THE BOTTOM LINE ON TREES

BY JAN McCOY

Planting a half-million trees over the next five years could be worth more than $236 million to Tucson, Ariz., by the year 2030.

A computer model developed to evaluate the local costs and benefits of a nationwide tree planting program estimates the long-term benefits may be more than two and one-half times greater than its costs, says Gregory McPherson, a University of Arizona landscape architect.

The model came from McPherson's involvement in Trees for Tucson, the local arm of the American Forestry Association's Global ReLeaf program. The program promotes tree planting as a way to conserve energy and improve environmental quality. The Global ReLeaf goal is to plant 100 million trees in American cities by 1996. Trees for Tucson aims to plant 500,000 desert-adapted trees throughout the city by 1996.

But little data exist to evaluate the economic and ecologic implications of such a mass planting.

"Tucson Water has been making a great effort to reduce water use, and exterior water use is one of the prime

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areas the water company wants to reduce," says McPherson. "The idea of a half million trees—while sounding nice—certainly will impact the water supply.

"I felt I needed to take a look at not only the impact of planting on water, but all the costs, such as pruning and removal, over a fairly long period of time."

McPherson uses a microcomputer spreadsheet program to project average annual benefits and costs in five-year increments from 1990 to 2030. The program simulates these numbers based on a "typical tree" planted in parks, yards and along city streets. For Tucson, McPherson used the native velvet mesquite, which is popular in desert environments because of its quick growth, drought tolerance and moderately dense shade.

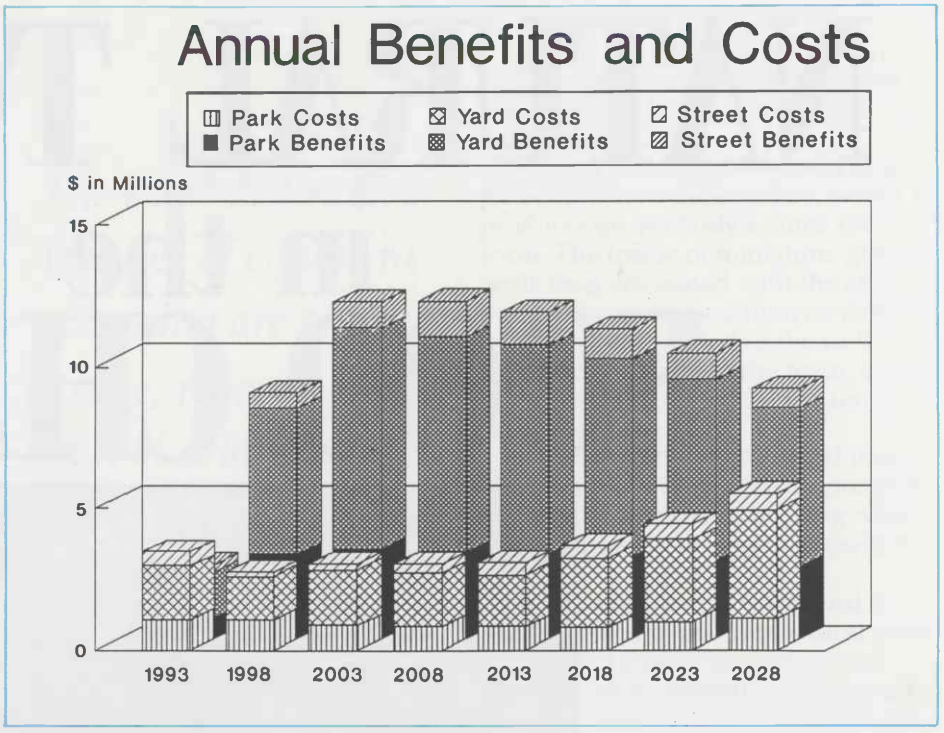
"The costs exceed benefits during the first five years, largely due to one-time planting expenses," McPherson says. "But for the next 25 years, benefits are three or more times greater than costs. During the last decade, cost begins to catch up with benefits as the trees die and are removed."

McPherson says air conditioning energy savings are the greatest benefit of the tree-planting program. Buildings shaded by trees require less air conditioning.

Although homeowners can obtain substantial energy savings from direct building shade, the Tucson community benefits even more from the aggregate effect of trees on urban climate. The trees also reduce urban heat by cooling the air through evapotranspiration, the evaporation of moisture released through the surface of leaves.

"Planting 500,000 trees will increase the Tucson canopy cover by about 10 percent, which is assumed to reduce urban heat island warming by 3 degrees Fahrenheit," McPherson says. "Computer simulations for typical residential buildings in Tucson indicate this temperature reduction may lower annual cooling costs from 21 percent to 25 percent," McPherson

The reduced demand for air conditioning power can lower the amount of coal and water consumed by power plants, resulting in conserved water and lower carbon dioxide emissions from smokestacks. Urban trees also lower atmospheric carbon dioxide through photosynthesis, where green plants use the radiant energy of the Sun to change water and carbon dioxide into sugars.



"I estimate about 400 to 500 pounds of carbon per tree would be kept from our air each year," McPherson says. Trees also can aid in controlling dust and storm water runoff, which could lower the city's road paving and flood control costs.

The most significant expense involved in a mass planting of trees involves removal, rather than irrigation, of the trees.

"Removing trees that have died from age, improper planting and maintenance, or that have been damaged by vandalism or storms will cost annually from about $3 to $7 per tree," McPherson says. "The projected average annual water use is estimated to cost a little more than $2 per tree —about the same amount used inside the home by a single person for 10 days."

Ultimately, the projected total benefits will exceed total costs by $236.5 million over a 40-year period.

McPherson says his model, which he used to justify the Trees for Tucson program, also can be used by other Global ReLeaf groups, city planners and urban vegetation managers to develop cost-effective tree plantings.

But computer models are only as reliable as the data that go into them, and little research has been done in this area. The data in McPherson's model are estimates based on previous studies and interviews with area nurseries, landscape companies and city managers. Still, the model offers decision-makers a timely tool for evaluating the economic and environmental implications of tree planting programs. McPherson now is writing a proposal to the U.S. Forest Service to develop more sophisticated models.

"Tree planting has to be carefully thought out, but you can't stop planting trees and wait for 10 years of research before doing anything," he says. "What you do, which is why I developed this model, is try to catch up as quickly as possible."

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