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TREE CONSULTANCY

The protection of trees

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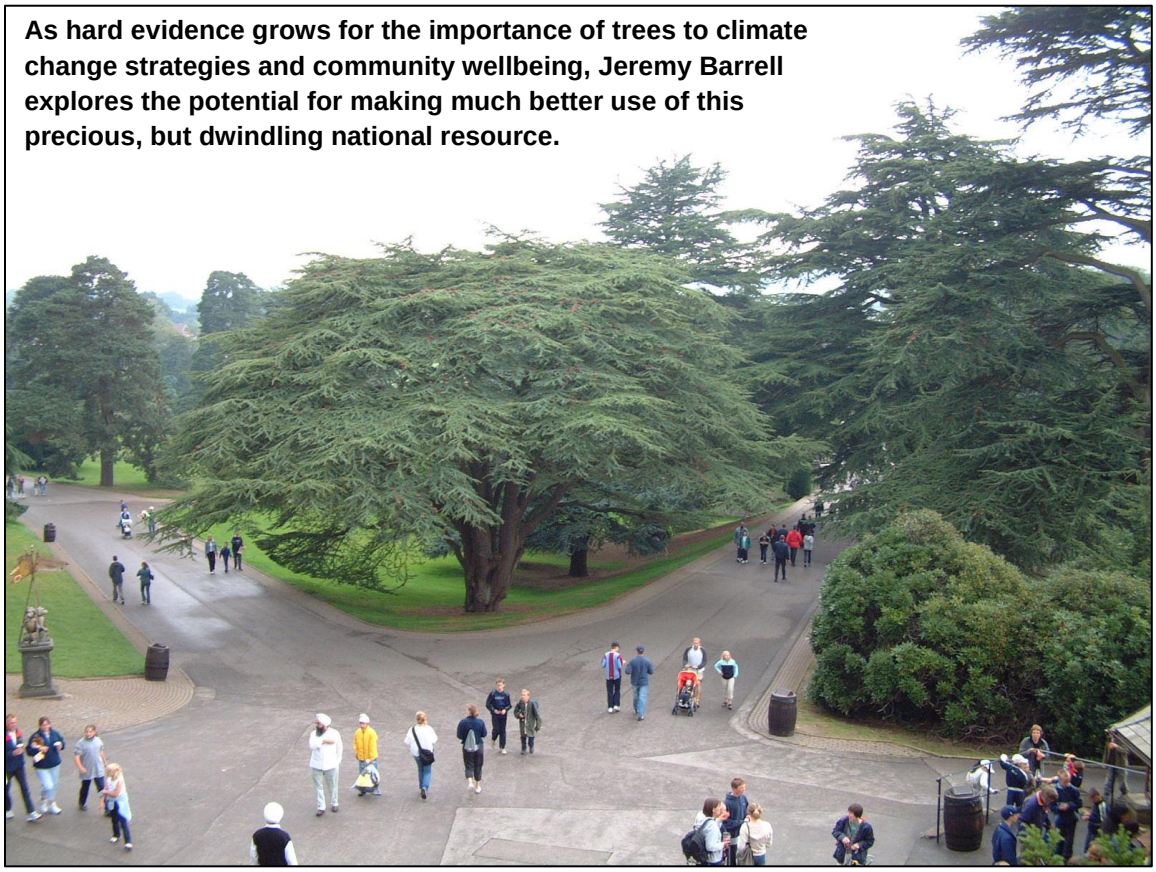
As hard evidence grows for the importance of trees to climate change strategies and community wellbeing, Jeremy Barrell explores the potential for making much better use of this precious, but dwindling national resource.



After a heavy shower, the ground beneath this cedar is still dry. The fact that much of the rainwater never reached the ground, demonstrates how effective trees are at slowing the rate of rainwater runoff.

The Climate Change Act 2008 commits the UK to sweeping sustainability improvements that are going to affect us all. There is growing public and political awareness of the green relief that trees provide and the contribution they could make to our national response to climate change. The task of realising those benefits will fall to land-management professionals overseeing the design of new developments and the upgrading of existing infrastructure.

Future shock

Most of us intuitively know that trees make a real difference to the quality of our lives. All over the world, neighbourhoods with mature trees are the most affluent and the most sought-after; trees make communities look better and feel better and create a focus for civic pride. By contrast, high-density developments with inadequate green spaces look unattractive, feel uncomfortable and often bring out the worst in human nature. Visualising a familiar, tree-lined street with all the trees removed demonstrates the point; the difference is instant and obvious, although the precise reasons for this may not be quite so clear.

Trees do so many good things just by being there, including buffering urban temperature extremes, improving human wellbeing, slowing rainwater runoff, enhancing ecological diversity and ameliorating particulate pollution. However, such 'woolly' virtues are difficult to

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quantify and value, therefore hard to factor into an urban decision-making process that is value-driven. Accountants and managers understand monetary values, but struggle to bring abstract values such as 'looks nice', 'feels better' and 'human wellbeing' into their calculations.

In fact, valuing the positive attributes of trees is such a challenge that it is often easier to ignore them. Traditionally, trees have been given a low priority in the allocation of resources, with other more pressing demands, such as social services and grey infrastructure, taking the bulk of the funds. This failure to appreciate the potential of trees in circumstances of constant budgetary pressure has resulted in a dramatic deterioration of our urban landscape. From the Victorian legacy of large suburban properties with appropriately substantial trees, we have switched the focus to using space more efficiently, which means smaller plots with fewer and smaller trees. Across the country, a heritage of oak, beech and pine is giving way to a future of cherry, thorn and rowan. While the loss of tropical rainforests has been getting all the headlines, urban deforestation has been gaining momentum, unnoticed, in our own backyard.

Typical missed opportunity; a 1970s development that had real potential for big trees with space to mature, like those that can be seen on the skyline. Instead, it delivered a landscape of cherries, thorns and rowans, with no potential to contribute to climate adaptation.

The case for more trees

Historically, trees were valued because people instinctively knew that a world with trees was probably better than one without. Now, intuition alone, no matter how much it resonates or how sensible the arguments are, is not enough. Only hard evidence produces action, and the main driver for finding that proof is climate change.

At a political level, the case for climate change has been made. Anxieties over how these changes may affect our lives have fuelled a considerable research effort into how we can reduce the adverse impacts on our lifestyle. Detailed information on how trees can help is still patchy, but there is an emerging body of evidence confirming that they are much more valuable than we first thought. Recent simulations by the University of Manchester have revealed that trees have real potential to make our communities more resilient to the impacts of climate change (Gill, *et al*, *Adapting Cities for Climate Change: The Role of Green Infrastructure,* Built Environment. 2007). Most notably, they can significantly reduce urban temperature extremes and buffer surges in rainwater runoff, creating safer and more comfortable living conditions.

There is a consensus of opinion that, through the urban heat-island effect, global warming will cause temperature rises in excess of 3°C in our densest urban areas during the next century. Trees, by creating shade and absorbing heat, combined with their verticality and large surface area in contact with the air, are very efficient at reducing temperatures in the extremes of summer. Indeed, one of the most significant indications from the Manchester research was that trees are so effective at temperature buffering that an increase of 10% in urban tree canopy cover and green space may be sufficient to offset all but the most extreme predicted temperature rises. Furthermore, trees, through their size and leaf surface area, are particularly effective at slowing the rate at which water reaches the ground and flows away. Traditionally, rainwater has been treated as more of a problem than an asset, with the focus on draining it out of cities quickly rather than storing it locally as a resource. However, as hydrologists begin to understand its value and the harm that rapid flow causes, trees and their

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rooting environment are being recognised as a viable buffering mechanism.

In addition to these benefits, there is growing evidence of an even more compelling reason for having more trees in communities; they directly and positively affect the human spirit and condition. Researchers are discovering that trees can measurably improve our psychological and physical wellbeing; people who live near trees are likely to be healthier and happier. Natural England's Walking for Health initiative *(www.whi.org.uk)* has shown that, for every £1 spent on access to green space, there was more than £7 worth of benefit in terms of health costs avoided. This and other research confirms that trees offer multiple benefits to our communities, with the potential to deliver significant rates of return on investment.

A new development without trees does nothing for our national climate-adaptation effort.

The policy framework

The previous government responded to growing concerns about climate change and sustainability with the Climate Change Act 2008, which received cross-party support, indicating that it is unlikely that the new government will deviate from its core principles. The Act commits the UK to challenging targets for reducing carbon emissions (a reduction of 80% on the 1990 levels by 2050), with equally tough interim figures (a reduction of 34% achieved by 2020).

Although the focus of the Act is on climate mitigation through carbon management, it also addresses climate adaptation, i.e. reducing the impacts on people and their living conditions (sections 58 and 59). Furthermore, this recognition of the importance of trees and green infrastructure in climate change strategies is repeated in recent government consultations on planning for climate change, *Planning for* a *Low Carbon Future in* a *Changing Climate* and *Planning for* a *Natural and Healthy Environment (www.communities.gov.uk).* To clarify the role local planning authorities (LPAs) should take, the government introduced an 'adapting to climate change' indicator (NI 188) in the new Local Government Performance Framework (*www.defra.gov.uk*). The indicator helps LPAs measure their progress in adapting to climate change over five levels, ranging from identification of priority areas, through to developing and maintaining an action plan. Its rationale commits LPAs to being ' ... sufficiently prepared to manage risks to service delivery, the public, local communities, local infrastructure, businesses and the natural environment from a changing climate, and to make the most of new opportunities' (source: NI 188 guidance). Through the administration and planning function of each LPA, all of us will be contributing to the national climate change adaptation response whether we like it or not.

The practicalities

Delivering the ideal of more trees in our streets is an obvious aspiration, but the practicalities are a lot more daunting and will require the active engagement of land-management professionals. Fortunately, innovative managers and private enterprise around the world are developing more and more products and examples of good practice with exciting potential to assist in this task. Although there is a common perception that the US is inconsistent, to say the least, on the broader global warming issues, it has localised pockets of excellence that provide very useful indicators as to how the UK might proceed. In particular, the mayoral nature of leadership in

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US communities has allowed environmental visionaries to influence municipal strategies in favour of a sustainability agenda. One example is New York City, which has a pioneering climate change plan, with trees high on the list of priorities. More than £140m has been allocated over 10 years to planting and maintaining one million trees as part of the city's sustainability strategy *(www.milliontreesnyc.org).* Furthermore, NYC knows its canopy cover is 24%, consisting of 5.2 million trees, it is 74% stocked and is ranked fifth in the US league of greenest cities. London clearly has aspirations in this direction, as set out in the Mayor's draft *Climate Change Adaptation Strategy (www.london.gov.uk) in* 2008, but its targets of 10,000 new trees over four years and a 5% increase in canopy cover by 2025 confirm that we have some way to go before we can match the US level of ambition.

Another US innovation that has realistic potential for constructive application in the UK is a suite of urban forest management software tools called i-Tree *(www.itreetools.org).* Its programmes convert the 'ecosystem services' provided by trees into cash equivalents that can then be used to demonstrate value and set priorities for more effective decision-making. Although developed by the US Forest Service, it is now on trial in the UK, with the latest council to participate, Torbay, implementing a £120,000 pilot scheme.

On a practical level, another product likely to have a big impact on urban greening is the Silva Cell integrated tree and stormwater system from US-based company *DeepRoot (www.deeproot.com).* The system is designed to improve the success and viability of new trees in the toughest urban environments by employing the Silva Cell, a steel-reinforced plastic frame that is installed beneath hard surfacing and capable of supporting heavy vehicle loading. The frame voids are filled with soil, which allows roots to grow and trees to flourish where they would have struggled using traditional planting techniques. The cells can be stacked in various configurations to provide a continuous rooting environment tailored to the specific requirements of each site. In addition to providing a rooting medium, it also absorbs rainwater runoff to buffer the surges after storms. This slowed water release mimics the flow from natural areas without surfacing - an additional benefit of this innovative product.

This Silva Cell installation in the US supports the finished concrete sidewalk on the reinforced cells, which allows tree roots to thrive in good quality soil beneath. The soil also acts as a temporary storage site when there are surges in rainwater runoff.

The UK's high failure rate for newly planted trees prompted a local company to explore innovations in the way trees are selected, grown in the nursery and planted in the ground. It is tough on the streets for new trees and many die before they get to middle age or maturity. Traditionally, nursery production has focused on the fastest growing trees in the smallest space to maximise the financial return at the nursery gate. However, the resultant tall, thin trees are reliant on intensive watering/fertilisation regimes. They do not cope well with harsh street conditions and often die or never flourish. Barcham Trees

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(www.barcham.co.uk) identified small improvements in selection and cultivation that have the potential to wipe out planting failures and significantly reduce establishment costs. Barchams is researching the production of 'tough trees' that can cope with whatever is thrown at them. They are more expensive to produce, but promise significant savings during their life in the streets because of their resilience.

Conclusions

With the quality of our urban canopy in decline, the UK is not in good shape to adapt to the anticipated extremes of climate change or to achieve a more sustainable community infrastructure. Government recognised these shortcomings and put in place a world-class legal framework for action, with the potential to reverse this position. At the same time, research is confirming that trees deliver an impressive array of essential community services in a very cost-effective manner. The challenge for land managers is to convert this emerging wisdom into results on the streets.

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