TREE DIMENSIONAL

TREES, PEOPLE AND THE BUILT ENVIRONMENT was the title of the recent ICF-hosted Urban Trees Research Conference held in Birmingham in April. The conference chair, Mark Johnston, introduced the conference and reminded those present that the aim of the event was to reach out to those non-tree professionals in the built environment who can have a big influence on the urban forestry resource. That said, most of the delegates were tree professionals of one sort or another, and not surprisingly the research side of the event was the main theme. A large number of overseas delegates and speakers (mostly academics) were present and this gave the conference a lovely international flavour.

HRH THE PRINCE OF WALES had written a letter promoting the importance of quality urban forestry and wished the conference great success which Mark Johnston read out to the large audience of approximately 400 delegates. This was followed quickly by a lively opening address from Pam Warhurst, the chair of the Forestry Commission. As media partners for the conference, essentialarb sent along their own correspondent, Eamonn Wall. His report follows.

So, everyone was primed and ready to hear the most up-to-date research findings and to hear about urban forestry projects, activities and approaches from around the world.

We were not disappointed with the first speaker who I felt got the conference really going. Matthew Wells, is director of tree preservation at the New York City Department of Parks and Recreation. A native of southern England, he has been living in New York USA for eleven years. He presented many statistics about the New York urban tree resource, the initiative to plant another one million trees and the great success of the project to date. 38% of New York is green (contrasted to grey for buildings and roads, and blue for water) with 5.2million trees providing an urban tree canopy of 24%; this compares to only 11% in Chicago. The London plane is the most common tree at 15%, followed closely by the Norway maple (14%). The number of actual street trees is approximately 600,000. Matthew reckons that you can have a street tree (whether you like it – or want it – or not) every 60 foot (20m) and so their data collection research shows scope to plant another 220,000 street trees, and this is what they are doing. Their research also showed that the value of these trees to the city in financial terms was $153m and with this information they were able to convince the mayor to sanction a $22m annual tree budget. They also plan to plant up to 809ha of new woodland/tree-filled parks as part of the Plan New York which focuses on land, air, water, energy and transportation. So far they have planted 421,672 trees at the rate of 22,000 trees per year.

The research methodology used was i-Tree. This also helped highlight where the first tree planting should take place and was based on population density and air quality. Recent research into survival rates of 13,405 planted trees (6-9 years old) found that 62-74% had survived. Much of the survey work was carried out by volunteers. For the future, Matthew is looking forward to opening up a NYC Urban Field Station where research can be carried out and stressed that much of the success of his project came down to the fact that Mayor Bloomberg recognised the importance of urban green infrastructure and trees, combined with his situational awareness.

The second speaker, Kenton Rogers, led on nicely from this and presented the results of his tree survey of Torbay trees using the i-Tree ECO methodology. This aims to measure the environmental services of trees in order to determine the current tree stock and ultimately lead to an improvement in management. The results of the survey include values for the amount of CO_2 held in the trees and removed from the atmosphere each year, pollution removal, structural usefulness, species composition etc. Kenton estimates that the tree resource comprises 818,000 trees sequestering 4280 tonnes of CO_2 annually and removing 50 tonnes of pollution per year – both worth about £280m annually!

The more specific data results show an 11.8% tree cover (compared to 11.2% average for the whole south west of England) which gives 6 trees/person. A further 8% of the land area could be planted on, 37% of the area is built on and 23% already comprises grass areas and parks. The ten most common trees were ash, sycamore, Leyland cypress, hazel, beech, holm oak, elm, Lawson's cypress, hawthorn and oak. Seemingly Leyland cypress is the most commonly tree planted in the urban realm! i-Tree helps to highlight the value of trees and showed that larger trees provide much more benefits than smaller trees.

Dr Norman Dandy, of Forest Research, giving his talk on exploring the role of street trees in the improvement of green networks.

Philip van Wassenaer, a consultant based in Canada, then presented his paper outlining the Strategic Urban Forest Management Plan (SUFMP) approach both he and colleagues have developed and implemented over the past years. For anyone involved in preparing management plans this was a good reminder as to why we write plans in the first place and why they are so important. His SUFMP approach is an eight-point process comprising identification of urban forest attributes, assessment of resource data, creation of vision reflecting community values, determination of current status, identification of gaps, administration vehicle, formulation of operational plan and implementation and maintenance.

The actual plans have a 20-year time frame with more detailed five-year operational plans. The plans must be robust as the urban forest is complex and often political. The plan itself is then made up of five sections – goals and objectives, tree inventory, plan components e.g. tree planting etc., public education and communication, and finally budgets.

The actual model (UFORE – similar to i-Tree) that he developed to help create the SUFMP is focussed on criteria and indicators, examining vegetational resource, community framework and management plan. This process has been modified and has been used to prepare tree management plans for golf courses and other institution land owners. Philip then went on to present a number of interesting case studies where they had produced SUFMPs including one at Oakville near Toronto. This town of 166,000 inhabitants is rightly proud of its trees but the recent infestation of the emerald ash borer is a concern. The SUFMP with the help of the UFORE model helped also to identify/promote other issues and opportunities including an increase in public and political tree awareness, increasing allocation of public budget to tree maintenance, more informed tree species selection, more consideration of urban forestry in planning and development issues and an increase in council staff support for urban forest initiatives. He also pointed out that the intensity of management and benefits is usually different for street trees and parkland trees.

This excellent morning session was followed by an afternoon session split into two streams. The benefit of this is more choice but, on the downside, it is often difficult to choose which session you wish to

attend, coupled with the disappointment of missing out on the other speakers.

Each session comprised three speakers. I attended one on Tree Planting and Establishment (chaired by Keith Sacre), whilst the one I missed was Promoting Green Networks and Human Wellbeing.

Professor Francesco Ferrini from the University of Florence presented his academic findings on the results of a long-term project using controlled mycorrhisation with specific fungal strains on different urban trees. Glynn Percival presented an interesting paper on A Review of Factors Influencing Transplant Survival of Urban Trees. Generally he felt there was a 25% mortality of new urban trees and then went on to outline all the factors affecting tree survival and growth (i.e. establishment). This again was an interesting reminder to tree planting professionals. He split the factors into four groupings – tree ecophysiology (local climate, phenology, tree tolerance), plant quality (tree specification, tree nursery practice and plant handling), planting and post-planting (planting practice, canopy management, rhizosphere etc.), and lastly rooting environment (soil volume, soil ecology and soil structure). I like this list! His observations suggest too many trees are planted too deep and would benefit from mulch and de-compaction.

The final speaker in this session was Gary Watson, Head of Research at the Morton Arboretum in the USA, who also highlighted the problem of deep planting and 'stupid' volcano mulching. I liked his idea of slicing off the outside edge of pot-grown trees' pots, in order to encourage roots to grow straight into the soil and not circular within the tree pit.

The final session of the first day was also split into two streams and I attended Trees and Urban Climate Challenges chaired by Ian Phillips who was representing the Landscape Institute. The alternative session was on Energy Supplies and Other Management Challenges. The first of two papers was by Liz Denman from the School of Land and Environment at the University of Melbourne Australia. Her interesting paper outlined her PhD research

Peter Head, a world leader on green buildings and infrastructure, gives his visionary closing speech.

into the Use of Trees in Urban Stormwater Biofiltration. The aim of this research was to help generally promote an improvement in water quality and managing stormwater in a more planned approach. She found that urban 'rain gardens' were very useful in dealing with stormwater and that the tree species diversity was not significant. Further research was required to examine a wider range of species, range of climates and to examine submerged zones to increase nitrogen removal.

Onto the final paper of the day, presented by Roland Ennos from the University of Manchester, on the Cooling Benefits of Urban Trees. In general, tree shade to buildings can reduce air-conditioning costs by 5% (up to 30% in some cases) and help with reducing winter heating costs. In the winter, broadleaved trees are preferable to conifers in that they both reduce cooling wind speeds, but broadleaves allow

winter sun to reach buildings. In the summer, trees, like other vegetation, cool the city (5-7°C) by evapotranspiration and less heat storage. He reckons a 10% increase in urban tree cover would reduce city temperatures by about 4%, basically the same amount of increase that researchers are forecasting for 2080 as a result of climate changes. So to future-proof our cities we need to plant more trees.

Urbanisation increases the area of impervious engineered surfaces and reduces that of vegetated surfaces. This creates an urban heat island in which temperatures are higher than the rural surroundings and also increases the risk of pluvial flooding by increasing surface runoff. The term street canyon is now used where streets get very warm due to lack of air movement.

Re-vegetating cities can help solve these problems. Vegetated surfaces provide cooling through evaporation, while trees also provide shade. Vegetated surfaces also have increased permeability, allowing more water to penetrate into the ground and reducing runoff and hence the risk of flooding.

Roland's research showed that a concrete surface in full sunlight will overheat gaining 25°C over the air temperature whereas grass in full sunlight only became 2.5°C warmer than the air. However if you measure the globe temperature (basically the air temperature plus incoming and outgoing radiation, positioned 1.1m above the ground level), Roland found that in contrast to the surface temperature increases noted above, the surfaces had little effect upon the globe temperatures. However, tree shading did. In full sunlight the globe temperatures (which indicate human comfort) above both the grass and concrete were 11.6°C and 9.5°C higher than the air temperature respectively, whereas in the shade they are only 1.1°C and 1.5°C warmer. This indicates that shade is more important for human comfort than the surface a person is positioned above. This all makes sense when you think about it, and explans why shade is so important in hot weather! When in bare feet it can be too hot to walk on concrete or sand whereas you can easily walk on grass which does not overheat and that when sitting outside in hot weather, shade is always sought out whether over grass or concrete, and as the results show, grass and concrete surfaces remain at similar temperatures whilst in the shade but not when in full sun when the surface temperature of concrete zooms away. His conclusions confirm the role of vegetation in reducing the urban heat island, the huge importance of tree shade in increasing human comfort in urban areas by reducing globe temperature by as much as 11°C and finally that both trees and grass reduce surface water runoff, thus helping to reduce the risk of urban flooding. More recent research shows that even in winter leafless broadleaved trees can help reduce water runoff by trapping and directing water into the tree hole/pit.

The conference dinner was held at the Birmingham Botanic Gardens with after-dinner speaker Tony Kirkham from Kew Gardens.

The second day kicked off with a similar format to the first day, two main speakers followed by two sets of parallel sessions.

The topic for the first two speakers was Governance and the Urban Forest. Cecil Konijnendijk, Professor in Green Space Management at the University of Copenhagen, got the day up and running with a breezy presentation on the many issues, benefits and opportunities for urban forestry. In particular the shifting relationship between state, commerce/markets and civil society. Governance comprises all these aspects, both government and non-government. He also spoke about the greater integration of the urban forest with general green spaces within cities and that he saw urban forestry as a delivery mechanism for green infrastructure. He outlined a trend to make cities more compact and to produce smaller but better green spaces, in a bid to bring the trees to the people rather than having to hand the people to the parks, though each is important. He also pointed out that cities like getting green or being green, and that Hamburg is the EU Green Capital for 2011 (Stockholm was in 2010).

Anna Lawrence from FC Forest Research who heads up its Social and Economic Research Group gave a very interesting overview of Governance which comprises people's traditions encompassing rules and culture, stakeholders, institutions and processes. Forestry governance includes rules such as felling licences and certification, whilst urban forestry governance is much broader, encompassing the planning system, public participation, politics and power. Her team have developed a framework for Governance and later in her presentation she reviewed a number of urban forestry initiatives and related them back to the framework which comprises eight aspects as follows: policies and laws (policy), ownership (tenure), stakeholders (people), funding (money), processes, knowledge management, monitoring/watching/learning (feedback) and power. The initiatives she felt demonstrated her points best were the Woods In and Around Towns (WIAT) FC grant scheme in Scotland for urban woodland management; the peri-urban Mersey Forest where the emphasis was on cherishing your local environment; the Trees and Design Action Group for its mixture of professionals and Cydcoed the Welsh initiative established in 2001 to provide grant aid to local projects (163 in fact). This is grass roots led, but like the other

initiatives, its project team was essential. Lessons from this research have shown that local authorities do matter, public land matters, partnerships matter, networks are important, participation at a grass roots level is rare, more good knowledge/data is needed, power is important within cultures and relationships, adaptive management is also important and there is scope for cross-geographical learning and better integration of people and trees.

For the first parallel session I attended Multipurpose Management and Urban Futures chaired by Janet Askew representing the Royal Town Planning Institute. The first presentation was a double act on the topic 'Natives Versus Aliens' – the relevance of the debate to urban forest management in Britain. Sylvie Nail, Professor of British Studies at the University of Nantes, gave a general background to the subject matter whilst Mark Johnston outlined the various nationalistic tendencies creeping into the debate, exotic, invasive, non-native etc. Within the government's Big Tree Plant there was a preference for natives, and there seems to be a confusion that biodiversity has to mean native species. All trees add to the diversity of life. The Trees in Towns II report showed the large number of non-native trees in the UK urban forest and when you consider that Leyland cypress is the most commonly planted urban tree you wonder what all the fuss is about. Mark stressed that the urban environment is a man-made environment and that normal woodland processes of the countryside do not exist. Therefore it is totally wrong to only focus on native species for the urban forest. Climate change is another factor to bear in mind when choosing trees for the urban forest. It seems wrong for local authorities and others to specify native trees carte blanche. Mark concluded by saying, "We choose plants best suited."

Next up was Rob MacKenzie, reader in Atmospheric Science at Lancaster University, who outlined their approach to Strategies For Exploring Urban Futures In, and Across, Disciplines. Rob's research focuses on testing sustainable solutions – how sustainable will the current solutions be, bearing in mind that scenarios will change over time? Their work then focussed on urban trees and air quality with pollution deposition a useful benefit of urban trees and urban vegetation. Roof gardens, green walls, rain gardens etc. all now seem to be better at improving the urban environment than previously thought.

In the question and answer session Francesco Ferrini highlighted a daft situation in Milan where the council is keen on native species and, in particular, bird cherry, native to the region. However, he highlighted these riparian trees are native to the river basin and not suitable for the Milan urban environment!

The last parallel session of the day was Resolving Conflicts with Urban Infrastructure, chaired by John Lockhart. The alternative session was The Value of Communities in Successful Urban Greening.

Stuart Body from Flintshire County Council gave an overview of their research project investigating interactions between closed-circuit television and urban forest management in Wales. He stressed that CCTVs have been shown to reduce crime by only 4% and have no effect on violent crime. His research found that there was a lot of tree lopping and topping to make way for cameras and sometimes tree felling. More communication is required between tree and camera managers to reduce tree damage.

The final presentation was on Current Research Relating to Domestic Subsidence in the UK. Margaret MacQueen gave a sobering overview of her experiences mainly dealing with tree issues in court. Trees are an asset and liability to cities, she maintains, as 15 million homes in the south of England are on clay soils. Foundations are often no more than 2m deep and vegetation can differentially dry soils down to 5m depth. Annual claims are in the region of £500m. There is lots of current research and a Subsidence Forum to disseminate information. Finally Stephen Plante, Director of the Clay Research Group, outlined their works, flagged up oak and willow as the greater users of soil moisture and that re-hydration can help. The trees that use up most water are young, fast-growing trees – 'teenager trees'.

So, almost at the end and we re-convene for the very last session to hear Peter Head of Arup present their ideas on designing a sustainable future. Much of his ideas are contained on the Arup website which describes what he calls the Ecological Age. The idea is that we had the Stone Age, Bronze Age, Industrial Revolution Age (all great users of the Earth's capital) and now that we have climate change (and are wiser?) we have the Ecological Age.

I hope it happens and we can all help it to happen. It was fascinating to listen to Peter, hear his ideas and grasp his vision, learn about new technologies and actual demonstration projects to be built. The emphasis was on reducing consumption and making better/more use of renewable systems and making them more efficient – all about efficiency and reducing waste. He is an engineer so all the time his eco ideas are backed up with practical solutions for the future. Cities must become more compact and more in harmony with the environment. Retro-fitting cities to be more efficient is a huge opportunity and one available big time in the USA where there is scope to make huge energy (via conservation) savings. Damagers must be payers! He outlined biomimicry as a useful tool. He sees anaerobic digestion as the answer for energy production as biomass will only ever be able to produce a proportion of our energy requirements. His paper was fascinating and 25 minutes was no way enough time, a wasted opportunity. I also thought that in some ways his paper did not really connect enough with the subject matter of the conference, trees in the urban setting.

Mark Johnston summed up the conference stating it had been a good idea to reach out to all sectors and stressed the importance and relevance of research to back-up society's demand for trees in cities. It was interesting to note that all but three of the papers I attended were from academic doctors – a research conference indeed. Finally Mark outlined the challenges that lay ahead, saying that all tree professional jobs under threat should be defended as the British public have a great love and need for trees.

It was certainly a good conference and the largest number of delegates probably ever seen at a tree conference in the UK. The international flavour was great.

The value of large trees in urban areas was once again made loud and clear. The old saying – 'Plant more trees… now what was the question?' – seems more apt than ever. The multi-benefits of trees are certainly tree-dimensional!