Digging into i-Tree

with Scott Maco, Urban Forester, The Davey Institute

I am an overseas reader who, like many of my colleagues, has a keen interest in the information i-Tree provides. Could you clarify whether the i-Tree tools are applicable outside the U.S.?

Urban forestry professionals are a close knit group and word of successful practices tend to travel quickly. So it is no surprise that interest in i-Tree has peaked this past year on the heels of projects that have proven that the information i-Tree provides—namely quantifying ecosystem services—plays a critical role in improving our understanding of how trees function in cities and gaining support for tree programs.

Whether you are in the U.S., Spain, China, Chile, or Australia, it's hard to ignore headlines such as, "US Benefit Analysis Snared Over $220m for Trees" (*Horticulture Week, 10/1/2009*). While this New York City reference may be an exception, it is becoming the norm that i-Tree users who conducted a project two or three years ago are now starting to see the fruits of their labor and are sharing their success stories of using i-Tree information to defend budgets and support new planting programs—and the world is watching!

A couple of years ago, you probably could have counted the number of international requests for i-Tree on your hands and feet. Today, however, i-Tree is in the hands of nearly 1,000 people outside of the U.S., accounting for about 15% of all i-Tree requests and growing steadily. The problem, of course, is that while urban forest management issues in any language can often be translated into common themes, assessment and analysis tools do not always transfer as easily.

i-Tree is no exception. The tools were developed using domestic standards for data collection, climatic, and geographic parameters. For example, without the availability of tree diameter measured at 4.5 feet or local air pollution data measured hourly, there can be no meaningful i-Tree analysis conducted. Before running out to start an international project, it is imperative to know, minimally, whether you have the means and resources to acquire the required field and environmental data. Beyond required data, you must understand the limitations of the two primary i-Tree analysis tools—Eco and Streets—outside the U.S.

The tool least amenable to use outside the U.S. is i-Tree Streets—the tool specific to assessing street tree populations. Benefit calculations for this application are based on regionally specific tree growth measurements, hourly climate and air pollution concentration data, and building and energy information from reference cities representing U.S. climate zones.

To calculate tree-related benefits for your city, Streets must know what species are most likely to be found in your region, how much the trees are expected to grow and what leaf area they will have. The application also uses building, energy use, land use, and climate information to calculate trees' functionality. These factors are fixed by reference city conditions for each climate zone—and can vary a great deal from region-to-region in the U.S., let alone continent-to-continent. Because these data don't exist outside the U.S. within Streets, any analysis you conducted would lack regional field data to support it. That being said, and while there is no facility for calculating error associated with trees outside the specified climate zones, an order of magnitude estimate of benefits is possible. But it is up to you to understand the assumptions you would be making and whether or not the results will be valid for their intended use.

By contrast, i-Tree Eco not only allows you to assess the urban forest beyond street trees, it doesn't rely solely on regional reference city data averages for estimating benefits. Eco analyses require local inputs of weather, air pollution, and field data including detailed tree and canopy cover measurements. These data are all locally-based measurements that are not estimated by the application. As such, Eco's relevance and applicability to non-U.S. locations make it the tool of choice.

To date, approximately 25 cities in 9 countries outside the U.S. have conducted Eco analyses. They have been able to utilize the tool by doing a little extra legwork than their American counterparts and accepting the bounds and limitations with which Eco models and reports results. Stateside users need not submit local weather and air pollution data, for example, but international users must obtain comparable data sets and submit

them following precise formatting protocol. Overseas users must also change some of their traditional data collection techniques and definitions to adhere to field data collection protocols such as land use and DBH that were defined for domestic audiences. Further, the monetary valuation of air pollution or carbon sequestration, for example, are based on externality values, or the social and environmental costs, of these pollutants in the United States. Though these values may not be applicable to international users, they can be recalculated where local valuation methods exist.

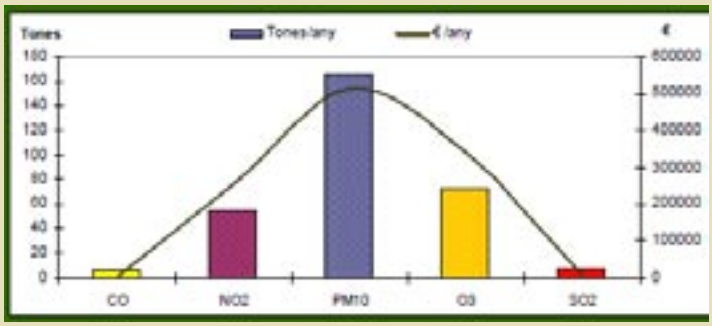
Unfortunately, willingness to do the extra work that is needed for international Eco projects is not all that is necessary. You also need to accept that some components of the model will simply not be transferrable with any degree of certainty. Energy and structural value are the two notable examples. As with Streets, the energy model component can be run for any tree population, but it assumes climate zones, building types and energy use, and emission factors from the U.S. Similarly, the structural valuation in Eco is calculated based on formulae and regional ratings factors specific to the CTLA (Council of Tree and Landscape Appraisers) tree valuation method—a U.S. standard.

The international users that have used i-Tree do so because they are rewarded with information that they wouldn't otherwise be able to obtain, including estimates of leaf area and biomass, carbon sequestration and storage, air pollution removal, and releases of biogenic volatile organic emissions. The model limitations noted above highlight the significant work and understanding that is required of an international Eco project. While everything from gathering local data to processing time may be longer from start to finish, and outputs and their relevance may be somewhat diminished when compared with typical U.S. projects, i-Tree Eco is adaptable and applicable. For those willing to take the time to understand the model—its requirements and assumptions—Eco can provide scientifically defensible outputs that quantify structure and function of the urban forest.

i-Tree is in the public domain and is freely accessible by visiting *www.itreetools.org.*

"Digging into i-Tree" is meant to be an ongoing forum for Scott Maco to field questions from SMA members about the i-Tree suite of tools. Please send general questions you would like answered in this column to *digging@itreetools.org*.

Note: Questions submitted to the above address will not be answered personally, and not all questions can be addressed in the column. Technical i-Tree support is available by visiting: *www.itreetools.org/support*.



i-Tree Eco reported air pollution removal by trees of Barcelona, Spain,reported in metric tones and valued in Euros (1 Euro = 1.4 USD) (Chaparro and Terradas, 2009).

This is the cover of a recent i-Tree Eco-based report on the ecosystem services of Barcelona, Spain's urban forest conducted by Lydia Chaparro and Juame Terradas of the Centre for Ecological Research and Forestry Applications, University of Barcelona, Spain.