

Overseas with i-Tree

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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 piqued 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 few 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 approximately 1,600 people outside of the U.S., accounting for about 25% of all i-Tree requests and the international user base is 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 i-Tree tools were developed using standard data collection techniques, international climatic data sets and U.S. geographic and pollution data sets. Therefore, before running out to start an international project, it is imperative to know whether you have the means and resources to acquire the required field and environmental data. 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. Beyond required data, you must understand the limitations of the two primary analysis tools—Eco and Streets—outside the United States.

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 conducted abroad 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, the program will function, but based on U.S. data. If the model is used internationally, it is up to the user to understand the model assumptions and whether or not the results will be valid for their intended use.

By contrast, i-Tree Eco allows you to assess the urban forest for street trees and beyond, and doesn't rely solely on regional reference city data averages for estimating benefits. Eco analyses require local inputs of weather, air pollution, city geographic information, and field data including detailed tree and canopy cover measurements. These data are all locally-based measurements or information 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 26 cities, in 10 countries outside the U.S. have conducted Eco analyses. While originally designed for a U.S. audience, they have been able to utilize the tool by doing a little extra legwork than their American counterparts and accepting the bounds and limitations of the Eco model. Stateside users need not submit local air pollution data, for example, but international users must obtain comparable data sets and submit them following a 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 U.S. domestic audiences. Further, the monetary valuation of air pollution, for example, are based on externality values (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, 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 Council of Tree and Landscape Appraisers (CTLA) tree valuation method. CTLA approach can be used in some countries, but users will have to supply their local species factors needed for a CTLA assessment.

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, and air pollution removal. 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 requirements and assumptions, Eco can provide scientifically defensible outputs that quantify the structure

and functions of the urban forest.

In addition to i-Tree Eco and Streets, various new tools in i-Tree Version 4.0 have the potential to be used internationally:

i-Tree Species is a program designed to guide users in selecting the best species for various desired environmental services that a tree can provide. This program has been updated to allow international users the ability to input their local average minimum winter temperature and length of growing season to allow the program to operate for conditions outside of the United States.

i-Tree Hydro is the first vegetation-specific urban hydrology model. It is designed to model the effects of changes in urban tree cover and impervious surfaces on hourly stream flows and water quality at the watershed level. This program can be used internationally if the data files required by the program exist (e.g., stream flow data, digital elevation maps).

i-Tree Canopy offers a quick and easy way to produce a statistically valid estimate of land cover types (e.g., tree cover) using aerial images available in Google Maps. The data can be used by urban forest managers to estimate tree canopy cover, set canopy goals, and track success. This program can be used internationally anywhere that high-resolution Google Map imagery and GIS shape files of city boundaries exists.

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

References:

Chaparro, L. and J. Terradas. 2009. Ecological Services of Urban Forest in Barcelona. Centre de Recerca Ecològica i Aplicacions Forestals, Universitat Autònoma de Barcelona, Bellaterra, Spain. 103pp.

Horticulture Week. 2009. US benefit analysis snared over \$220m for trees. Interview by Magda Ibrahim on 01 October 2009. www.horticultureweek.com.

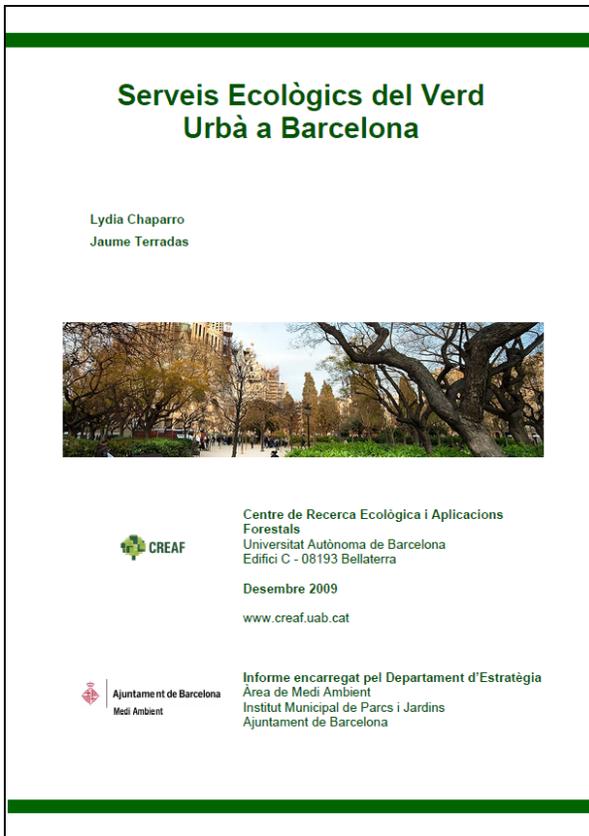


Figure 1. A recent i-Tree Eco-based report on the ecosystem services of Barcelona's urban forest conducted by Lydia Chaparro and Jaume Terradas of the Centre for Ecological Research and Forestry Applications, University of Barcelona.

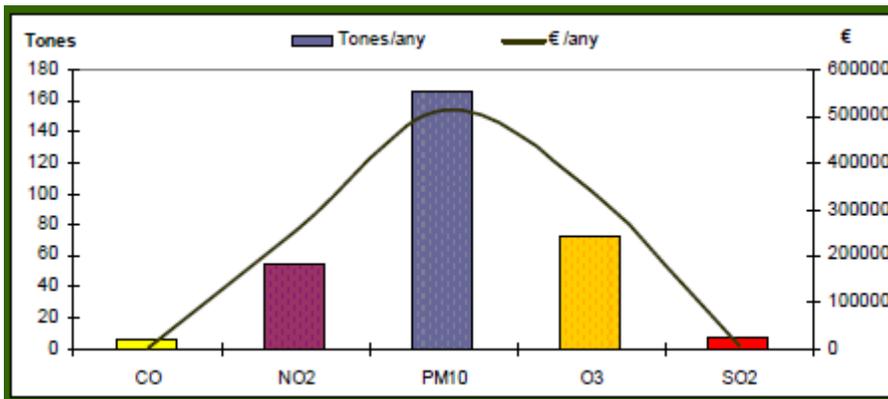


Figure 2. i-Tree Eco reported air pollution removal by trees of Barcelona; reported in metric tones and valued in Euros (1 Euro \approx 1.4 USD) (Chaparro and Terradas, 2009).