions per year. Shade trees reduce air conditioning demands and heat gain by 40% to 80%, depending upon their placement and density.
- Urban trees sequester 22.8 million tons of carbon per year - a service worth $3.8 billion annually.
- Increasing tree cover by 10% in New York City would meet over a third of the city's federal air quality compliance needs for ground level ozone.
- The estimated 1.92 million trees in Washington, D.C., store 523,000 tons of carbon and remove 540 tons of air pollutants annually, a service valued at $2.5 million, and save the city and residents $2.6 million a year in energy costs.
- Two healthy 32-foot-tall trees provide oxygen for one person for one year.
- Cooler temperatures (shade and evapo-transpiration) reduce smog levels up to 6%.
- Mature trees absorb 120 to 240 pounds of small pollutant particles that otherwise would enter the lungs.
- Over a 50-year lifetime, a tree provides $62,000 worth of air pollution control.
- 100 trees remove five tons of CO2 per year and about 1000 pounds of pollutants per year, including 400 pounds of ozone and 300 pounds of particulates.
- In Brooklyn, one acre of trees would produce enough oxygen for 14 people.
- Shaded parking spaces reduce vehicle emissions from parked cars in hot weather.

A total of 300 trees can counterbalance the amount of pollution one person produces in a lifetime.

2. Economic Benefits

- A community whose streets and public areas are lined with trees and greenspace is more attractive and more welcoming to tourists, new residents, and businesses seeking to relocate. Existing residents are more likely to reinvest in an attractive home town.
- Apartment, office, and retail developments landscaped with trees enjoy higher occupancy rates and longer lease periods.
- Businesses that relocate offices in wooded developments report that employees are more productive than before, and absenteeism is reduced.
- Houses on lots abundant with trees (especially mature trees) sell for an average 1% to 2% higher than comparable houses on lots with few or no trees.

Property values of homes with trees in the landscape are 5% to 20% higher than equivalent properties without trees, resulting in higher property tax revenue for the community.

- Trees add about $10.4 million to the economy annually, when you combine the value of increases in sales price and property tax revenues.
- Shoppers are more likely to patronize a shopping area well landscaped with trees versus one without trees.
- Business patrons will remain longer, be more willing to pay for parking, and spend more for comparable merchandise and services purchased in a commercial area with trees. Trees in commercial parking lots induce shoppers to spend 11% more for goods and services.
- Well-placed trees that shade buildings and air conditioning units save business owners and homeowners in energy costs, resulting in lower overhead for the business and more expendable income for homeowners.
- Trees planted along major streets have a "traffic calming" effect, resulting in slower moving traffic with fewer accidents and less property damage.
- Bioretention areas filled with trees utilize "green engineering" to delay or eliminate the need to build costly underground stormwater containment facilities.
- Trees are the only part of municipal infrastructure that appreciate in value each year, while roads, water mains, street lights and everything else depreciate in value.

3. Health benefits

- Shade trees allow exercising and other outdoor activities on days when it's too hot to be out in the sun.
- Hospital patients with a view of trees out their windows recover faster and with fewer complications than those without the tree view.
- Children with Attention-Deficit/Hyperactivity Disorder do better in activities like reading or playing sports when performed outdoors among trees than in other settings.
- Trees filter asthma-causing pollutants from the air.
- The canopy of urban trees eliminates exposure to 40% to 60% of harmful UV-B rays, compared to direct sunlight.
- Trees on playgrounds and other outdoor play areas protect children from the sun's harmful rays -- an important health factor, since the American Academy of Dermatology estimates that we get 80% of our sun exposure in the first 18 years of life.
- Trees reduce noise pollution by acting as a buffer and absorbing on average 50% of urban noise, the U.S. Department of Energy reports.

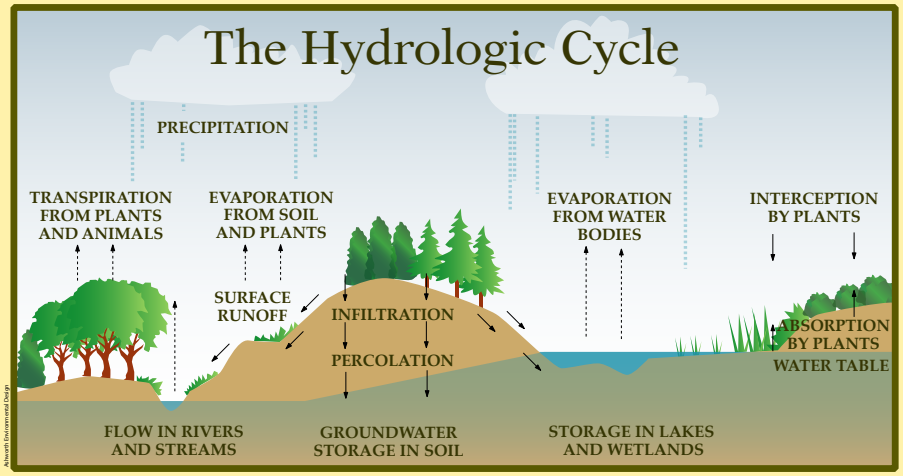
Trees relieve stress, creating significant drops in blood pressure and muscle tension in as little as five minutes.

4. Water Quality Benefits

- Trees along the banks of rivers and streams trap 50% to 100% of run-off sediment so that the attached nutrients can settle and be absorbed by plants.
- Trees keep run-off silt from destroying fish eggs and other aquatic wildlife and making rivers and streams shallower, which causes more frequent and more severe flooding.

Trees can capture 80% to 85% of the phosphorous, nitrogen, and other elements in run-off water.

- One tree reduces 4,000 gallons of storm water runoff annually. Four hundred trees capture 140,000 gallons of rainwater annually.
- Trees prevent erosion and inhibit flooding by slowing the velocity of run-off water, thus allowing the water to infiltrate the soil and replenish the groundwater supply.
- Trees trap airborne pollutants and particulates, preventing them from entering bodies of water.
- Four trees would save $14 million in annual storm water run-off costs.
- The Environmental Protection Agency now recognizes increasing tree canopy for slowing stormwater runoff, as a best management practice.



5. Crime reduction and social benefits

- Public buildings with high levels of greenery had 48% fewer property crimes and 56% fewer violent crimes.
- Residents who live near trees have significantly better relations with and stronger ties to their neighbors, compared to treeless neighborhoods.
- Trees have the potential to reduce social service budgets, decrease police calls for domestic violence, strengthen urban communities, and decrease the incidence of child abuse, a study in Chicago found.
- Fewer reports of physical violence come from homes that have trees outside, compared to barren conditions.
- Green spaces with trees bring people together outdoors, increasing surveillance and discouraging criminals.

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