



*Town of Carrboro  
Presents*

**URBAN TREES!**

# What are Urban Trees?



# What are Urban Trees?



# Green Infrastructure?



Green infrastructure uses vegetation, soils, and natural processes to manage water and create healthier urban environments. At the scale of a city or county, green infrastructure refers to the patchwork of natural areas that provides habitat, flood protection, cleaner air, and cleaner water. At the scale of a neighborhood or site, green infrastructure refers to stormwater management systems that mimic nature by soaking up and storing water.



# The Benefits of Urban Trees





United States  
Department of  
Agriculture

Forest Service

Northern  
Research Station

State and Private  
Forestry

General Technical  
Report NRS-62  
June 2010

# Sustaining America's Urban Trees and Forests

David J. Nowak, Susan M. Stein, Paula B. Randler, Eric J. Greenfield,  
Sara J. Comas, Mary A. Carr, and Ralph J. Alig



A Forests on the Edge Report



- **Local climate and energy use**—Trees influence thermal comfort, energy use, and air quality by providing shade, transpiring moisture, and reducing wind speeds. The establishment of 100 million mature trees around residences in the United States is said to save about \$2 billion annually in reduced energy costs (Allison et al. 1988, 1992; Donovan and Butry 2009).
- **Air quality**—Trees improve air quality by lowering air temperatures, altering emissions from building energy use and other sources, and removing air pollutants through their leaves. Urban trees in the conterminous United States remove some 784,000 tons of air pollution annually, with a value of \$3.8 billion (Nowak et al. 2006).



The shade of trees keeps people cool.

- **Climate change**—Urban trees can affect climate change by directly storing carbon within their tissues and by reducing carbon emissions from power plants through lowered building energy use. Urban trees in the conterminous United States currently store 770 million tons of carbon, valued at \$14.3 billion (Nowak and Crane 2002).
- **Water flow and quality**—Trees and soils improve water quality and reduce the need for costly storm water treatment (the removal of harmful substances washed off roads, parking lots, and roofs during rain/snow events), by intercepting and retaining or slowing the flow of precipitation reaching the ground. During an intense storm in Dayton, OH, for example, the tree canopy was estimated to reduce potential runoff by 7 percent (Sanders 1986).
- **Noise abatement**—Properly designed plantings of trees and shrubs can significantly reduce noise (Anderson et al. 1984). Wide plantings (around 100 ft) of tall dense trees combined with soft ground surfaces can reduce apparent loudness by 50 percent or more (6 to 10 decibels) (Cook 1978).
- **Wildlife and biodiversity**—Urban forests help create and enhance animal and plant habitats and can act as “reservoirs” for endangered species (Howenstine 1993). Urban forest wildlife offers enjoyment to city dwellers (Shaw et al. 1985) and can serve as indicators of local environmental health (VanDruff et al. 1995).
- **Soil quality**—Trees and other plants help remediate soils at landfills and other contaminated sites by absorbing, transforming, and containing a number of contaminants (Westphal and Isebrands 2001).



Trees provide homes for urban wildlife.

• **Local climate and energy use**—Trees influence thermal comfort, energy use, and air quality by providing shade, transpiring moisture, and reducing wind speeds. The establishment of 100 million mature trees around residences in the United States is said to save about \$2 billion annually in reduced energy costs (Akbari et al. 1988, 1992; Donovan and Butry 2009).

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• **Real estate and business**—Landscaping with trees—in yards, in parks and greenways, along streets, and in shopping centers—can increase property values and commercial benefits (Anderson and Cordell 1988; Corrill et al. 1978; Donovan and Butry 2008; Dwyer et al. 1992; Wolf 2003, 2004). One study found that on average, prices for goods purchased in Seattle were 11 percent higher in landscaped areas than in areas with no trees (Wolf 1998).

• **Individual well-being and public health**—The presence of urban trees and forests can make the urban environment a more aesthetic, pleasant, and emotionally satisfying place in which to live, work, and spend leisure time (Dwyer et al. 1991; Taylor et al. 2001a, 2001b; Ulrich 1984). Urban trees also provide numerous health benefits; for example, tree shade reduces ultraviolet radiation and its associated health problems (Heisler et al. 1995), and hospital patients with window views of trees have been shown to recover faster and with fewer complications than patients without such views (Ulrich 1984).

• **Community well-being**—Urban forests make important contributions to the economic vitality and character of a city, neighborhood, or subdivision. Furthermore, a stronger sense of community and empowerment to improve neighborhood conditions in inner cities has been attributed to involvement in urban forestry efforts (Kuo and Sullivan, 2001a, 2001b; Sommer et al. 1994a, 1994b; Westphal 1999, 2003).

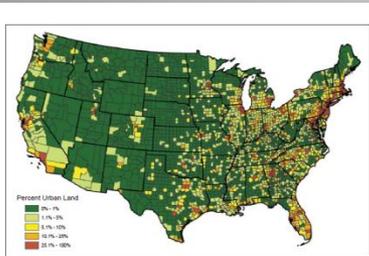


Figure 1—Percentage of the county classified as urban (2000).

**URBAN FOREST BENEFITS**

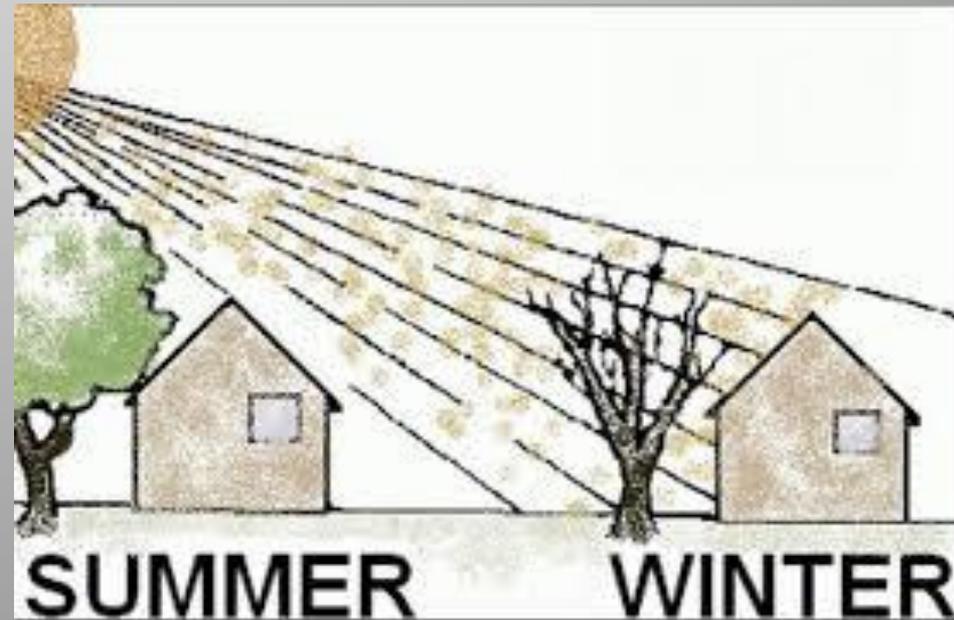
Urban forest benefits that close to 80 percent of the population of the conterminous United States lives in an urban area, urban benefits provided by urban forests reach about 2.5 billion. Nationally, urban forests in the United States are estimated to contain about 3.8 billion trees, with an estimated replacement asset value of \$2.4 billion (Nowak et al. 2002). This dollar value reflects only a portion of the total worth of an urban forest. Urban trees also provide immeasurable natural ecosystem services that affect both the local physical environment (such as air and water quality) and the social environment (such as individual and community well-being) that enhance urban quality of life (Nowak and Dwyer 2007). Urban forest services and benefits include, but are not limited to:



Trees are a valuable asset to the urban community.

<sup>1</sup> Discounted asset value is based, in part, on extrapolations of estimated replacement costs of trees of the same size, condition, species, and location.

# What can you do?



# What can you do?

www.isa-arbor.com/findanarborist/arboristsearch.aspx

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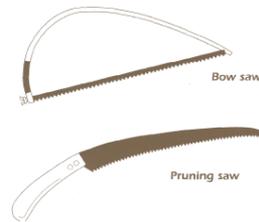
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# Proper Techniques



coarse teeth on the other; these can be difficult to use in densely branched plants.

Bow saws are good only where no obstruction exists for a foot or more above the area to be cut.

Chain saws come in a variety of sizes, both gas and electric. However chain saws are not appropriate for pruning live plant material except for large limbs. They are better suited to tree removal and cutting firewood.

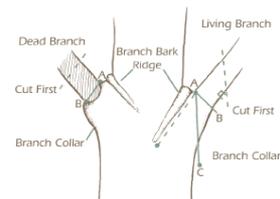
## GENERAL PRUNING TECHNIQUES

### Twigs and Small Branches

When pruning twigs and small branches, always cut back to a vigorous bud or an intersecting branch. When cutting back to a bud, choose a bud that is pointing in the direction you wish the new growth to take. Be sure not to leave a stub over the bud or cut too close to the bud. When cutting back to an intersecting (lateral) branch, choose a branch that forms an angle of no more than 45 degrees with the branch to be removed.

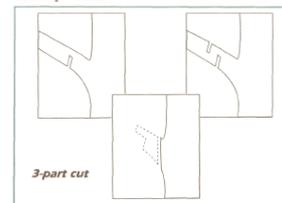
### Thick Heavy Branches

Large branches should be removed flush with the collar at the base of the branch, not flush with the trunk. The collar is an area of tissue that contains a chemically protective zone. In the natural decay of a dead branch, the decay advancing downward meets the internal protected zone (an area where very strong wood meets an area of very weak wood). The branch then falls away at this point, leaving a small zone of decayed wood within the collar. The



decay is stopped in the collar. This is the natural shedding process when all goes according to nature's plan. When the collar is removed, the protective zone is removed, causing a more serious trunk wound. Wood-decay fungi can then easily infect the trunk. Even if the pruned branch is living, removal of the collar at the base still causes injury to the tree.

For over half a century, the recommendations for pruning have been to flush-cut and paint. These outdated recommendations have no basis in scientific fact. The flush-cut increases the tree injury, which the paint hides. The paint is primarily cosmetic, a psychological treatment for the person doing the pruning, to show that he or she has done something to "help" the tree. In fact, paints or wound dressings may trap moisture and increase disease problems.



When cutting branches over 1 1/2 inches in diameter, use a 3-part cut. This is accomplished by first sawing the bottom of the branch, 6 to 12 inches out from the trunk and about one-third of the way through the branch. Next, make a second cut from the top, about 3 inches further out from

# What can you do?

The screenshot shows the Carrboro Public Works website. At the top, there is a navigation menu with categories: YOUR GOVERNMENT, OUR COMMUNITY, DOING BUSINESS, FOR VISITORS, and HOW DO I...?. A search bar is located to the right of the menu. Below the navigation is a large banner image showing workers in safety vests planting flowers in a garden. To the right of the banner is a yellow excavator. The main content area is divided into several sections:

- Public Works**: A central section with a heading "PUBLIC WORKS" and a sub-heading "RESIDENT INFORMATION". It contains a list of links for various services: Commercial Dumpster Service Agreement (PDF), Holiday Pickup Schedule (PDF), Local Construction Projects for 2014, Residential Rear Yard Sanitation Service Form (PDF), Residential Solid Waste Services Pickup Map, Roll-out Container Order Form (PDF), Solid Waste Brochure (PDF), and Yard Waste Order Form (PDF). There are three small images illustrating these services: workers planting flowers, a water fountain, and a worker with a trash bin.
- News Flash**: A section with a heading "NEWS FLASH" and three news items: "MLK JR. PARK CONCEPT DESIGN PRESENTATION", "TOWN HALL EARLY VOTING", and "RESIDENTIAL LOOSE LEAF COLLECTION BEGINS NOVEMBER 3". Each item has a "Read on..." link. Below the news items is a "VIEW ALL" link.
- Divisions**: A section with a heading "DIVISIONS" and two sub-sections: "SOLID WASTE MANAGEMENT DIVISION" and "STREETS DIVISION". The Solid Waste Management Division provides waste collection for single-family, multi-family, and commercial sectors, and provides bulk item and yard waste collection. The Streets Division provides general street maintenance services including street sweeping.
- Services Menu**: A vertical menu on the left side of the main content area listing various services: Bulky Items, Commercial Dumpster Service, Construction Projects, Curbside Recycling, Household Waste, Least Toxic Integrated Pest Management (IPM), Loose Leaf Collection, and Yard Waste. Each item has a "Read on..." link.
- Contact Us**: A section on the right side of the main content area with the heading "Contact Us" and the text "Public Works Department". It provides the address "100 Public Works Drive, Carrboro, NC 27510", phone number "Ph: 919-918-7425", and fax number "F: 919-908-7728".
- Community Engagement**: A green button at the bottom left of the main content area with the text "NOTIFY ME", "COMMUNITY ENGAGEMENT", and "REPORT A CONCERN".

The website footer includes a "Select Language" dropdown menu and a system tray showing the time "3:33 PM" and date "10/22/2014".

# Problems



# Problems



# Problems



# Problems



# Problems



# Problems



# Contractors



# Contractors



# Contractors



# Contractors



# Contractors



# Arborists



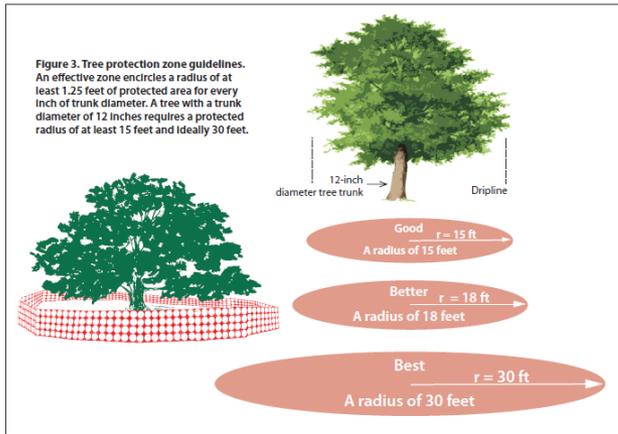
# Arborists



# Arborists



# Protection during Development



## Construction and Tree Protection

Protecting trees during construction can yield big rewards. Planning and prevention are the keys to success. Achieve the best results by taking action to prevent tree damage during site development and construction.



**Figure 1. Tree protection zone.** A protected zone preserves roots and soil and keeps branches clear of contact with construction equipment and materials.

### Before Construction

#### 1. Take stock of trees on the site.

Hire a professional arborist or urban forester to inventory existing trees. An inventory records the variety, location, size, and health of each tree. A proper tree inventory creates the foundation for a successful tree protection plan. A professional can identify valuable trees and those that need attention or removal.

Identify any stressed trees that need removal. Stressed, unhealthy trees have wilting leaves, dying limbs, thinning crowns or other signs of declining health. Always remove insect-, disease-, or storm-damaged trees prior to construction. This is fast, efficient, and saves resources.

**2. Draw a base map.** Include all the important site features such as existing vegetation, property lines, utility connections, slopes, and required setback distances before drawing in the proposed building(s):

- Map grading and drainage.
- Identify priority trees for protection. Mark their locations on the base map and sketch in approximate tree protec-

This publication describes some tree protection strategies that builders and developers can use before, during, and after construction to conserve healthy trees. Community actions to encourage tree protection and reduce the risk of injuring or losing valuable trees are highlighted.

Conserving the right trees can reap rewards for developers, homeowners, and communities. Healthy trees enhance property values and community development by providing shade, wildlife habitat, and beauty. Sickly, stressed trees reduce property values, discourage potential buyers and detract from a community. Post-construction maintenance and removal of trees is difficult and expensive. Replacing trees after construction can also be costly and time consuming.

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# Guidance and Info!

- <http://www.isa-arbor.com/home.aspx>
- <http://www.treesaregood.org/>
- <http://www.ncufc.org/>
- <http://www.townofcarrboro.org/123/Public-Works>
- <http://www.treebenefits.com/calculator/>



**Understanding This Tool:**

The Tree Benefit Calculator allows anyone to make a simple estimation of the benefits individual street-side trees provide. This tool is based on [i-Trees](#)'s street tree assessment tool called [STREETs](#). With inputs of location, species and tree size, users will get an understanding of the environmental and economic value trees provide on an annual basis.

The Tree Benefit Calculator is intended to be simple and accessible. As such, this tool should be considered a starting point for understanding trees' value in the community, rather than a scientific accounting of precise values. For more detailed information on urban and community forest assessments, visit the [i-Tree](#) website.

# National Tree Benefit Calculator Beta

*Thank you for choosing this site to calculate the economic and ecological benefits of your tree.*

**Find your climate zone to get started:**

Enter your zip code below:

**-OR-**  
Select a zone from the [map](#)



The National Tree Benefit Calculator was conceived and developed by Casey Trees and Davey Tree Expert Co.





# Pollarding

