Placing a Value on Trees

TREE CITY USA® BULLETIN

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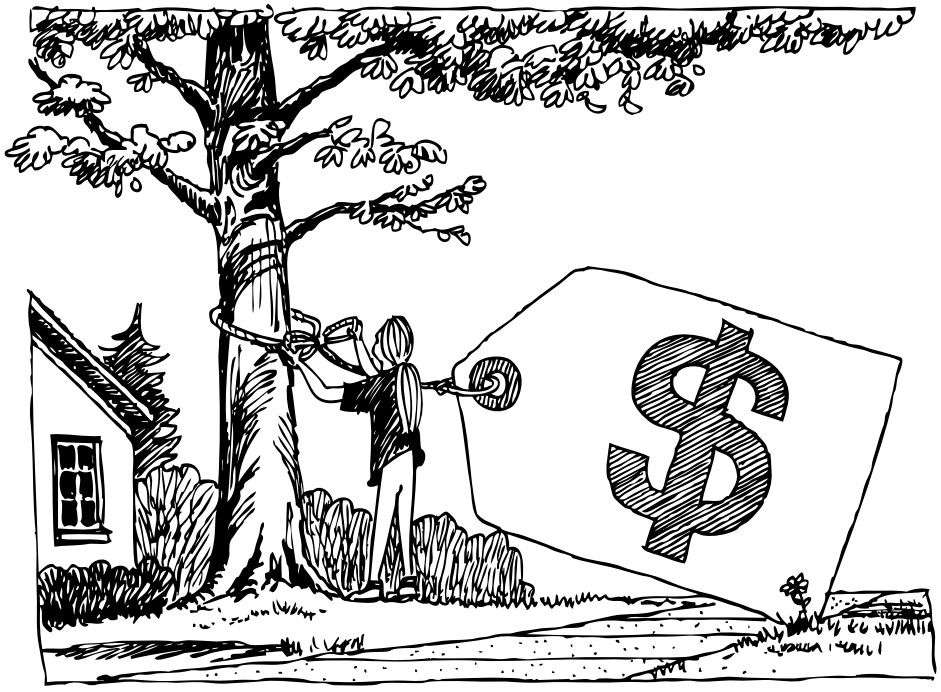
It is easy to think of reasons why trees in the community are important, but it is more difficult trying to assign a dollar value. This is because trees appeal to emotions as well as having a practical, or functional, side. Through a better understanding of the many ways trees are valued, urban and community forests can be managed more effectively and with greater sensitivity.

When a logger and a poet view the same tree, it is no surprise that they are unlikely to describe its value in the same way. Less expected is what happened not too long ago when two foresters were asked about the worth of a street tree. The story goes that a landowner had two large oaks in the way of highway construction. During negotiations about the value, a forester was called in who placed the figure at $300 per tree. This was based on the going price of firewood at $75 per cord. Seeking a second opinion, the landowner found another forester who used an appraisal formula and arrived at a value of $10,000 per tree! As is usually the case, the right tree in the right place had more value as a shade, or landscape, tree than for any products it might yield. A third side to this story is that the owner himself treasured the tree not in terms of dollars at all, but as part of a rich store of pleasant memories.



It is easy to place a value on trees that are grown solely for products. Foresters have done this for centuries. It is simply a matter of measuring wood volume (usually in terms of board feet of lumber or cords of pulpwood or fuelwood), and multiplying by the current market value. Similarly, trees in an orchard are valued based on the bushels of fruit they produce and the market price for that product.

The problems arise with non-commercial values. What is the value of a shady place for an afternoon barbecue? How much is the beauty of trees worth when you want to sell your house, or when a drunken driver destroys your flowering dogwood? How do you place a value on a tree that was planted by a departed parent, or that stood at the crossroads when Civil War soldiers marched past?

In the following pages, trees will be looked at in two ways. First is what trees mean to the heart. To foresters, developers, utility workers, and business professionals, this is an aspect often ignored during the math and science of college courses or in the hard-nosed world of work. Yet it can explain why controversies arise over trees and why all workers need to use special care in working around trees. It can also help in building forestry programs that people will support.

The second section explains how an attempt is made to place a dollar value on trees in a way that all parties consider fair.

Through the use of proper appraisal methods, it is often surprising to discover how much trees are worth in the landscape. This, in turn, is a powerful argument on behalf of protecting and providing care for street, park, and yard trees. It is also an important step toward putting community forestry on par with other public services.

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Trees and the Psyche

In 1882, the great landscape architect Fredrick Law Olmsted wrote that the "air purifying value" of trees and the "decorative motive" for planting trees should be considered secondary to the importance of trees as a restorative "solace and comfort" to the strained minds of city dwellers.

At the time, such a tribute to trees was the province of romantics, but a century later scientists are finding that there are, indeed, mysterious linkages between trees, the mind, and the body.

Here are some values of trees that go far beyond their usefulness in cleansing polluted air, beautifying our avenues, saving money on energy bills, and adding to the value of real estate.

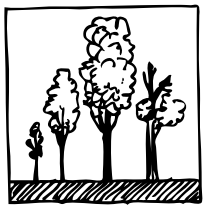
Stress Reduction and Health

Researcher Roger S. Ulrich has repeatedly measured a relationship between human health and viewing trees. In some cases it has been the relaxing effect of tree scenes on students under the stress of final exams. In others he found that urban scenes with vegetation resulted in slower heartbeats, lower blood pressure, and more relaxed brain wave patterns. He even found hospital patients recovering from surgery, with a view of trees through their windows, had fewer complications, required fewer pain relievers, and left the hospital sooner than similar patients with a view of a brick wall.

Many other studies that correlate trees with mental health benefits have been conducted by the Human-Environment Research Lab at the University of Illinois–Champaign.

The psychological relationships between people and trees are complex, but research is beginning to prove that they exist and are important.

Reflection on Change



Scientists at the U.S. Forest Service's experiment station in Chicago believe that a key element in the psychological tie with trees is the ability of trees to help us reflect positively on life's changes. Observing the dynamics of seasonal change, tree growth, and even tree death, have been mentioned repeatedly by survey participants in explaining why they find pleasure in visiting the Morton Arboretum.

Symbols of Human Character

Trees have deep symbolic meanings, including human traits that we are taught to admire. Trees are seen as representing such virtues as wisdom and steadfastness, even in the face of adversity. Their sheltering nature suggests parental care, and we even equate our heritage with the roots of a tree. We also apply human terms to trees, such as limbs, injuries, suffering, healing, tree doctors, and surgery. It is no wonder, then, that many citizens view trees as fragile and innocent, ever in danger and deserving of pity.

Symbols of Continuity

In recent years entire organizations have sprung up around interest in planting the offspring of famous trees. Whether they are from seeds that traveled to the moon or cuttings from a tree planted by George Washington, the trees represent a continuous, living link with the past. Similarly, we plant birthday trees and memorial trees. Mere mortals come and go, but trees are seen as the bridge between generations.

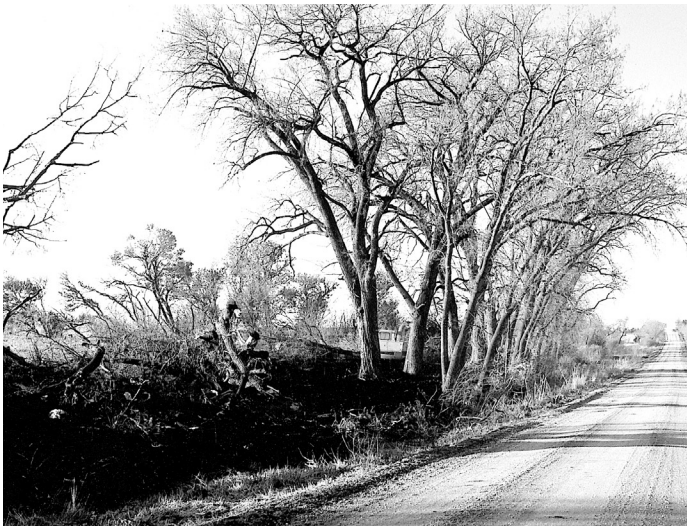
Symbols of Religion

Trees play a role in virtually all religions. Some hold certain trees sacred, others refer to trees to help teach tenets, and all, like the story of Buddha receiving enlightenment under the wisdom tree, contain stories associating important people with trees. Also, we often refer to forests, groves of trees, or even a street arched by tree canopies as cathedrals. In the presence of large trees, people frequently profess feelings of humility, awe, and reverence.

The Dark Side

Unfortunately, not all people feel a kinship with trees. Some actually view them with worry. Research by the U.S. Forest Service cites these reasons for the fear:

- Trees can hide criminals who may attack.
- People may get lost in thick woods.
- Trees harbor animals and insects that may invade the home or carry disease.
- Branches or entire trees may fall, causing damage, injury, or death.



When trees die, people are affected. The unnecessary clearing of roadside trees, such as these large cottonwoods in a soon-to-be Midwest suburb, evoked comments from residents such as, "I received my inspiration each day driving past that grove." Another said, "When the trees were gone, so were the songbirds and tree frogs I'd hear when jogging. A bit of my daily pleasure vanished with those trees."

The Real Cost of Vandalism

There are some who hate trees or express hate through what they do to trees. Reasons range from revenge and ignorance to attempts at thwarting the plans for a park or the expenditure of public funds on tree care.

The destruction of old trees tugs at human emotions. Whether for road construction, power line clearance, or through acts of vandalism, when trees die, people are affected. It may not even be the landowner involved, but others who simply pass by or associate the trees with some significant experience. One of the more poignant examples is told by Alabama resident Cathe Steele, who went to visit a giant live oak that had been girdled one night with a chain saw:

I thought the people there might think I was strange, crying over a tree like that. I could not fathom why or how anyone would do such a thing as this.

As I walked around the tree, there was a little girl standing at the base of it, looking at one of the huge limbs that arched down like a swing seat to almost touch the ground.

The girl was about 11 years old and was so quiet I didn't realize she was crying at first.

I put my hand on her shoulder and said maybe the tree would live, although not convinced of it myself. What this child said to me, I will never forget.

She began to tell me about her father. "He used to bring me here to sit in the tree," she said.

About a year ago, her father had died from cancer. She said she missed him and it was hard to understand why God took him.

Before he died, he brought her to the tree and told her that the tree was very old, that it had been here for hundreds of years. He told her he would no doubt die, but that this oak tree would always be here. He said that when he died, she could come here to sit in the limbs of this old oak and it would be like he was with her forever.

To this little girl, the probable death of this old oak was like losing her daddy twice.

I walked away and cried. It didn't matter anymore if anyone thought I was strange.

Assigning a Dollar Value

In recent years more and more attention has been given to the economic contributions of street and shade trees. These values — which are nearly always estimates based on the best available data — make a strong statement on behalf of planting more trees and taking good care of the ones we have. Here are some examples from the U.S. Forest Service:

100 million mature trees in U.S. cities (about 1.5 trees per single family home) can reduce annual energy use by 30 billion kWh, saving consumers $2 billion plus avoided investment in new power plants.

The amount of taxes contributed to community coffers throughout the U.S. due to the value added by privately owned trees on residential property is conservatively estimated at more than $1.5 billion per year. The contribution of street and nearby park trees to property values would probably double or triple this figure.

The tree canopy in an Ohio community reduces stormwater runoff and its associated flood damage and water treatment costs by 7 percent. With only a modest increase in tree cover, the potential reduction is 12 percent.

By planting 500,000 trees in Tucson, Arizona, it is projected that airborne particulates will be reduced by 6,500 tons per year. This converts to a "particulate matter control" value of $1.5 million per year, or $4.16 per tree per year.

Trees and Your Home

Tree values translate to dollars most visibly when looking at the costs of residential property. Numerous studies have shown that trees increase the value of property from 3.5 to 27 percent. Here are examples that help underscore the value of trees.

An analysis of 844 single family homes that sold in Athens, Georgia, revealed that houses with an average of five trees (regardless of species) in the front yard sold for 3.5 to 4.5 percent more than comparable houses without trees.

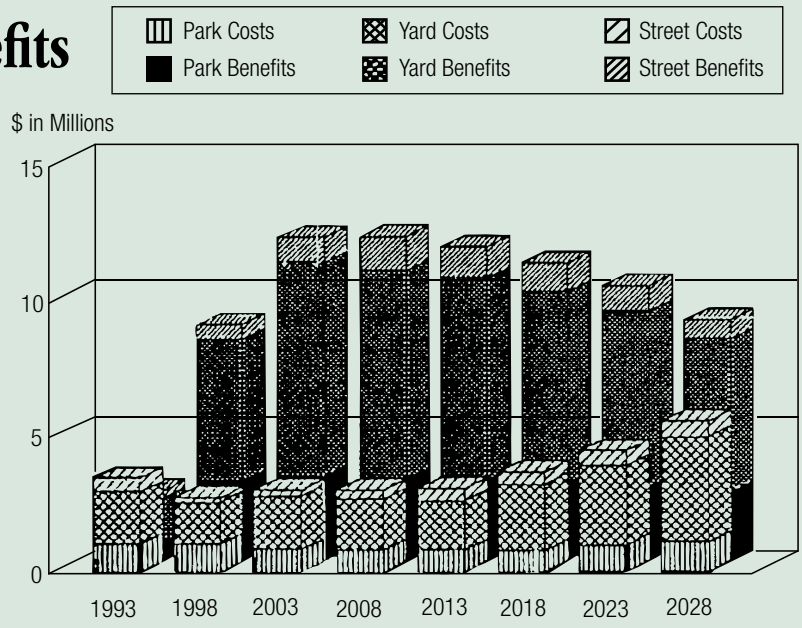
A developer in Columbia, South Carolina, found that bare house lots sold much faster after he transplanted 2- to 3-inch diameter pines to the lots. He more than paid for his efforts by increasing the selling price by more than $1,500 per acre.

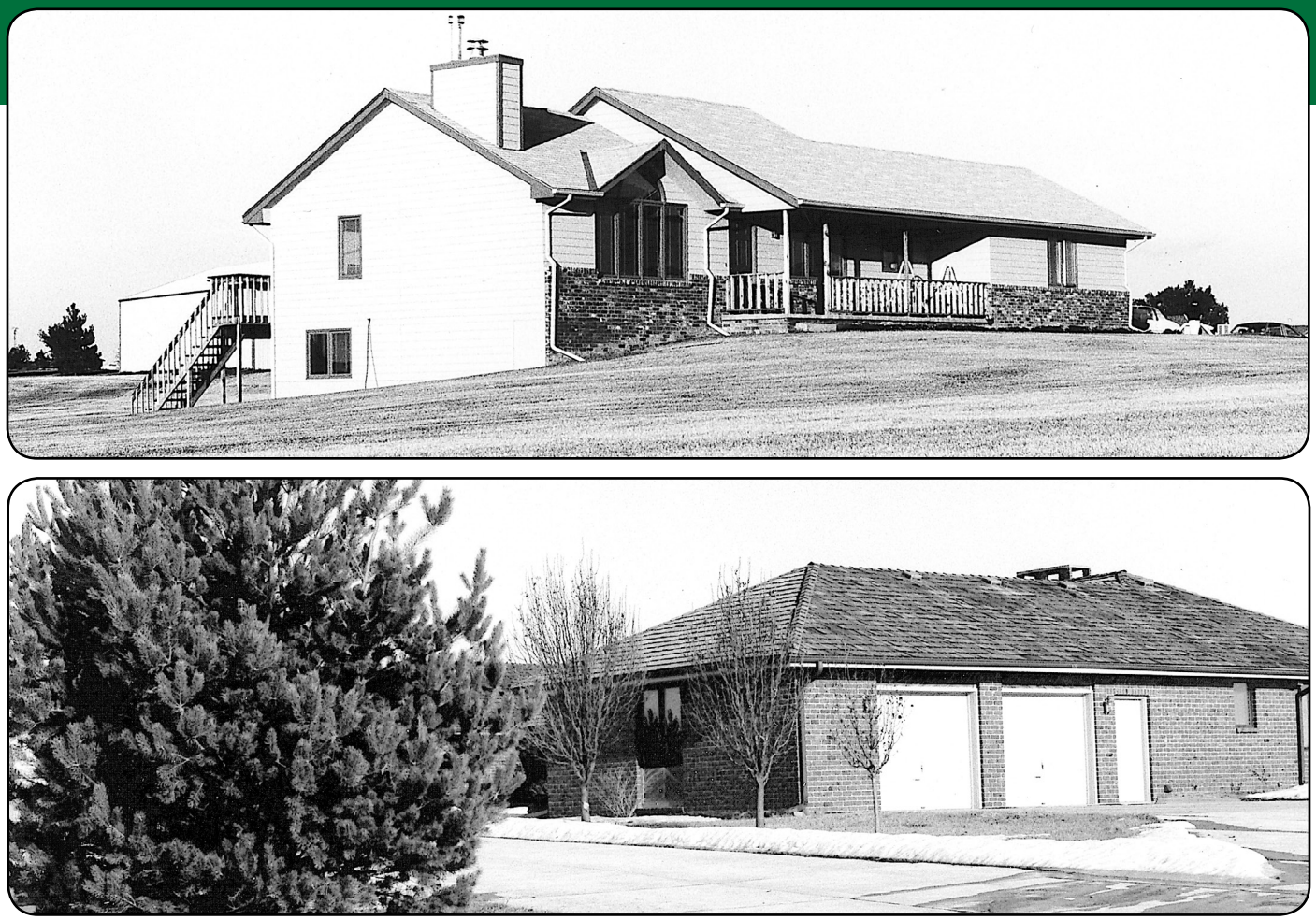
A researcher showed photos of house lots to both professional appraisers and recent homebuyers. By increasing the amount of tree cover in the photos, estimates of value rose 7 to 27 percent.

In a classic study of 14 variables that might influence the price of suburban houses in Manchester, Connecticut, and Greece, New York, trees ranked sixth in importance in influencing the selling price of homes. They increased sale prices 5 to 15 percent.

Annual Costs and Benefits

To help Trees for Tucson plan a 500,000-tree planting project, Dr. E. Gregory McPherson, formerly of the University of Arizona, constructed a computer model to weigh the project's costs and benefits. Using velvet mesquite, a popular native species, for the study, McPherson included planting, annual water costs, pruning, and removal as cost items. Benefits included such things as energy savings, dust control, and storm runoff management. As can be seen in the chart, only during the first five years did costs exceed benefits. Removals near the end of the trees' expected life spans account for the convergence of costs and benefits as the trees age. Overall, projected total benefits exceed costs by $236.5 million over a 40-year period.





Two houses built at approximately the same time, on two sides of the same street, show a marked difference in less than 10 years. By planting trees, the owners of the house above have an opportunity to increase the value of their property and significantly reduce their winter heating bills and summer air conditioning costs.

6 WAYS TO ECONOMICALLY USE TREES TO INCREASE YOUR PROPERTY VALUE

1. Protect existing trees during construction. See Bulletins No. 7 and No. 20.

2. Transplant trees from elsewhere on the property to the front lawn area or other spots where trees are fewer.

3. Plant seedlings on property now that is to be a building site in the future.

4. Strategically place a few large trees from a nursery to enhance aesthetics or increase energy efficiency. See Bulletin No. 21.

5. Encourage the planting of street trees in newly developed areas and proper pruning in older areas.

6. Prune off any dead or dying branches in yard trees.

Calculate Your Own Values

For a quick and easy way to estimate the economic contributions of a tree on your property, try the National Tree Benefit Calculator. A more sophisticated method is offered by the free softward program, i-Tree Design. Links to both may be found at arborday.org/bulletins.

How Much Is A Tree Worth

The Formula Method

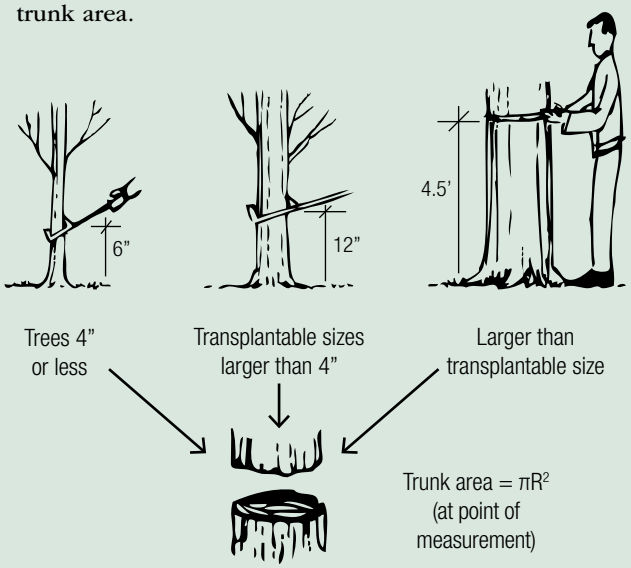
It sometimes is necessary to place a specific dollar value on a landscape tree. Typically, this helps settle legal claims for the damage or death of a tree, assists with insurance payments, contributes to real estate assessments, and proves loss for income tax purposes. Placing a dollar value on public trees can also be used to help justify city expenditures for tree care.

There are several ways to establish value, and a key point is to have it done by a professional. Only appraisals that reflect experience and good judgment will be able to stand up in court or before a claims examiner. To obtain the services of an appraiser, contact the American Society of Consulting Arborists referenced on page 8.

The most widely accepted formula method is one developed by the Council of Tree and Landscape Appraisers in its manual *Guide for Plant Appraisal*, published by the International Society of Arboriculture. This guide is regularly updated & available on the ISA's website at isa-arbor.com. Search the Store section for "appraisal." The following is not intended as a do-it-yourself guide, but it should serve to illustrate the components of landscape tree appraisal.

Factors Considered in Determining a Tree's Value

Size: Trunks are measured for diameter. The point of measurement depends on the size of the tree. Diameter is then converted to square inches of trunk area.



Location: Location value is the average of the ratings for these three factors.

Species: A rating is assigned to every species within a geographical region. The rating is expressed as a percent of "ideal" (5-100 percent) for that area and is based on the tree's suitability to climate and soils and generally how well it grows there. Aesthetics and functional attributes are also considered. State foresters can usually supply this list.

Condition: A tree in good health is assigned a higher condition rating than one plagued by disease, insects, or physical damage. The range is:

0 percent	dead or dying
5-49 percent	poor
50-69 percent	fair
70-89 percent	good
90-100 percent	excellent

Site: (10-100 percent) This is a highly subjective rating of the general surroundings, with emphasis on quality and design. A well-kept industrial park may be rated 90, whereas a run-down residential area could be 30. But trees in areas of intensive tree care, such as along a residential street, are usually rated higher than trees in industrial zones or those that occur naturally in woods along a roadside.

Contribution: (10-100 percent) The tree's functional attributes (shade, privacy, safety barrier) and aesthetic attributes (flowers, shape, purposeful place in landscape design, wildlife value, etc.) are in this judgment. Historic values can be considered here, but personal sentimental values are not taken into account in any formula method.

Placement: (10-100 percent) The tree's placement affects its function and aesthetic value. A specimen tree in the middle of the lawn would have more value than a single, beautiful tree within a grove. A tree that is large at maturity and has been planted under utility wires or too close to the house will result in a low placement value.

Appraisal Method #1: Replacement Cost

Trees up to 8 inches in diameter (4 inches in some localities and higher in others) are usually considered transplantable. Value can then be determined by obtaining price quotes from three local nurseries for the same or comparable species of the same size. Transportation and planting costs at the same site should be added.

This formula is then used:

$$\text{Value} = \text{Installed Cost} \times \text{Species Rating} \times \text{Condition} \times \frac{\text{Site} + \text{Contribution} + \text{Placement}}{3}$$

Note: Removal and cleanup cost may be added if appropriate.

Appraisal Method #2: Trunk Formula Method

Trees too large for practical replacement by transplanting are appraised by determining a basic value, then adjusting by condition and location ratings. A two-step process is followed in making the determination.

Step 1. Basic Tree Cost =

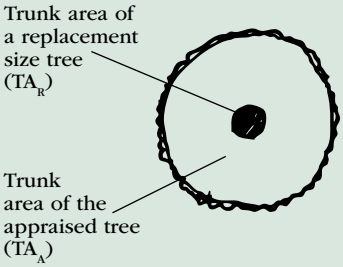
Replacement and installation cost of largest normally available tree locally

+

Unit tree cost (i.e., cost per square inch of trunk area of the replacement tree)

x

($TA_A - TA_R$) The difference between the trunk area of the appraised tree and a replacement tree



Step 2. $\text{Appraised Value} = \text{Basic Tree Cost} \times \text{Species Rating} \times \text{Condition Rating} \times \text{Location Rating}$

Note: Increases in trunk diameter on large trees dramatically affect trunk cross sectional area, and therefore basic value. In fact, it becomes unrealistic to say, for example, that a 31-inch tree would be worth $1,300 more than a 30-inch tree when most people could not even visually discern the difference. To account for this, adjusted trunk area values for trees more than 30 inches in diameter are presented in table form in the ninth edition of *Guide for Plant Appraisal* or they can be calculated using the formula: $ATA = -.335d^2 + 69.3d - 1087$.

Government officials in Monroe County, New York, were able to place tree loss at a staggering $97.1 million when a disastrous ice storm struck. Estimating tree values during street and park tree inventories can be useful when trees are subsequently damaged or destroyed.

The Bottom Line — An Example

Using the above Trunk Formula Method, a 15-inch diameter English oak was valued by the Council of Tree & Landscape Appraisers at $4,400. This was based on a $1,785 installed, replacement cost for a 4-inch balled and burlapped tree, and species and condition ratings of 75 percent and 80 percent, respectively. Site, contribution, and placement ratings for location were found to be 90, 80, and 70 percent, respectively.

Mirror, Mirror ... Which is the Most Important Value of Them All?

Is it a tree still living that was planted by George Washington? Or perhaps the one you climbed in as a youth, or that served as shade for the grave of a pet? Or the one that makes your house one of the most attractive on the block?

Of course the answer depends on your perspective. However, a good argument can be made that the most important value of any tree is the ecoservices it provides. These are "free" services we often take for granted such as taking carbon out of the air and replacing it with life-giving oxygen. Or sequestering carbon in its wood that would otherwise contribute to climate change. Or, less recognized, the ability to retain thousands of gallons of rain that would otherwise run off quickly after a storm and make it necessary for larger drain pipes or retaining ponds to prevent flooding. Trees also remove hundreds of pounds of particulate matter from the air and a variety of chemicals that are harmful to our health, and they shield tender skin from ultraviolet rays that can cause cancer later in life. And the list goes on.

Now there is a way to calculate how much the trees in your community contribute in the way of ecosystem services. Two of the important computer programs are known as i-Tree Streets (formerly STRATUM) and i-Tree Eco (formerly UFORE). i-Tree Streets is used to convert data from street tree inventories into the value of services provided by those trees. i-Tree Eco goes a step farther and calculates the value for all trees in a community. Both provide the results in dollars and, remember, it is money that talks. The results can be the basis for a convincing argument on behalf of planting trees and supporting urban forestry in your community. For more information, please visit itreetools.org.

Appraisal Assistance

American Society of Consulting Arborists
9707 Key West Ave., Suite 100
Rockville, MD 20850
301-947-0483

The ASCA is a good source of professionals who are experienced in doing amenity tree appraisals. To learn more about the Society or to search their national directory for a consulting arborist near you, visit their website at asca-consultants.org.

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