

Dr Greg McPherson explains how a software tool developed at the Pacific Southwest Research Station in the US Forest Service is helping the nation's cities manage their urban treescape

Value for money...

Urban forests don't get the recognition that natural forests do. They don't encompass sweeping vistas and magnificent views, and they rarely provide critical habitat to endangered species. But they are vital.

In the US, more than 90 per cent of all Californians live, work, and play in urban forests. As urban foresters, we know how trees in the urban landscape provide vital ecosystem services. In fact, urban trees are the ultimate managed forests. To maximise ecological, economical, and social benefits, cities need to identify potential planting locations, as well as decide what species of trees to use.

Unfortunately, many cities find it difficult to manage their treescape because it is expensive to inventory and update records of urban trees. A city with 25,000 trees might pay \$100,000 (£59,500) for a starting inventory. To address this, urban foresters in the Center for Urban Forestry Research at the Pacific Southwest Research Station developed the Street Tree Resource Analysis Tool for Urban Forest Managers (STRATUM).

STRATUM is one in a suite of software tools called i-Tree that cities can use to assess the approximate economic value that trees provide. Urban foresters are still often up against decision-makers who don't fully subscribe to the value of trees so don't include it as part of their assessment. The i-Tree tools help articulate that argument.

Fiona Watt, Chief of Forestry and Horticulture at the New York City Department of Parks and Recreation,

said: "Before the Forest Service's work on quantifying the values of trees, trees were more of a 'feel good' issue, and the resources allocated to tree planting and maintenance waxed and waned with public advocacy. The scientific work over the last decade has helped everyone articulate that trees can be very productive infrastructure. Seeing trees in that way makes people value them more."

MODEL COSTS AND BENEFITS OF URBAN FORESTS

i-Tree STRATUM is useful for determining the current status of municipal forests because it can be applied by any city using regionally based tree size data and growth curves. Although more accurate benefit results could be obtained using locally based tree growth curves, the cost of surveying a city's trees and analysing growth data is often prohibitive.

STRATUM was created as a cheaper alternative. The team that created it divided the USA into 16 climatic zones and conducted analyses for a reference city in each zone. The reference city research entailed extensive data collection on 30-60 trees from each of the predominant 20 tree species, including leaf biomass, data

“**MANY CITIES FIND IT DIFFICULT TO MANAGE THEIR TREESCAPES BECAUSE IT IS EXPENSIVE TO INVENTORY**”

FAST FACT
 In June 2009, i-Tree had 4,381 users worldwide. i-Tree STRATUM was recently re-named i-Tree Streets.



on tree care expenditure, environmental data for modeling tree benefits, and monetary values for tree benefits.

The team created regional tree guides, an i-Tree STRATUM regional database for use by any city in the region, Municipal Forest Resource Analyses (MFRAs) using STRATUM and PowerPoint presentations. The tree guides extend applicability of the reference city research to all cities in a climate zone, to estimate the future benefits and costs of proposed tree planting projects.

STRATUM, on the other hand, provides a snapshot in time about a specific city's current municipal forest. It also estimates annual costs and benefits. The programme accepts data from a sample or full inventory of a city's trees, then generates an estimate of the annual esthetic and environmental benefits, including energy conservation, air quality improvement, carbon dioxide reduction, storm water control, and



Working out the value

STRATUM works by calculating the annual dollar value of the benefits that trees are producing, based on measurements of individual trees.

If numerical models say that a Modesto ash tree that is 4.5 inches in diameter at breast height will provide 100 kilowatt hours of energy savings in a year and that the inventory for a city has 1,000 trees Modesto ash trees that are 3-6 inches in diameter, then multiply that 1,000 trees by 100 kilowatt hours to get air conditioning savings.

property value increases. The STRATUM software incorporates information on management costs, as well as regional data on building construction, energy use, and air pollution concentrations.

It can produce various reports, including comparisons of canopy cover in neighborhoods, conflicts with power lines and sidewalks, and the performance of individual species. In five cities, STRATUM demonstrated that for every dollar invested in tree management, cities gained \$1.37 to \$3.09 in benefits.

MFRA is produced using STRATUM and provide a much more in-depth look at a city's urban forest. They estimate the energy conservation, air quality, storm water runoff control, and property value increases conferred by trees.

Reports include management recommendations regarding species to plant, optimal pruning cycle, tree removal and replacement programmes, strategies to reduce

conflicts between trees and sidewalks and power lines and techniques to ensure space for trees in new developments. In New York, the MFRA demonstrated dramatic results: its street trees were providing \$5.60 in benefits for every \$1 spent on tree planting and care.

In 2005, the city's Department of Parks and Recreation began a major street tree inventory, and ran the results through STRATUM to quantify the benefits of these trees.

The result was the publication of the *New York City Municipal Forest Resource Analysis* which showed that street trees produced \$122 million per year in benefits to New York City, including improved air quality, rainwater uptake and increased property values. That monetary value helped planners show that tree benefits can offset their anticipated costs. "It was a way for policymakers to have some perspective about the real costs and benefits of trees," said Watt, and it gave her team

In St. Paul, Minnesota, trees were labeled with price tags showing the value of benefits they provided local residents

ammunition for getting approval for a major "sustainable" city project. "It really formed the basis of our policy discussions, and as it turns out, trees are one of the environmental cornerstones of that plan."

Work on the sustainable city plan is now well under way and includes the creation of new forests on 2,000 acres of city parkland, construction of 800 new street gardens, and \$380 million in new funds for urban forestry efforts over ten years.

Greg McPherson is director of the Center for Urban Forest Research at the United States Department of Agriculture Forest Service's Pacific Southwest Research Station. This article is published courtesy of Greg McPherson, author Jim Kling, and the Pacific Southwest Research Station.

**i For more information, visit:
www.itreetools.org**