



UA 'Street Trees' Perform Double Duty

Benefits include energy savings, reduced pollution

By Jeff Harrison, University Communications



new inventory of "street trees" at The University of Arizona shows they do more than provide pleasant vistas and an oasis in central Tucson.

The more than 2,000 trees that line campus roadways sequester carbon from the atmosphere, reduce pollution and flooding and save the UA a bundle on cooling costs.

The study, conducted by the UA Campus Arboretum, documented individual trees, their distribution and compared their yearly costs and benefits, said Elizabeth Davison, director of the Campus Arboretum.

Davison said the street trees and other trees at the University are a significant factor in reducing the UA's carbon footprint. The study included only those trees that directly flank campus roads. Each year, the UA's street trees:

- Sequester 246,620 tons of carbon dioxide (CO₂)
- Reduce the energy costs for UA facilities by \$18,230
- Reduce emission, pollutants and particulates by 9,994 pounds
- Intercept more than a million gallons of rainfall or stormwater

"These street trees contribute to the quality of life for all our neighbors, providing shade on pavements, and reducing air pollution, stormwater and the University's 'carbon footprint,'" said Davison.

There are more than 7,000 trees within the UA's boundaries, including the street trees. Davison said that many of the largest trees are in the interior of campus, and that some of them are among the oldest trees in Tucson.

Robert Forbes, the first head of the UA Agricultural Experiment Station, planted olive trees on the west side of campus at the end of the 19th century, part of his experiments with tree crops from Mediterranean countries. Those trees, most likely bought from a nursery in Santa Barbara, California, were Spanish, French and Italian in origin.

In all, Davison estimated that the combined benefit of the UA's urban forest could be three to four times higher than for just those trees listed in the current study.

The age and size of trees also factor into their effectiveness.

"As trees age, their benefits rise, but then may fall," Davison said. "As we plant more small trees, we ensure increased potential benefits for ensuing years. As older trees are removed, the ratios shift. Sometimes an older tree is less efficient in stormwater uptake, but it holds more carbon in its trunk and branches." ☆

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Beyond Shade: Calculating the Value of a Tree

By Susan McGinley

The street tree inventory conducted on the University of Arizona campus assisted a larger effort undertaken by the City of Tucson's Department of Urban Planning and Design to assess the species distribution, annual costs/benefits and maintenance priorities for municipal trees.

Funded by a generous donor on behalf of the UA Campus Arboretum, plant sciences undergraduate Ben Brandt began measuring trees in November 2007. Nearly a year later, he had amassed data for all 2,000 trees that line the streets within the campus boundaries.

"From the point of view of the software we used, we're a little city with 14 miles of streets," says Elizabeth Davison, arboretum director. "Ben walked tree to tree, carrying a PDA with all of the tree choices in it." He identified each tree species; entered its size after measuring its diameter at chest height with calipers; made a decision on its health according to a menu—leaves falling, branches, dead, etc.; and described its location.

"We put the inventory into a software program called STRATUM, part of the i-Tree Suite of software developed by the Center for Urban Forest Research at UC Davis," says Davison. The center is headed by Greg McPherson, a former UA faculty member in Landscape Architecture. The model in the software was adapted for Phoenix and desert Southwest tree species.

The STRATUM program assumed that: 1) Each species of tree has an average life span and each individual tree's current condition gives potential to reach that life span, 2) Each tree's size relates to its ability to take up water and provide other benefits, 3) Orientation on the streets influences default shade benefit, 4) Aesthetic benefits relate to median home costs in a particular area, and 5) Energy benefits depend on UA's cost per kilowatt hour of electricity and therm of gas.

In the Southwest, trees bring more value for shade and electricity, compared to the Northwest, where trees may contribute more value in air quality (CO₂ sequestered) and gallons of stormwater collected.

A few examples: Each Chinese pistache on campus contributes about \$74 every year, including energy and water saved, carbon dioxide sequestered, and aesthetic value. Mesquites contribute \$112; Aleppo pine, \$156; California palm, \$33 and blue paloverde, \$93. With some campus trees living 40, 60 or even 100 years, their contributions can be considerable over their life spans.