Who said money doesn't grow on trees?

Can you measure the financial value of trees? And if so, should you? The answer to both questions, says Kenton Rogers, is yes

Many of us will already be aware that urban trees offer many significant ecological functions – providing shading, evaporative cooling, the capturing of polluting aerosols and fine particulates, interception and filtration of rainfall, carbon storage and sequestration, not to mention noise reduction, soil conservation, biodiversity and the indirect benefits on human health and well-being. As just one example, a single hectare of mixed forest can remove up to 15 tonnes of particulates per year from the air whilst a pure spruce forest may filter two to three times as much (Bramryd and Fransman 1993).

Trees are the single most important component of green infrastructure and the ecosystem services provided by the urban forest will become increasingly important in a changing climate. There is also increased regulatory focus on the value of natural capital which means that it is more important than ever to understand the value of ecosystem assets.

Yet despite this our natural assets are being eroded and lost at unacceptable levels. The Millennium Ecosystem Assessment concluded that we systematically undervalue our ecosystem services and that as a result in the last 50 years we have degraded two-thirds of these.

The benefits of trees need to be made tangible, or they will continue to be undervalued. Furthermore, there is a need to quantify the urban forest resource to establish a baseline from which to monitor future progress. If you can't measure your resource, then how can it be managed?

Consider your own town or city. How much is known about the benefits and costs of this forest to the community? How much is known about the environmental services that these trees provide on a daily basis? Evidence from the 2008 Trees and Towns II report to government illustrated that only 5% of local authorities have conducted any form of cost benefit analysis on its tree stock and that there is an increasing tendency to view trees in the context of hazard and risk rather than as an asset (Johnston 2008).

Ecosystem services can be defined as the services provided by the natural environment that benefit people

In contrast, tools for quantifying Urban Forest Structure and Function are freely available in the US and are used by academics and communities alike. For the past 20 years the United States Forest Service has collaborated with state agencies and non-governmental organisations to develop tools which provide baselines that are both measurable and comprehensible to technical specialists and the public alike. A recent study in New York valued the contribution of New York's existing street trees at nearly $122 million annually or $5.60 for every dollar spent in planting and maintenance. Although one must bear in mind these contributions are built up over time, it still prompted Mayor Bloomberg to announce an exciting goal: to plant one million trees over the next 10 years. This is some turnaround, as in the decade between 1977-1987 there had been a net loss of approximately 175,000 street trees in New York, equivalent to 25% of the population (quoted in Moll 1989).

One such peer-reviewed software suite is i-Tree Eco. Originally known as the Urban Forest Effects Model (UFORE), designed by the United States Forest Service in 2000, it is subject to ongoing development and has been used to quantify urban forest structure, function and values in numerous communities throughout the world. A UK trial is currently underway in Torbay where the project is being delivered as a partnership involving both Forest Research and Natural England in order to collate region specific data sets for pollution and climate which need to be incorporated into the model to provide a UK specific benchmark.

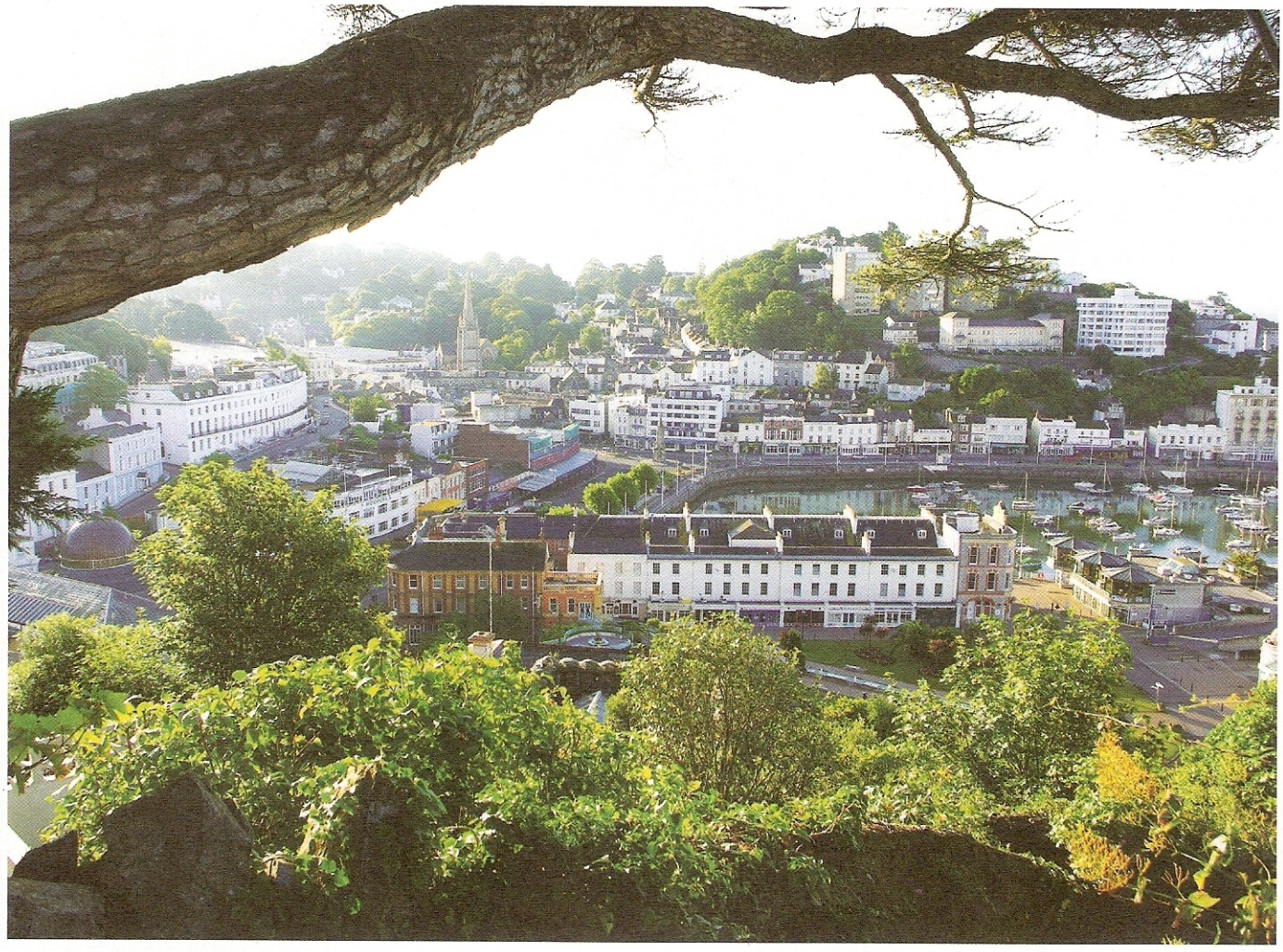
Some 250 random plots have been generated across the project area, providing a representative sample of the green infrastructure and its relationship with the built environment. Data is collected from each of the plots on tree species, numbers, dimensions and condition as well as information on the different land use types present.

The data from these plots is then fed into the model which will calculate values for:

- the structural values of trees;
- the energy-saving effects on buildings (summer cooling/ winter warming);
- carbon storage;
- annual carbon sequestered;
- pollution filtration.

It will also provide a datum point on the character of the area's tree stock, a marker post from which to set further goals or to ensure the level of natural capital is maintained.

'The i-Tree applications can provide valuable information



Climate projections for Torbay indicate that it looks set to experience warmer, drier summers with average temperatures rising by about 1.5°C by 2020 and potentially by 4°C by 2080. The urban forest will be an important part of Torbay's adaptation strategy UKCIP(2008)

that will allow for greater understanding of the services provided by community trees, leading to greater advocacy and strategic management to ensure that benefits are provided for future generations,' says Al Zelaya of the Davey Tree Expert Company. 'However, the importance of leadership is still essential to be able to identify local issues of concern and to identify opportunities to teach citizens and decision-makers how proper long-term care and management of the urban forest can be part of the solution to local and regional problems.'

A host of US projects have been able to actively demonstrate the benefits that trees provide, many of which have been community led or driven. This has in turn lead to greater advocacy for increasing urban forest cover and improving urban environments. Basically we need trees in all parts of our towns and cities, but tree cover in urban areas tends to be lowest in high-density residential zones where socio-economic deprivation and ill-health are often concentrated. With better investment in tree care and planting, the benefits become increasingly apparent, as the environment improves, with better air quality, greater visual amenity, pollution reduction, storm-water management and so forth. The potential knock-on economic benefits of increased tree numbers are reduced summer cooling and winter heating bills for residents and businesses, reduced healthcare needs and fewer days off work. Simon Bates, Natural England's senior project manager on climate change in the south west notes, 'Increasing urban tree cover is a smart way of coping with rising temperatures and flooding, but we will have to put a monetary value on the benefits that humans accrue from those trees. This then opens up private investment opportunities, rather than the whole cost of tree maintenance falling to the local authority all of the time.'

The results from the Torbay project will be available by early next year and will constitute a very useful exercise in quantitively measuring the ecosystem services of Torbay's trees and assessing their worth. It will also ensure that Torbay's tree stock can be made healthy and resilient in the face of a changing climate. Neil Coish, Torbay Council's Trees Manager, concludes that 'the project within Torbay will help members of the community gain a greater understanding of the role trees play within the urban environment. The project will identify the positive benefits that trees confer within the public realm and to the wider environment, proving that the positives far outweigh the negatives.'

Kenton Rogers is a senior consultant with Hi-line Consultancy who are helping to deliver the UK pilot as a partnership between Forest Research, Natural England and Torbay Council. For further information or advice contact: kentonrogers@hi-linecontractors.co.uk. More information on i-Tree Eco is available at: www.itreetools.org