i-Tree abroad and now at home

Keith Sacre, of Barcham Trees, has been lucky enough to travel to the USA twice in the past year. His visits have taken him to New York and Chicago. On both occasions he spent time with the urban forestry unit of each city and was impressed with how the benefits of trees have been emphasised at political, professional and community level. Here he explains more.

This emphasis on the benefits of trees and what they offer to a community appears to have raised the profile of trees in general and attracted the sort of prioritised funding which can only be dreamed of in the UK at present.

Much has already been written about the New York Million Trees Campaign, with the City's Urban Forestry unit identifying a need for an additional 20,000 street trees in order to bring the city's streets up to maximum stocking level. The identification of this need resulted in a firm budgeted commitment to plant and maintain an additional 2000 trees each year over a ten-year period to achieve the target. In the planting season 2009-2010 an additional 2423 trees were planted.

The benefits of trees can be described in numerous ways but these benefits have always been difficult to quantify, especially in economic terms, and it is difficult to see how such existing valuation systems can be used alone to influence budget holders and decision makers with respect to urban forest profile and budget.

In North America the most widely used method for estimating the compensatory value of trees was developed by the Council of Tree and Landscape Appraisers (1992). Compensatory values represent compensation to owners for the loss of an individual tree. These values can also be used to estimate compensation for tree losses, justifying and managing resources and/or setting policies related to the management of urban trees.

In the UK the system known as Capital Asset Valuation System for Amenity Trees (CAVAT) fulfils the same purpose. Both systems are, essentially, depreciated trunk formula methods where replacement value is based on a square centimetre measurement of trunk diameter at breast height with replacement value calculated on an equivalent square centimetre nursery price. This price is then depreciated against such factors as useful life expectancy, condition and location.

However, once again the benefits of the urban tree population are not quantified in monetary terms by either system, although it is possible to estimate the replacement value of the urban forest in monetary terms and to present the urban tree population as a quantifiable asset with a real and defined monetary value. This is useful in budgetary negotiation and for increasing the profile of urban forestry among policy and decision makers. For example, using CTLA, it has been estimated that the urban forest of Chicago, consisting of some 3,585,000 trees, has a structural value of 2.3 billion dollars.

It has been suggested that the value of the urban forest is equal to the net benefits that members of society obtain from it and that to estimate those benefits several relationships must be evaluated. Relations between the urban forest structure and associated ecological processes need to be understood. Urban forest structure is the way in which vegetation is arrayed in relation to other objects such as buildings, and other hard impermeable surfaces.

Research in two cities in California – Modesto and Santa Monica – analysed the cost-benefit ratio of street and park trees. The approach considered functions such as energy savings, air quality improvement, storm water run off reduction and CO_2 reductions and aesthetic benefits. The estimated benefit of the trees was between 1.85 to 1.52 times higher than the actual costs of maintaining the asset. The aesthetics and other benefits accounted for a large part, 50-80% of the total benefits, while pruning accounted for half the maintenance costs (McPherson and Simpson 2002). The above research resulted in the development by the US Forestry Service of STRATUM, a measurement tool focusing on the benefits provided by urban street trees and putting a financial value on those benefits.

The latest series of tools for measuring eco-system services in the urban environment are contained in what is now known as the i-Tree suite. The system was developed by the US Forestry Service and was introduced in 2006. The suite comprises of two main components with further applications under development.

i-Tree Eco is an adaption of the urban forest effects model (UFORE) which provides a broad picture of the urban forest. It is designed to use field data from

complete inventories or randomly located plots throughout a community along with local hourly pollution and meteorological data to quantify urban forest structure and value to communities.

Streets (formerly STRATUM) focuses on the benefits provided by the street trees in a given geographical area. It makes use of a sample or complete inventory to put an economic value on street trees' annual environmental and aesthetic benefits.

The use of i-Tree Eco in the US has resulted in comprehensive cost-benefit analysis produced for major cities. An example of this comes from the report produced in 2007 for the city of Chicago, where it was calculated that the city's 3,585,000 trees removed 888 tons of pollutants each year at a value of $6.4 million a year, stored 716,000 tons of carbon with a value of $14.8 million, sequestered 25,200 tons of carbon per year with a value of $521,000 a year, saved $360,000 a year in building energy reduction (Nowak et al 2009).

Similar reports in other cities in the US have resulted in higher budgets, increased tree planting and a generally higher profile for urban forest management.

At Barcham Trees we have invested both time and money in inviting Davey Tree Care consultants across from the US to train Barcham staff in the use and implementation of i-Tree.

The following piece by Kenton Rogers of Hi-Line Consultancy describes how i-Tree Eco is currently being applied to Torbay in the UK.

The Value of Trees

At last year's Trees and Climate Adaptation Seminar (organised by Treeworks Environmental Practice), at the Royal Geographical Society in London, Tim Rollinson, Director General of the Forestry Commission, concluded during his summary that, "The benefits of trees must be made tangible. Because if we [as an industry] do not value trees, then they will be valued at nothing."

Trees are arguably the single most important component of green infrastructure – yet in many places we continue to see the urban forest eroded. Primarily, this is a direct result of undervaluation.

Most of the services provided by trees and forests are not captured in the balance sheets because they are not directly traded in markets, effectively making them 'invisible'. Many of them are public goods: things like clean air that everyone wants but nobody is prepared to pay for. Even where they are traded they are often undervalued because their worth is not fully appreciated, or only one provisioning service such as carbon sequestration is considered.

However, this should not lessen the need to treat them as economic assets.

Yet we must be careful not just to focus on the individual benefits of trees when determining value because the value of trees is in their ability to provide multiple ecosystem services simultaneously. In short, trees are worth more than just carbon.

Many argue that society does not have or use the right tools to measure ecosystem services accurately but this should not be used as an excuse for inactivity. Models (such as the i-Tree suite) can, and will always be, improved upon over time but these improvements can only result from the use of these tools today!

It was with this in mind that the Torbay 'i-Tree Eco' pilot project was conceived as a working partnership involving Torbay Council, Hi-Line Consultancy, Forest Research and Natural England, all of whom were, incidentally, delegates at the excellent Trees and Climate Adaptation Seminar, where we were able to lay the foundations that would take the project forward.

For those of you who don't already know, i-Tree is a peer-reviewed software suite (originally The Urban Forest Effects Model (UFORE) which has been designed by the United States Forest Service. i-Tree has been used to quantify urban forest structure, function and values in numerous communities throughout the world. Randomly generated plots stratified by land use type combined with local pollution and meteorological data can quantify the ecological benefits provided by trees and shrubs. By understanding the local, tangible ecosystem services that trees provide, i-Tree users can link urban forest management activities with environmental quality and community livability. i-Tree provides the baseline data that can be used to demonstrate value and therefore set priorities for more effective decision-making.

In Torbay 250 sample plots were laid out across the borough in order to glean information on the profile of the urban forest. i-Tree Eco is not an inventory tool but gives baseline information on the character of the urban forest and objectively quantifies some of the ecosystem services provided by the same.

Decision makers with access to information on ecosystem service values are better placed to make more efficient, cost-effective and fair choices and to justify their reasons for taking action or for choosing between options. The valuation of trees or 'treeconomics' can reveal opportunities for cost savings where the ecosystem services could be provided at lower cost than man-made alternatives eg carbon storage, flood control or evaporative cooling.

This study will mark the first quantitive UK analysis of the urban forest in terms of the benefits it provides to society, thereby helping to ensure long-term sustainable delivery of ecosystem services for the benefit of current and future populations of Torbay.

It will also allow for the improved management of the urban forest resource (treated as a whole rather than on a tree by tree basis) in a changing climate by improving climate resilience (defined as the ability of the urban forest to avoid, adapt to, or recover from shock or change).

With better information we can make better decisions and also make the benefits of biodiversity and ecosystem services visible to economies and society, leading to greater advocacy for trees in the urban environment.

For further details of i-Tree Eco implementation please contact kentonrogers@hi-linecontractors.co.uk or keith@barchamtrees.co.uk