

BENEFITS OF TREES: FACT SHEET

TREES: THE CARE AND PROTECTION OF A VALUABLE UPSTATE RESOURCE
UPSTATE FOREVER · APRIL 26, 2005 · PALMETTO EXPO CENTER · GREENVILLE, SC

Property Values

1994 Bank America Mortgage - 1,350 real estate agents surveyed¹

- More than half thought that trees had a positive impact on potential buyers' impressions of both a home and neighborhood.
- 84% believed that a home with trees would be as much as 20 percent more salable in terms of property value and curb appeal than a similar, treeless home.

1993 National Association of Home Builders²

1,000 homeowners polled on how homebuilders can help the environment

- 89 percent advised them to leave them as many trees as possible
- 77 percent said builders should add more trees to development

"Recent" National Association of Home Builders Survey³

Found that people are willing to pay more for homes with trees

- 43 percent said up to \$3,000 more
- 30 percent said between \$3,000 and \$5,000 more
- 27 percent said greater than \$5,000 or more
- 8 percent spent an additional \$10,000

A six percent increase on home sale price (value) was found to be associated with the presence of trees; an increase of 3.5 to 4.5 percent was reported in another study.⁴

According to Northwest Builder Magazine, one mature tree can add approximately \$6,000 a year to a property's value.⁵

A 1976 study that evaluated the effects of several different variables on homes in Manchester, Connecticut, found that street trees added about \$2,686 or 6 percent to the sale price of a home.⁶

A more recent study indicated that trees added \$9,500, or more than 18 percent, to the average sale price of a residence in a suburb of Rochester, New York.⁷

¹ *Building Greener Neighborhoods*. American Forests and Home Builder Press of the National Association of Home Builders of the U.S., 2004

² *Ibid*

³ *Ibid*

⁴ *Urban Forest Values: Economic Benefit of Trees in Cities*. Seattle, WA: Center for Urban Horticulture, University of Washington, November 1998.

⁵ *Blending In Residential Landscape Architecture*. Northwestern Builders Magazine, May/June 2000.

⁶ *Benefits of Trees In Urban Areas*. <http://www.coloradotrees.org/benefits.htm>

⁷ *Ibid*

Environmental Benefits

Air Quality

A mature tree absorbs from 120 to 240 pounds of air pollutants (particulate matter and gases) every year. In Sacramento, California study, this equated to a value of \$28.7 million each year.⁸

One acre of trees produces enough oxygen for 18 people to breathe each day⁹ and eliminates as much carbon dioxide from the air as is produced from driving a car 26,000 miles.¹⁰

Trees in and around parking lots help mitigate air pollution by reducing temperatures by up to 30 degrees and greatly reducing the volatilization of gasoline from the tanks of parked cars.¹¹

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Trees reach their most productive stage of carbon storage at about 10 years.¹³

During a 50-year life span, one tree will generate \$30,000 in oxygen, recycle \$35,000 worth of water, and clean up \$60,000 worth of air pollution or \$125,000 total per tree without including any other values.¹⁴

A mature tree canopy reduces air temperatures by about 5 to 10 degrees Fahrenheit, influencing the internal temperature of nearby buildings.¹⁵

A typical person consumes about 386 lb of oxygen per year. A healthy tree, say a 32 ft tall ash tree, can produce about 260 lb of oxygen annually – two trees supply the oxygen needs of a person each year.¹⁶

⁸ *Urban Forest Values: Economic Benefits of Trees in Cities*, University of Washington, College of Forest Resources. http://www.cfr.washington.edu/Research/fact_sheets/29-UrbEconBen.pdf

⁹ Air Info Now, U.S. Environmental Protection Agency and Pima County Department of Environmental Quality. <http://www.airinfnow.org/html/faq.html>

¹⁰ *Benefits of Trees in Urban Areas*, www.coloradotrees.org/benefits.htm

¹¹ *Ibid.*

¹² *Urban Forest Values: Economic Benefits of Trees in Cities*, University of Washington, College of Forest Resources. http://www.cfr.washington.edu/Research/fact_sheets/29-UrbEconBen.pdf

¹³ Roloff, Glenn. *Twenty-Nine Reasons for Planting Trees*. USDA Forest Service – Northern Region. Treelink: The Community Forestry Resource: http://www.treelink.org/docs/29_reasons.phtml

¹⁴ *Ibid*

¹⁵ *Urban Forest Values: Economic Benefit of Trees in Cities*. Seattle, WA: Center for Urban Horticulture, University of Washington, November 1998.

¹⁶ *Ibid*

Cooler air temperatures created by tree canopies reduce smog levels by up to 6 percent.¹⁷

A 2001 report by American Forests stated that the trees within the Portland region are removing 178 million pounds of pollutants annually, a savings valued at \$419 million.¹⁸

Direct tree shading prevents approximately 140,000 tons of carbon from being emitted into the atmosphere annually.¹⁹

In 1994, trees in New York City removed an estimated 1,821 metric tons of air pollution at an estimated value to society of \$9.5 million.²⁰

In 1994, trees in Atlanta removed an estimated 1,196 metric tons of air pollution as an estimated value to society of \$6.5 million.²¹

Approximately 800 million tons of carbon is stored in U.S. urban forests with a \$22 billion equivalent in control costs.²²

An acre of trees absorbs enough carbon dioxide over one year to equal the amount produced by driving a car 26,000 miles.²³

If every American planted just one tree, the amount of carbon dioxide in the atmosphere would be reduced by one billion lbs annually. This is almost 5 percent of the amount that human activity pumps into the atmosphere each year.²⁴

Over a 50-year lifetime, a tree controls \$31,250 worth of soil erosion. (USDA Forest Service)²⁵

Particulates are small (<10 microns) particles emitted in smoke and from burning fuel, particular diesel, that enters our lungs and cause respiratory problems.²⁶

A total of 300 trees can counter balance the amount of pollution one person produces in a lifetime.²⁷

A car driven 26,000 miles will emit 6,240 lbs carbon (22,880 lbs carbon dioxide) or 7,540 lbs carbon (27,647 lbs carbon dioxide) if the whole fuel process is included.²⁸

¹⁷ *Ibid*

¹⁸ *Regional Ecosystem Analysis for the Willamette / Lower Columbia Region of Northwestern Oregon and Southwestern Washington State*. Washington, D.C.: American Forests, 2001.

¹⁹ *Ibid*

²⁰ Nowak, David J. *The Effects of Urban Trees on Air Quality*. Syracuse, NY: USDA Forest Service.

²¹ *Ibid*

²² *Benefits of Trees in Urban Areas*. <http://www.coloradotrees.org/benefits.htm>

²³ *Ibid*

²⁴ *Ibid*

²⁵ *Ibid*

²⁶ *Ibid*

²⁷ *Ibid*

²⁸ *Ibid*

Trees in and around parking lots and adjacent to roads reduce air temperatures by up to 30 degrees, thus greatly reducing the volatilization of gasoline from the tanks of parked cars. Other benefits include extended asphalt duration (extending the time between repaving) due to slower volatilization of structural components.²⁹

Estimated annual averages for Brooklyn trees for various dbh classes:³⁰

DBH Class (inches)	Oxygen Produced (lbs/year)	Carbon Sequestration (lbs/year)	Pollution Removal (lbs/year)
0 to 3	6	2	0.07
9 to 12	49	19	0.8
18 to 21	115	43	2.2
27 to 30	148	55	2.0
39 +	247	93	5.3

Stormwater and Water Quality

Trees along rivers, streams, and lakes reduce water temperatures by their shade, prevent or reduce bank erosion and silt, and provide hiding places for improving fish habitat.³¹

One tree needs at least 5 gallons of water plus 5 gallons per caliper inch each week. For example, one 2-caliper inch tree requires a minimum of 15 gallons of water weekly. This calculation is for minimum needs – many trees can take in much more water. A mature bald cypress can absorb as much as 880 gallons per day!³²

The canopy of a street tree absorbs rain, reducing the amount of water that will fall on pavement and that then must be removed by a stormwater drainage system. In one study, 32-foot tall street trees intercepted rainfall, reducing stormwater runoff by 327 gallons.³³

Trees can catch and process an amazing amount of water through evapo-transpiration. A recent USDA study showed that a 28-foot-tall tree intercepted 58.1 gallons in its crown area during a ½-inch rainfall event. If we conclude that every space without a tree results in 58.1 gallons of runoff, we can see a dramatic impact of trees on the volume of stormwater that must be processed.³⁴

²⁹ *The Community Forest*. Jackson, MS: Mississippi Forestry Commission Urban and Community Forestry Department, July 2002.

³⁰ *Ibid*

³¹ Roloff, Glenn. *Twenty-Nine Reasons for Planting Trees*. USDA Forest Service – Northern Region. Treelink: The Community Forestry Resource: http://www.treelink.org/docs/29_reasons.phtml

³² Keating, Janis. *Trees: The Oldest New Thing in Stormwater Treatment? Stormwater: The Journal for Surface Water Quality Professionals*. www.forester.net

³³ *Urban Forest Values: Economic Benefit of Trees in Cities*. Seattle, WA: Center for Urban Horticulture, University of Washington, November 1998.

³⁴ *The Community Forest*, Mississippi Forestry Commission, Urban and Community Forestry Division, <http://www.mfc.state.ms.us/urban/pdf/non-pointbrochure.pdf>

Tree loss between 1972 and 2000 in the Portland region resulted in an estimated increase of 963 million cubic feet of stormwater flow during a peak storm event. This vegetation loss is equivalent in value to a \$2.4 billion system.³⁵

For every 5 percent of tree cover added to a community, stormwater runoff is reduced by approximately 2 percent.³⁶

USFS research shows that in 1-inch rainstorm over 12 hours, the interception of rain by the canopy of the urban forest in Salt Lake City reduces surface runoff by about 11.3 million gallons, or 17%.³⁷

A USDA Forest Service Study showed that a 28-foot-tall tree intercepted 58.1 gallons, or 68% of a 0.5-inch rain event that fell within its crown area. IF we conclude that every space without tree canopy contributes at least 58.1 gallons (larger trees process larger amounts) for a similar rain event, we can see dramatic influence of trees on the volume of stormwater that must be processed.³⁸

Retaining healthy trees and associated vegetation on and surrounding construction sites can help mitigate off-site water movement during and after construction.³⁹

Shade from trees can cool hot streets and parking lots. Cities are “heat islands” that are 5-9 degrees hotter than surrounding areas. And cities spread each year.⁴⁰

A mature tree canopy reduces air temperatures by about 5 to 10 degrees Fahrenheit, influencing the internal temperature of nearby buildings.⁴¹

Energy Savings

In the United States, the annual effect of properly positioned trees is a savings averaging about 20-25 per cent of residential energy costs, compared with the costs for the same house in an unsheltered area.⁴²

Shade from trees can reduce utility bills for air conditioning in residential and commercial buildings by 15-50 percent.⁴³

³⁵ *Ibid*

³⁶ *Benefits of Trees In Urban Areas*. <http://www.coloradotrees.org/benefits.htm>

³⁷ *Ibid*

³⁸ *The Community Forest*. Jackson, MS: Mississippi Forestry Commission Urban and Community Forestry Department, July 2002.

³⁹ *Ibid*

⁴⁰ Roloff, Glenn. *Twenty-Nine Reasons for Planting Trees*. USDA Forest Service – Northern Region. Treelink: The Community Forestry Resource: http://www.treelink.org/docs/29_reasons.phtml

⁴¹ *Urban Forest Values: Economic Benefit of Trees in Cities*. Seattle, WA: Center for Urban Horticulture, University of Washington, November 1998.

⁴² *Tomorrow's Energy Today*, U. S. Department of Energy. www.eren.doe.gov

⁴³ Roloff, Glenn. *Twenty-Nine Reasons for Planting Trees*. USDA Forest Service – Northern Region. Treelink: The Community Forestry Resource: http://www.treelink.org/docs/29_reasons.phtml

Windbreaks around homes can shield against wind and snow, and heating costs can be reduced by as much as 30 percent.⁴⁴

A 25-foot tree reduces annual heating and cooling costs of a typical residence by 8 to 12 percent, producing an average \$10 savings per American household.⁴⁵

Trees provide an estimated \$1.86 million in annual energy savings for single family residences in the Portland area.⁴⁶

Properly placed trees in the landscape can realize savings of up to 58 percent on daytime air conditioning and as high as 65 percent for mobile homes. If applied nationwide to buildings not now benefiting from trees, the shade could reduce our national consumption of oil by 500,000 barrels of oil/day.⁴⁷

Projections suggest that 100 million additional mature trees in US cities (3 trees for every unshaded single family home) could save over \$2 billion in energy costs per year.⁴⁸

Other

A Cheyenne, Wyoming study by the US Forest Service found that for every \$1.00 spent on the city's public trees, the residents received \$2.09 in benefits such as the energy savings for cooling homes, improved health through better air quality, enhanced management of stormwater runoff, and higher property values.⁴⁹

One half of a tree's dry weight is carbon. Thus, carbon storage is directly related to size.⁵⁰

Trees reach their most productive stage of carbon storage in about 10 years.⁵¹

Physical barriers erected just beyond the dripline of trees will help protect them from damage during construction.

Trees provide nutmeats, fruit, berries for jams and jellies and maple syrup.⁵²

One of every four pharmaceutical products used in the U.S. comes from a plant found in a tropical forest.⁵³

⁴⁴ *Ibid*

⁴⁵ *Urban Forest Values: Economic Benefit of Trees in Cities*. Seattle, WA: Center for Urban Horticulture, University of Washington, November 1998. http://www.cfr.washington.edu/Research/fact_sheets/29-UrbEconBen.pdf

⁴⁶ *Regional Ecosystem Analysis for the Willamette / Lower Columbia Region of Northwestern Oregon and Southwestern Washington State*. Washington, D.C.: American Forests, 2001. http://www.americanforests.org/download.php?file=/rea/AF_Portland.pdf

⁴⁷ *Benefits of Trees In Urban Areas*. <http://www.coloradotrees.org/benefits.htm>

⁴⁸ *Ibid*

⁴⁹ *Trees in Cheyenne are a Wise Investment*, USDA Forest Service, September 29, 2004. http://cufr.ucdavis.edu/products/cufr_525_PR_Cheyenne_9-29-04.pdf

⁵⁰ *Ibid*.

⁵¹ Roloff, Glenn. *Twenty-Nine Reasons for Planting Trees*. USDA Forest Service. www.treelink.org/docs/29_reasons.phtml

⁵² Roloff, Glenn. *Twenty-Nine Reasons for Planting Trees*. USDA Forest Service – Northern Region. Treelink: The Community Forestry Resource: http://www.treelink.org/docs/29_reasons.phtml

⁵³ *Ibid*

Experiments conducted at the National Cancer Institute for the past 10 years have shown that taxol, a drug extracted from the bark of the Pacifica yew, is effective in treating cancer.⁵⁴

Customers were found to travel longer, farther, and more often to a tree-enhanced shopping district. They stayed longer, and were willing to pay more for both products and parking.⁵⁵

The average density in a forest stand is around 480 trees/acre. Average tree density within tree covered urban areas is approximately 204 trees/acre of tree cover.⁵⁶

It takes the wood from a 100-foot tree to keep the average American supplied for a year with newspaper, books, magazines, tissues, paper towels, housing materials, furniture, desks, fences, boxes and other assorted wood products. On the average that amounts to:⁵⁷

- 613 lbs. of paper products
- 200 square feet of 1" thick lumber
- 87 square feet of plywood
- 59 square feet of insulation board, particle board and hardboard

Now, consider that there are more than 295 million Americans.⁵⁸

Vital statistics for that 100-foot tree:

- Grew to 18" in diameter at the base
- Grew to 100 feet tall with a 60-70 foot crown spread
- Weighs about 4,100 lbs. at harvest
- Grew 200,000 leaves @ 120 lbs. per year or 3,600 lbs. over its lifetime
- Developed 1,300 lbs. of roots (an additional 2,000 lbs. were grown and discarded)
- Retained 100 lbs. of nutrients in the wood (twice that amount were returned to the soil)
- Took up over 5,000,000 gallons of water from the soil and transpired it into the air;
- Retained 350 gallons of water
- Respired 6,000 lbs. of oxygen

⁵⁴ Ibid

⁵⁵ *Believe It Or Not, Trees Will Affect Consumer Spending Patterns in Downtown*. Downtown Idea Exchange: July 1, 1999.

⁵⁶ *Air Quality and Trees*, Nowak, David, USDA Forest Service, from *Benefits of Trees in Urban Areas*. <http://www.coloradotrees.org/benefits.htm>

⁵⁷ *Tree Activities*, March 2002, North Carolina Forest Service. http://www.dfr.state.nc.us/education/pdf/tree_act_k.pdf

⁵⁸ U.S. Bureau of Census, U.S. and World Population Clocks, January 2005. <http://www.census.gov/main/www/popclock.html>