

# Fact Sheet #1: Benefits of the Urban Forest

## Did you know?

**A large front yard tree can provide the following benefits each year:\***

- 1 Saves \$29 in summertime air conditioning by shading the building and cooling the air (250 kWh), about 9% of a typical residential building's total annual air conditioning cost.** (This finding assumes tree is west of the residence where it provides maximum shading benefit.)
- 2 Absorbs 10 lbs. of air pollutants, including 4 lbs. of ozone and 3 lbs. of particulates.** The value of pollutant uptake by the tree is \$45 using the local market price of emission reduction credits. Uptake of NOx by the tree (1.07 lb) is equivalent to NOx emitted by a typical car driven 188 miles. (NOx emissions taken from a *Sacramento Bee* article, Dec. 7, 1997, Forum 2, that lists EPA test results of measured emissions at 4,000 miles, as well as maximum emissions allowed at 50,000 miles for 7 car models and 11 models of light trucks. This calculation assumes 30 grams/yr. uptake by tree and car emission rate of 0.16 grams/mile for Ford Taurus at 4,000 miles. Emission rates ranged from 0.06-0.16 for the cars listed.)
- 3 Intercepts 760 gal of rainfall in its crown, thereby reducing runoff of polluted stormwater and flooding.** This benefit is valued at \$6 based on local expenditures for water quality management and flood control. (Interception is relatively low for this deciduous species in a climate with predominately winter precipitation. An evergreen camphor tree in coastal Southern California was estimated to intercept 4,000 gals annually, see page 82, "Tree Guidelines for Coastal Southern California Communities.")
- 4 Cleans 330 lbs. of CO<sub>2</sub> (90 lbs. C) from the atmosphere through direct sequestration in the tree's wood and reduced power plant emissions due to cooling energy savings.** The value of this benefit is \$5 assuming the California Energy Commission's price of \$30/ton. This tree reduces the same amount of atmospheric CO<sub>2</sub> as released by a typical car driven 388 miles. (From the same *Sacramento Bee* article, Dec. 7, 1997, Forum 2, CO<sub>2</sub> per year assuming 15,000 miles driven a year (55% city, 45% highway). Assuming an average emission rate of 0.85 lb/mile, the CO<sub>2</sub> offset by the tree is equivalent to 388 miles driven. Emission rates ranged from 9,200-14,800 lb/yr. for the cars listed.)
- 5 Adds about 1% to the sales price of the property, or about \$25 each year when annualized over a 40-year period.** This assumes a median residential property sales price of \$100,000. (Based on research that found a large front yard tree increased the sales price of residential properties by nearly 1%: Anderson, L.M. and Cordell, H.K., 1988. "Residential Property Values Improve by Landscaping with Trees." *Southern Journal of Applied Forestry*, 9:162-166.)

\* in a San Joaquin Valley community like Modesto

The value of all benefits is \$111 in this example. Typically, a city will spend \$20-\$30 per year to maintain a street tree of this size (sometimes located in a front yard easement) and a resident will spend about \$10-\$30 per year maintaining a large yard tree. Our benefit-cost analysis for Modesto's 90,000 street/park trees found \$1.89 returned annually for every \$1 invested in stewardship. The net annual benefit of \$2.3 million (\$13/resident, \$26/tree) can be referenced as follows: McPherson, E.G., Simpson, J.R., Peper, P. & Xiao, Q. 1999. "Benefit-Cost Analysis of Modesto's Municipal Urban Forest." *Journal of Arboriculture*, 25(5):235-248.

All tree data taken from "Tree Guidelines for San Joaquin Valley Communities," by McPherson, E.G., Simpson, J.R., Peper, P. and Xiao, Q. 1999, published by Local Government Commission, Sacramento, CA. (See back page for more information.)

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# References: Benefits of the Urban Forest

**For more information on the benefit/cost of the urban forest, refer to the following publications, written by Center researchers and associates:**

McPherson, E.G. 1994. Benefits and costs of tree planting and care in Chicago. McPherson, E.G.; Nowak, D.J.; Rowntree, R.A., eds. In *Chicago's Urban Forest Ecosystem: Results of the Chicago Urban Forest Climate Project*. General Technical Report No. NE-186. Radnor, PA. Northeastern Forest Experiment Station. pp. 115-134.

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Dwyer, J.F.; McPherson, E.G.; Schroeder, H. W.; Rowntree, R.A. 1992. Assessing the benefits and costs of the urban forest. *Journal of Arboriculture*. 18(5): 227-234.

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McPherson, E.G.; Simpson, J.R.; Peper, P.J.; Xiao, Q.; Pettinger, D.R.; Hodel, D.R. 2001. *Tree Guidelines for Inland Empire Communities*. Local Government Commission: Sacramento, CA. 92p.

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of residential yard trees for improving air quality in Sacramento, California, using existing models. *Atmospheric Environment: Urban Atmospheres*. 32(1): 75-84.

McPherson, E.G. 2000. Expenditures associated with conflicts between street tree root growth and hardscape in California, United States. *Journal of Arboriculture* 26(6): 289-297.

McPherson, E.G.; Simpson, J.R.; Peper, P.J.; Xiao, Q. 1999. Benefit-cost analysis of Modesto's municipal urban forest. *Journal of Arboriculture* 25(5): 235-248.

McPherson, E.G. 2000. Street tree growth rates and quantification of benefits and costs. In: Kollin, C., ed. *Proceedings of the Ninth National Urban Forest Conference*. Washington, DC: American Forests.

## An urban forest is:

- ☛ the aggregate of all vegetation within an urban area
- ☛ the management of populations of trees
- ☛ the intersection of people with biology of urban flora and fauna

## A Benefit-Cost Analysis of Modesto's Municipal Forest

This 1999 study of the Central Valley town of Modesto, CA found that for each \$1 invested in urban forest management, \$1.89 in benefits was returned to residents. City trees actually removed 154 tons of air pollutants, increased property values by nearly \$1.5 million, and provided shade that saved over \$1 million. This was enough to convince city officials to increase the tree budget, and an electric utility to invest \$20,000 in developing the Modesto Tree Foundation.

Annual Benefits by Species and Age



To learn more about this study go to:  
<http://wucfre.ucdavis.edu/benmod.htm>.