urban forestry
Imagine walking down a tree-lined street or enjoying a meal at an outdoor cafe under the pleasant shade of a tree canopy. It is not difficult to envision how trees can enhance the downtown experience. Yet not all trees in the urban environment look as they were envisioned in planning stages. This is largely because urban trees' prescribed living conditions often do not respond to trees' biological needs. This chapter looks at street trees and their benefits, management, and needs in an ‘urban’ setting. Trees can be worthwhile expense for the present and a wise investment in the future of a place!

Introduction

Some Exemplary Urban Forestry Programs in Other States

Austin, TX - Parks and Recreation
www.austintexas.gov/department/urban-forestry-0

Chattanooga, TN - Public Works: Citywide Services
www.chattanooga.gov/Public_Works/70_Urban%20Forestry.htm

Eugene, OR
www.eugene-oregon.gov/portal/server.pt/gateway/PTARGS_0_2_144746_0_0_0_18/Forest-Plan.pdf

Milwaukee, WI - Public Works
city.milwaukee.gov/mpw/divisions/operations/environmental/forestry/

Mobile, AL - Urban Development Department
urban.cityofmobile.org/forestry.php

Portland, OR - Parks and Recreation
Urban Forestry
www.portlandonline.com/parks/index.cfm?c=381294

Savannah, GA - Park and Tree Program
www.savannahga.gov/cityweb/p&tweh.nsf

Seattle, WA
www.seattle.gov/environment/water.htm
What are the Benefits of Street Trees?

Trees offer a plethora of benefits. They provide environmental, economic, and social benefits, affecting both people and places. They can bring communities of people together; provide shade, beauty, and habitat for urban wildlife; reduce heating and cooling costs; intercept and store rainwater; improve air quality; and increase property values and local tax bases (www.plantsciences.ucdavis.edu/plantsciences/what_we_do/urban_forestry.htm). Some benefits can be measured, quantified, and given an associated economic value (energy saved, the water kept out of treatment plans, the benefits of cleaner air). Other benefits are less easily measured, but no less valuable.

The following benefits are highlights from Research Social Scientist Dr. Kathleen Wolf’s research at the University of Washington. Wolf specializes in the study of how place and physical environment influence human behavior. She has conducted many research projects that statistically quantify the economic value of the social benefits trees provide.

**Trees save energy by reducing heating and cooling needs and thus costs.** “A mature tree canopy reduces the air temperature by 5 to 10 degrees, influencing the internal temperatures of nearby buildings” (www.naturewithin.info/products.html - Fact Sheet 3).

**Trees clean the air and protect water systems.** A single mature, healthy tree can produce 260 pounds of oxygen, absorb 120 to 240 pounds of small particles and gases of air pollution, and reduce storm water runoff by 327 gallons in a single year (www.naturewithin.info/products.html - Fact Sheet 3). These benefits transfer into dollars saved. “The trees in the Portland metropolitan region save over $20 billion in storm water costs by eliminating the need for expensive treatment, as well as saving nearly $2 million annually in summer energy savings” (www.portlandonline.com/parks/index.cfm?a=184641&c=38306).

**Trees benefit a place by fostering positive moods, providing visual identity and unity, expressing a message of care** (www.naturewithin.info/products.html - Fact Sheet 2). “Our physical environment affects our behavior, often in ways that we are not aware of...Trees are a positive ‘atmospheric’ for business districts. They create a retail mood that appeals to shoppers and visitors. Trees greet shoppers with a message of welcome even before entering a merchant’s door.” (www.naturewithin.info/products.html - Fact Sheet 17). In fact, Wolf has found that 74% of the public prefer to patronize commercial establishments that are beautified with trees and landscaping (www.naturewithin.info/products.html - Fact Sheet 3). These consumers enjoy having trees in their shopping districts and are even willing to spend more in areas where trees are present (www.naturewithin.info/products.html - Fact Sheet 16).

**Trees also affect commercial land value and occupancy rates.** “Weyerhauser surveyed real estate appraisers and 86% of them agreed that landscaping added to the dollar value of commercial real estate. 92% also agreed that landscaping enhances the sales appeal of commercial real estate” (www.naturewithin.info/products.html - Fact Sheet 3). Another study suggests that landscape amenities, such as trees, have the highest correlation with occupancy rates (www.naturewithin.info/products.html -Fact Sheet 3).

---

“Trees greet shoppers with a message of welcome even before entering a merchant’s door.”
- Kathy Wolf

**Research Organizations**

Human Dimensions of the Urban Forest and Urban Greening, University of Washington (Dr. Kathleen Wolf):
www.naturewithin.info/

Urban Ecosystems and Social Dynamics Program
www.fs.fed.us/psw/programs/uesd/uep

Landscape and Human Health Laboratory, University of Illinois at Urbana-Champaign (Dr. Francis Kuo)
lhhl.illinois.edu

Plants for People
www.plants-for-people.org

Urban Horticulture Center, Virginia Tech
www.hort.vt.edu/UHC/index.html
Why Have an Urban Forestry Program?

Street trees are an important component of an “urban forest”. The Pacific Southwest Research Station in California defines the urban forest as “the aggregate of all vegetation and green spaces within communities that provide benefits vital to enriching the quality of life” (www.fs.fed.us/psw/programs/uesd/). There are three components of a sustainable urban forest: vegetative, social, and managerial. The vegetative component of urban forestry includes tree selection, installation, and maintenance. The social component relates to how people in a geographic community interact with the urban forest. The managerial component applies to how the urban forest is managed by either the local government or the private estate owner. An urban forester manages all three components.

Many towns and cities across the state and nation have their own urban forestry programs and others have an urban forestry as a component of their Parks and Recreation or Public Works Department. These town or city urban forestry programs are often responsible for planting on public property, tree selection and maintenance, providing technical tree advice to citizens, responding to storm events, and, in some cases, are responsible for managing public green space such as parks and riparian areas. Urban forestry programs are essential to healthy urban forests because trees need management! Healthy and attractive trees don’t just happen in an urban environment.

Volunteer programs can augment urban forestry programs run by the local government or bridge the gap in the case of their absence. One such program in Virginia is the Tree Stewards program. “Tree Stewards are volunteers dedicated to improving the health of trees by providing educational programs, tree planting and tree care demonstrations, and tree maintenance assistance throughout their communities. Through classroom training and hands-on practice, Tree Stewards learn the basics of tree biology and physiology, tree identification, and planting and maintenance techniques” (treesvirginia.org/joomla/index.php?option=com_content&view=article&id=52&Itemid=68). The program provides assistance to local municipalities and their residents in maintaining healthy trees throughout the locality. All Tree Steward projects are tailored to meet the needs of their specific community. There are Tree Steward groups across the Commonwealth the Virginia. The Virginia Urban Forestry Council supports the Tree Steward program. This organization’s mission is “to enhance the quality of life through stewardship of our Commonwealth’s urban and community trees.” The council offers training opportunities throughout the year and throughout the state via workshops they host. They also have created a Tree Stewards Coordinator’s Notebook that contains information on how to initiate, manage, and sustain a program for Tree Steward Volunteers. The notebook includes the Tree Steward Training Manual used in classroom training and hands-on practice. Both can be ordered through the Virginia Urban Forest Council.

Some Exemplary Urban Forestry Programs in Virginia

Alexandria
alexandriava.gov/uploadedFiles/recreation/info/UFMP%20Final.pdf

Arlington County
www.arlingtonva.us/departments/commissions/ParksRecreationCommissions/ParksRecreationScriptsCommissionsUrbanForestryCommission.aspx

Falls Church
http://www.fallschurchva.gov/content/government/departments/publicworks/urban-forestry/default.aspx

Herndon

Norfolk
http://www.norfolk.gov/rpos/parksUrban.asp

Roanoke, VA
www.roanokeva.gov/852568AB0062AF37/CurrentBaseLink/N27TANFJ289LGNEN

Virginia Beach

Some Helpful Links:

Crime Prevention through Environmental Design
www.cpted.com

International Society of Arboriculture
isa-arbor.com

Urban and Community Forestry Program

Virginia Urban Forest Council
www.treesvirginia.org/
Understanding the Costs of Street Trees

Street trees are clearly a worthwhile addition to any commercial area. Once planted, they have a tremendous number of benefits but they also have associated, perceived, and potential costs.

Maintenance is an associated cost. A desirable tree deserves proper maintenance. Trees are living organisms that require some degree of attention throughout the entirety of their lifespan. When considering adding street trees to your downtown, be sure to consider how you will maintain them as well, which includes proper watering and pruning.

Street trees also bring with them some perceived and potential costs. Some of the most common perceived costs are: reduced visibility, engineering impacts, loss of functional space, tree debris, and security issues (www.naturewithin.info/products.html - Fact Sheet 2). Proper planning and tree selection can alleviate or eliminate most if not all of these "costs". For example, many cities are selecting small street trees due to sign visibility and maintenance issues. Yet “the mature canopy of small trees directly screens shop windows and signs. Larger trees can have the canopy raised as they grow, to enhance visibility and are more preferred by the people whose purchases support merchants” (www.naturewithin.info/products.html - Fact Sheet 16). Larger trees also offer far greater environmental benefits as mentioned earlier.

The presence of properly placed and managed vegetation, including street trees, can help reduce crime. Crime prevention through environmental design (CPTED) strategies “rely upon the ability to influence offender decisions that precede criminal acts” (en.wikipedia.org/wiki/Crime_prevention_through_environmental_design). Street trees can respond to and assist with CPTED principles by maximizing visibility (for example, keeping vegetative heights above 8 feet), fostering positive social interaction among legitimate users of private and public space, increasing the definition of a space, and communicating propriety care and concern by property owners.

Tree roots can potentially cause infrastructure damage. Tree roots will exploit the path of least resistance in search of nutrients they need. A variety of techniques and products have been developed to address tree root/infrastructure issues, including crown pruning, root pruning, root barriers, and root trenches. Most of these techniques have a negative effect on a tree’s heath. Others may have little impact on root/infrastructure issue. Planting appropriate trees and giving them an adequate space to grow is the best way to address potential root/infrastructure issues. Similarly, purposefully creating paths of least resistance to a place you want the tree roots to grow can help avoid conflicts.

Know what you want your long term result to be when planting and plan wisely. Be sure to consult appropriate professionals such as urban foresters, urban horticulturists, and landscape architects early in the design process. Make design decisions based on a full understanding of desired design effect, amount of maintenance that can be performed, and capacity of the place to support the vegetation. Select appropriate species based on their hardness, size, shape, and interests and the place the will be sited to help reduce unnecessary maintenance and some potential safety issues.

Additional Resources

Arboriculture: Integrated Management of Landscape Trees, Shrubs, and Vines
by Richard Harris, James Clark, and Nelda Matheny

International Society of Arboriculture Municipal Specialist Certification
secure.isa-arbor.com/webstore/Municipal-Specialist-Certification-Study-Guide-P349.aspx

Planning the Urban Forest
www.planning.org/research/forestry/report.htm

Reducing Infrastructure Damage by Tree Roots: A Compendium of Strategies
by L.R. Costello and K.S. Jones

Society of Municipal Arborists Urban and Community Forestry Accreditation
www.urban-forestry.com/sma-accreditation

Tree Owner’s Manual
na.fs.fed.us/urban/treeownersmanual/

Urban Forestry Manual
www.urbanforestryouth.org/resources/collections/urban-forestry-manual
Questions to Ask Before Planting:

*Is there Room?*

The first question that should be asked and answered regarding street trees for a downtown street is: *Is there room to accommodate a healthy tree?* A common saying in the urban forestry profession is “Right tree, right place.” Before trying to select the right tree, first look at the place. Is the sidewalk wide enough to accommodate a street tree and pedestrians? While the minimum dimensions for tree pits will depend on species and budget (for example a structural soil mix under the sidewalk can increase available rooting space) as well as the scale of the street and downtown, a four foot width and a nine to fifteen foot length are minimum tree pit dimensions. Additionally, consider if there is adequate overhead clearance to support a tree canopy or will the tree become intertwined with overhead power lines?

Trees need space, soil, an adequate supply of oxygen to their roots, and moisture. “It is necessary for a tree to have access to sufficient rooting space in order to grow properly” (Urban, 1992). Providing adequate length and width for tree pits is essential, as the majority of most trees’ roots spread laterally and are found in the top 18 inches of soil. Soil quantity requirements are discussed in more detail on the following page.

Although the benefits of trees are numerous, it is better to have a great streetscape with no street trees than a streetscape with small, leafless twigs because the space provided for trees could not support their growth. Some strategies for maximizing soil volume include grouping trees together in a longer, continuous trench or introducing a structural soil to enhance a tree’s soil rooting volume beyond what is provided in a ‘standard’ tree pit. If your streetscape cannot accommodate street trees, look for opportunities to incorporate trees into your downtown in other places such as parking lots or adjacent open spaces. Or create a planting bumpout in place of a parallel parking space. You may come to find there might not be a “right tree” for your place. Adding hanging baskets or planters or window boxes are other ways to introduce vegetation into tight spaces downtown.

Preference surveys studying the shoppers’ perception of trees in small city business districts (cities with populations of 10-20,000) show that business districts that have large trees are most preferred by both small and large city residents - where trees are larger and define the space at the street level, providing a physical and visual separation from the street for the pedestrian. (www.naturewithin.info/products.html - Fact Sheet 16).
Questions to Ask Before Planting: How Much Soil is Needed?

If there is enough room to accommodate street trees, the next question to consider is what are the soil requirements of the species you would like to plant? In order for the visible part of the tree to be attractive, an equal or greater amount of attention needs to be given to a tree’s root system. Urban soils are often so poor that very few tree species could survive without soil modifications and amendments. “Current research suggests that many urban sites are so severe that no species will reliably work. Modification of the site soil and drainage capacity is often the only solution to successful grown of trees” (Urban, 1992).

A great first step in planning for great street trees is providing trees with enough usable soil volume - that is the amount of soil available for tree growth. Not all soil conditions are favorable for tree growth, especially in urban environments where soils are frequently heavily compacted and are a strange mix of soil layers and construction debris or other layers of construction history. Both soil quantity and quality are essential to the tree’s success. Also important to the tree’s vitality are adequate drainage and air supply to the root zone.

A frequently asked question is How much soil does a tree need? There are several methods for estimating soil requirements for trees, but a rule of thumb for soil estimates, presented on the Virginia Street Tree Selector website, is to provide 20-25 square feet of open ground with uncompacted soil for each inch of diameter breast height (trunk diameter at 4.5’ above the ground), calculated based on the tree’s diameter breast height at maturity. This much soil is rarely provided for urban trees.

A study conducted by the Virginia Tech Urban Forestry Department found that soil depth did not matter as much as available surface area. This is important to keep in mind with designing dimensions for tree pits - providing adequate surface area (length and width of the tree pit) is more critical than great depth.

To plant a $5 tree, start with a $10 hole.
- Unknown

Structural Soil Resources
CU Structural Soil
http://wwwhort.cornelledu/uhi/outreach/index.htm

Silva Cell
http://wwwdeeprootcom/products/silva-cell/applicationshtml

Tree-Utility Conflict Resources
Experts Agree - Don’t Top Your Tree
wwwmocommunitytreescom/treetoppinghtml

Municipal Tree Restoration Program
wwwdofvirginiaovesturbanmtrpindexhtm
If your downtown has space to accommodate trees and you are committed to giving the tree roots an adequate underground home, you are now ready to begin thinking about what types of trees are most appropriate for your downtown.

What size and shape of trees are appropriate for the space available? You can achieve a continuity of shape and size while avoiding a monoculture (see the Visual Similarity and Biological Diversity resource in the sidebar for ideas). Species diversity is extremely important, even within a street segment. Expanding foreign trade and environmental changes will increase problems with new invasive pests and diseases spreading beyond their normal ranges. To avoid consequences similar to the devastation caused by Dutch Elm Disease, a diversity of tree species should be selected and planted.

Additional questions to consider include: Are there potential conflicts with overhead wires, storefronts (awnings, entrances, windows), significant architecture that should not be blocked, undesirable features that should be screened? What characteristics do you want the tree to have: fall color, flowers, fruit? If the tree is deciduous, fruit bearing, or flowering, what is the potential impact when the leaves, fruit, or flowers drop? Do you have sufficient staff to clean it up? Consider planting trees native to your region and be sure to avoid planting invasive species.

How do your local merchants feel about street trees? Be sure to involve them in the tree selection process. Give them a chance to voice their concerns, desires, and priorities. This is also an opportunity to share with merchants and community members about the many benefits of street trees!

Once you have size, shape, and desired characteristics outlined, begin your search and create a list of possible tree species. The trees selected for consideration will need to be evaluated based on site specific soil conditions (test your soil for pH, texture, compaction, and permeability), climate, maintenance, and transplanting concerns. The checklist on the following pages is a good overview of questions to consider when choosing street trees. Included on the list are questions related to aesthetics and function. These questions can be used at any time in the selection process but should be revisited once a working list of potential species is created.

If an urban forester has not be involved in the process yet, be sure to have an urban forester familiar with your geographic region review your list of prospective street trees. If you do not have access to an urban forester, consider contacting the Virginia Department of Forestry’s Urban & Community Forestry Program Coordinators.
Tree Selection Checklist

This list was created by Virginia Tech Associate Research Professor Susan Day for forestry class FOR/HORT 3354. Work with your local urban forester or county forester if you are unsure of how to determine the answers to some of the questions below.

Soil Conditions
- Does the tree tolerate the soil drainage of the site?
- Does the tree tolerate the soil pH?
- If the soil is compacted (or will be in the future) can the tree withstand this?
- Is the tree susceptible to damage by deicing salt?
- Is there enough soil volume to support this type of tree?

Climate etc.
- Is the tree reliably cold hardy?
- Can the tree tolerate the heat at the site?
- Will the tree get enough water after it is established?
- Does the tree tolerate the site’s sun or shade patterns?

Maintenance and Transplanting Concerns
- Is the tree susceptible to any diseases or insects that will cause problems?
- Is the tree weedy or invasive? Are there nearby open areas that might be undesirably affected by the tree spreading?
- Will fruits, flowers, or leaves cause maintenance problems?
- Does the tree have thorns? (Important in areas with children, near walkways, or on plants requiring frequent pruning.)
- Is the tree’s eventual mature size appropriate for the space?
- Is the tree available at nurseries?
- Does the tree transplant readily?
Increasing the Diversity of Your Urban Forest

When selecting street tree species, you have an opportunity to increase species diversity in your urban forest. In addition to creating a rich palette of textures, colors, and seasonality, increasing species diversity also offers some long term protection as it relates to extent of impact from pests and disease. Avoiding a monoculture condition (high concentration of a single species) can help protect your urban forest and streetscape from total impact if a disease or blight specific to a species affects your area.

Aesthetics and Function

- Does the tree appropriately further your goals for species diversity in the community?
- Is the tree’s winter appearance appropriate? (evergreen, deciduous, attractive bark, etc.)
- Does the tree have attractive fall color?
- Does the tree have other especially ornamental characteristics? flowers? bark?
- Does the tree form accommodate nearby pedestrian and vehicular traffic?
- Does the tree fulfill its intended function (shading parking lot or street, screening, habitat/food for wildlife, etc.)?
- Is the tree’s form appropriate? (e.g., low or pendulous branches, columnar, wide spreading)

Additional tips:

Check drainage
Too many trees die from roots drowning in water. In a hole one foot wide and one foot deep, filled with water, a required drainage rate should be one to three inches/hour.

Water is crucial
Sufficient watering is essential, especially during the tree’s establishment period. Be sure you have a plan to provide consistent water during the first two years of establishment and possibility during the tree’s third year during the driest part of the summer.

Calling to check for underground utilities 48 hours in advance is mandatory.
Purchasing High-Quality Trees

Invest in good quality trees for your downtown. The International Society of Arboriculture (ISA) created a consumer tree care website - www.treesaregood.com - to provide the general public with quality arboriculture, or tree care, related information. This site provides very helpful information related to tree purchasing, planting, pruning, maintenance, and hazards/treatments. The following excerpt was taken from the ISA website.

“A high quality tree has:
  - enough roots to support healthy growth
  - a trunk free of mechanical wounds and wounds from incorrect pruning
  - a strong form with well-spaced, firmly attached branches.

A low-quality tree has
  - crushed or circling roots in a small root ball or small container
  - a trunk with wounds from mechanical impacts or incorrect pruning.
  - a weak form in which multiple stems squeeze against each other or branches squeeze against the trunk.
  - a large amount of soil above the root flare

Any of these problems alone or in combination with the others will greatly reduce the tree’s chances for a long, attractive, healthy, and productive life. When buying a tree, inspect it carefully to make certain it does not have problems with roots, injuries, or form. Remember the acronym RIF; it will help you remember Roots, Injuries, and Form.”

The best time to plant a tree is 20 years ago.
The second best time is now.
- Unknown

Tree Purchasing Tips

Trees Are Good
treesaregood.com

A Training Manual for Virginia Tree Stewards - Unit 7
Most urban trees live only 7 to 10 years, largely because of two common problems: insufficient maintenance budgets & inadequate planting spaces.
- Gary Moll

Investing for the Future - Proper Tree Maintenance

Communities should not only plan for the correct placement and conditions to support street trees; they also need to plan for the long term maintenance of their trees. A community should have only ISA Certified Arborists involved in contract work for maintenance and put this in their bid specs. If work is done in-house, the community should have an ISA certified arborist on staff. The International Society of Arboriculture (ISA) has developed a Tree Owner’s Manual that outlines several key maintenance items for helping trees establish and thrive. These include water, mulch, clean root collar, check for circling roots, check health, check safety, and prune.

Water - Water is what allows roots to grow. Sufficient water is critical during the establishment period, when trees are recovering from their transplant wounds and establishing their root system in a new environment. Frequency of watering depends on soil texture and drainage. Fast-draining soils should be checked several times a week for the first three years of a tree’s establishment. Slow draining soils can be checked once a week. Too much is water harmful for many trees and can in essence drown the roots. Be sure not to over water.

Mulch - Mulch helps with moisture retention and improves soil structure. When over applied, mulch (mulch volcanos) can encourage disease. Mulch should be 2-4 inches deep and should not come in contact with the tree’s trunk.

Clean root collar - It is very important that trees are planted at the correct depth. Many trees are planted too deeply. After the first year of planting, annually remove excess soil and mulch around the tree’s root collar (junction of trunk and root system).

Check for circling roots - Proper planting depth and cleaning the root collar will help reduce the likelihood of circling roots, which can girdle the tree. Periodically check (4-5 years) if a root is beginning to encircle the trunk. If one is identified, contact a certified arborist regarding appropriate action.

Check health - Check leaves, branches, crown and trunk each year signs of damage or disease.

Check safety - Inspect the crown, branches, trunk, and areas around the tree for broken, dead, or hanging branches as well as for cracks, holes, or fungi. All of these conditions, left unattended, could pose a hazard to public safety.

Prune - Pruning can be done for health, safety, and aesthetics. Be sure a certified arborist is contracted for pruning needs. Also, remember that topping your tree is not an effective pruning technique. Topping is harmful for the tree and increases its susceptibility to disease and its likelihood of causing damage due to structural failure.

For additional information and corresponding timeline for the maintenance items described above, visit: na.fs.fed.us/pubs/uf/tom/090202_tom_hr.pdf
Budgeting for Success

How much should be budgeted for your community’s street trees? Ideally, street trees should be a component of a larger municipal urban forestry program. Various organizations suggest $2 to $3 per capita as a minimum. The great tree cities spend more. Savannah, Georgia, with its 50+ percent cover, spent more than $10 per capita in FY2000.

In Chattanooga, TN, an average of $29/tree per year is spent for pruning, tree replacements, mulch, fertilizer/pesticide, irrigation system repair and maintenance, and starling harassment (Hyde, 2011).

Typical budget items for municipal urban forestry include:
- Professional Staff
- Tree Removals
- Tree Pruning
- Mulching
- Fertilization/Pesticides
- Irrigation
- Community Education
- Tree Ordinance Enforcement
- Tree Inventory
- Tree Planting

Tree Ordinances

A tree ordinance can regulate the “use, management, and conservation of trees” within a municipality, providing enforceable guidelines for new development and protection for important trees. Virginia Tech has developed a searchable database of tree ordinances in Virginia to “provide citizens, professionals, and elected officials with information they can use to craft tree ordinances for their communities” (VTODB).

Virginia Tree Ordinance Data Base (VTODB)
www.web2.cnre.vt.edu/vtod/

Community Tree Care Resources

Urban Forestry South Expo
www.urbanforetrysouth.org

The Southern Region of the USDA Forest Service has compiled a variety of resources that are useful when creating or updating a municipal tree care program. Highlights include sample tree ordinances, a training manual, news from around the South, and many useful links.

Tree Fact Sheets
hort.ifas.ufl.edu/database/trees/trees_scientific.shtml

Many community forests are not functioning to their capacity. Find out how to get the most out of yours through using this informative 10 chapter reference guide: Restoring the Urban Forest Ecosystem. This site also offers a tree selection guide for 680 species of urban trees.


Glossary of Terms and Common Practices

**Circling Roots** (also called *Stem Girdling Roots*) - roots that grow around the trunk in a circular manner rather than laterally away from it. If roots circle a tree, they can girdle it and cause its decline or death.

**Hardiness Zone** - a geographically defined area in which a specific category of plant life is capable of growing, as defined by climatic conditions, including its ability to withstand the minimum temperatures of the zone. (taken from en.wikipedia.org/wiki/Hardiness_zone). The United States Department of Agriculture (USDA)'s Plant Hardiness Zone Map is the standard reference.

**Invasive Species** - a species that is: 1) non-native (or alien) to the ecosystem under consideration and 2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health (taken from www.invasivespeciesinfo.gov/whatis.shtml). Invasive species often includes species that prolifically propagate themselves and overtake native habitats.

**Root Collar** - area at the base of the tree where the roots and stem merge; synonymous with root crown.

**Soil pH** - a measure of the acidity or basicity in soils (taken from en.wikipedia.org/wiki/Soil_pH).

**Soil Profile** - A soil profile is a cross section through the soil which reveals its horizons (layers) (taken from permaculture.wikia.com/wiki/Soil_profile).

**Species Diversity** - Used in this context to mean species richness, that is, the number of different species in a particular area (taken from cnx.org/content/m12174/latest/#speciesrich).

**Structural Soil** - a medium for growing plants consisting of a load-bearing component, such as crushed rock, and a native soil component. An alternative application with similar results is *Silva Cell*, a modular suspended pavement system that supports large tree growth and on-site stormwater management (http://www.deeproot.com/products/silva-cell/silva-cell-overview.html).

**Topping** - Pruning technique to reduce height of a tree by heading (cutting) off large branches. Detrimental to the health of the tree and considered poor practice.

**Tree City USA** - a national recognition program that provides a basis for a good community forestry program. Cities must meet four program criteria as follows:
- a tree ordinance
- a tree advisory board
- spend $2 per capita on their community tree care program
- hold an Arbor Day celebration and proclamation

Applications must be submitted annually to maintain Tree City USA status. For more information on the program go to arborday.org.

**Urban Forestry** - management of naturally occurring and planted trees in an urban area.

---

Certified Arborists

Why Hire An Arborist

Find a Tree Care Service
http://www.treesaregood.org/findtreeservices/FindTreeCareService.aspx

Mid-Atlantic Search for Certified Arborists
http://www.goodtreecare.com/search/index.cfm

All definitions were taken from Arboriculture (2004) unless otherwise noted.)
Citations

Text Citations:


Image Citations:
Page 49: Image by the Community Design Assistance Center
Page 50: Image courtesy of Dr. Eric Wiseman, Virginia Tech.
Page 54: Image by the Community Design Assistance Center
Page 58: Image courtesy of Dr. Eric Wiseman, Virginia Tech.