Forest Research

The Research Agency of the Forestry Commission

FR Eye

November 2007

Contents

Cold, wet, dark… Ah, the joys of winter are now upon us: the early morning chore of scraping the car windscreen and having to regularly commute in the dark; draughty waits on train platforms or steamed-up buses filled with rain-soaked commuters...

But take heart, it's not all gloom and drizzle! Only in winter do we get to enjoy the sunrise each morning and see the stark beauty of bare tree tops against a clear, frosty sky; to stand in front of a crackling, roaring fire at the local pub or make use of the excuse to stay inside where it's cosy and snug. Not to mention munching daily chocolates all in the name of advent, and a plethora of Christmas and New Year social gatherings if you do choose to get out and about.

But if all this doesn't convince you, don't forget there's just another month to go before the days start to get longer.

For now, ignore your emails and take ten minutes to read the latest news from Forest Research. This issue has details of the UK's intensive forest monitoring network and how it's helping spot changes in our forests. There's also a travel report highlighting our growing links with foresters in China, and details of research into fundamental things that many of us take for granted — soil and tree roots. We also say welcome to a number of new faces, including our two new Research Liaison Officers — see inside for more details!

If you've missed any previous issues, they can be accessed via our archive at: **www.forestresearch.gov.uk/freye**

If you would like to contact the editorial team or to request an email notification of future issues as they go live, write to us at: **newsletter@forestry.gsi.gov.uk**

With best wishes for Christmas and New Year from the *FR News* team.

UK forest monitoring system

Progressive change is easy to miss and only when we step back and compare the past with the present can we see just how much change has been happening over time.

Since 1994, Forest Research has been managing a unique intensive forest monitoring network around Britain that provides continuous, detailed information on the condition of forests and their interaction with the environment at both local and regional scales. Ground-level ozone pollution, 'acid rain', climate change, invasive pests and diseases can all affect the structure and composition of forest ecosystems. Our ability to predict the scale and pace of change provoked by these environmental disturbances relies on a sound understanding of forest ecosystem resilience across a wide range of geological and soil environments. Forest Research's network of monitored forest plots is helping to improve our understanding of cause-effect relationships and our ability to forecast change.

The network is made up of 20 permanent forest plots positioned across a broad range of pollution environments and climatic conditions. Each plot is continually assessed for local air quality, meteorology, atmospheric deposition, soil condition, tree growth, crown density, litterfall, phenology and ground vegetation. Soil fungal communities are also occasionally monitored as part of related research work.

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This network forms only a small part of a much larger European-wide forest monitoring network across which all measurements are standardised. It provides us with a means to gauge and understand reasons for changes in forest condition and also alerts us to the need to take rapid preventative action where problems emerge. Climate change in particular is pushing us all to consider the environment from this wider, cross-boundary perspective.

Among the subtle changes picked up by the British strand of the monitoring network, is a notable deterioration in tree crown densities of Scots pine since 1995 in the historically polluted Pennines. Although acid deposition measured in rainfall has fallen significantly at the monitoring site there, comparative improvement of soils at this site is slow, with levels of acidity and aluminium in the soil recovering at a gradual rate through time. This suggests a long time-lag in the recovery of certain forest soils to air pollution. On the other hand, the network has laid to rest bigger worries about the scale of 'acid rain' damage to forests. Nearly two decades ago, press headlines suggested alarming scenarios of catastrophic, wide-scale forest damage caused by air pollution. Tree growth and crown condition assessments show that forest condition has deteriorated far less dramatically on a European scale than was previously feared. Analysing the chemicals in rainfall has shown a reduction in sulphur pollution over the past 10 years attributable to the success of clean air emission control policies.

Looking to the future, what else is on the horizon to alter the stability of forests and their ecosystem? Certainly, the local effects of excess nitrogen (as ammonia) and ground level ozone pollution are now emerging as potential future causes for concern, alongside the direct and indirect effects of climate change on the forests and woods of Britain.

More details are included in the recent **Forestry Commission Information Note: *Ten Years of Intensive Forest Monitoring*** *or* **here**.

Nadia Barsoum

Research trip to Liaoning Province

The Forestry Commission has been developing strong links with China for several years and Forest Research is very much involved in supporting this.

Earlier this year, Colin Edwards visited the Liaoning Institute of Forest Management (LIFM) to help its researchers develop alternatives to clearfell management systems for upland conifers. Here, Colin recounts the highlights of his trip…

Liaoning Province lies about halfway between Beijing and the North Korean border. My visit focused on helping researchers at the Liaoning Institute to undertake some basic research into Korean pine (*Pinus koraiensis*) stands; to establish, photograph and analyse a series of Korean pine plots with a view to finding new ways of managing the stands, for example to improve their natural regeneration.

By working on-site with the researchers, we helped train them in the use of hemispherical camera equipment and associated analysis software, which in FR we use to establish the relationships between stand basal area, an indicator of stocking density, and the below-canopy light environment.

LIFM's plant nursery and research outstation for their Korean pine plantations lies to the north in Caohekou. These plantations look very similar to equivalent-aged Scots pine plantations in Scotland. The sites are thinned at irregular intervals, removing sufficient trees for commercial use, but leaving sufficient stock to perpetuate the stand until clearfell. However, there is now pressure for these forests to be managed for multi-purpose objectives, with an irregular stand structure and more diverse species.

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Research trip to Liaoning Province (cont.)

Although originally planted for timber, the seeds from Korean pine are a valuable resource in an area where the local population is mostly made up of farmers living on what they can grow or harvest from the natural environment. The seeds contain high levels of vitamins A and E, as well as oleic and linoleic acids and are often worth more than the commercial value of the trees. As a result, they are collected by anyone who can access the trees, reducing the sites' ability to regenerate. We did see some natural regeneration however, despite the removal of most of the cones — in one area of the forest, a seed stand of improved (wood) quality Korean pine has been established. Beside the stand, a wooden platform has been erected within the branches of a big larch tree; for three months before the seeds ripen, a local man is employed to live there armed with a shotgun to warn off any potential illegal seed collectors.

For my research work, we choose ten plots for assessment and photographed them at 5.30 a.m. — just before sunrise to get the best quality photography. In Scotland the forests are quiet, restful places at this time of day, but in China they're alive with the yells and cries of locals exercising; some practice Tai Chi, some Kung fu, and others are out for a brisk backwards walk or run before work.

The initial results from these ten plots indicated broadly similar light transmittance values in Korean pine plantations to those of comparable basal area in Scots pine plantations in Scotland. These results are being used by LIFM researchers to design suitable management systems to achieve their multiple objectives for the sites.

Overall, it was a valuable opportunity to share our expertise and I visited a range of sites to learn about the issues challenging foresters in China, including the social and economic pressures that affect their work.

Colin Edwards

Forest Research held a Research Update Meeting at the Drumossie Hotel in Inverness on 25 October. The event was organised in conjunction with Forestry Commission Scotland, the Institute of Chartered Foresters and the Confederation of Forest Industries (UK) Ltd, and took our work to an audience in northern Scotland. In addition to a good representation from the forestry sector, 22 students and two lecturers came along from the Scottish School of Forestry, University of Highlands and Islands.

The overarching theme for the day was climate change and Duncan Ray kicked off the proceedings by considering the impact of climate change on species suitability in northern forests. Sarah Green provided insights into the effect of climate change on tree diseases in northern forests. Tom Nisbet explored forest management and the water framework directive, Colin Edwards provided an interesting talk on natural regeneration, and Elspeth Macdonald gave details of Scots pine timber quality. We were also pleased to have an external speaker — Colin Legg of Edinburgh University gave an interesting summary of the influence of climate change on the frequency and severity of fires.

The day was chaired by Chris Quine, who took the opportunity to introduce our new Research Liaison Officer for Scotland **Steve Penny**.

Forestry Commission Scotland

INSTITUTE OF CHARTERED FORESTERS

ConFor

Confederation of Forest Industries

Cydcoed evaluation project

Forest Research's social and environmental research group is helping to evaluate progress of a £16 million grant programme run by Forestry Commission Wales. Funded by the European Union and Forestry Commission Wales, the programme, called Cydcoed* (pronounced 'Keed Koyd'), focuses on the Objective One region of West Wales and the Valleys. Cydcoed has been helping community groups influence the decisions made about their local area, as well as maximising the long-term social, economic and environmental benefits of woods, and helping individuals to play a positive role in their community.

During 2001-2004, the Phase 1 project awarded grants totalling £3,986,295 to 40 individual projects. Phase 2, which has been underway since 2003, has provided a further £12 million, for 123 new projects.

Roz Wornell is assessing the **Cydcoed programme**, to establish how well the projects are achieving the long-term goals of the programme.

The Cydcoed project groups have almost 8,000 local members and have involved around 18,000 schoolchildren. They also involve about 6,500 people from other groups, such as the Womens' Institute, health groups and Scouts, etc., and have helped 147 people into employment outside of the Cydcoed project through training.

Roz is examining the impacts of the Cydcoed programme more closely and is also carrying out an economic analysis of its public benefits. She is using both quantitative and qualitative techniques to examine people's values, opinions and use of Cydcoed woodlands both before and after the programme began. The evidence collected will help evaluate social return on recreation, health, wellbeing and volunteering. The final report will be ready in August 2008.

For more details of this work, contact Roz Wornell on 01970 881910 or via email: **rosalind.wornell@forestry.gsi.gov.uk**

* Learn some Welsh! Cydcoed literally translates as 'shared wood'; cyd means shared or joint, and coed means wood, so Cydcoed means 'woods for all'.

Cost-effective soil metal analysis

Many of the land regeneration projects undertaken by the Forestry Commission involve the development of contaminated and brownfield sites. There is often a requirement for a site investigation as part of this process to establish any risks that may be posed to site developers, users and the wider environment. The cost of analysing soil for metal contamination is often prohibitive, resulting in increased risks from a lack of full site characterisation. For example, contamination 'hot spots' could be missed or they could be overestimated, which might lead to costly and unnecessary remediation.

Hand-held field-portable X-ray fluorescence (FPXRF) instruments have been developed and marketed for some time, but potential users are still often not aware of these devices and how practical and accurate they are. The Forestry Commission and CL:AIRE (Contaminated Land: Applications In Real Environments) jointly funded a project to compare these instruments with traditional laboratory analysis for assessing the metal concentrations in soil.

When placed in direct contact with soil, the FPXRF provides a display showing the concentrations of metals. It can be easily used as a screening tool to identify areas of potential metal contamination and hot spots. This helps to assess the variability of the site and can also help when designing a site sampling strategy. The FPXRF was found to provide good-quality data for arsenic, cadmium, copper, manganese, lead and zinc, albeit above specified concentrations in some cases, and can be used to reliably supplement traditional soil analysis.

FR's Land Regeneration and Urban Greening researchers have recently completed a CL:AIRE Research Bulletin outlining these findings: *Field Portable X-ray Fluorescence (FPXRF): A rapid and low cost alternative for measuring potentially toxic elements in soils*, CL:AIRE Research Bulletin 7. This will be available for download from www.claire.co.uk

See also:

Kilbride, C., Poole, J. and Hutchings, T.R. 2006. A comparison of Cu, Pb, As, Cd, Zn, Fe, Ni and Mn determined by acid extraction/ICP-OES and ex situ field portable X-ray fluorescence analysis. *Environmental Pollution* 143, 16-23.

Danni Sinnett

Great expectations — the reality of research in a different culture

What happens when two people from separate cultures meet during a research interview? Cultural differences, prejudices, divergent expectations and misunderstandings can all lead to difficulties when carrying out research projects, wherever they may be. These issues were highlighted in a short play by FR researchers Vanesa Castan-Broto and Claudia Carter at this summer's 6th Global Conference on Environmental Justice and Global Citizenship.

Vanesa and Claudia used experiences gained from an international research project carried out in Bosnia to dramatically demonstrate the problems that can be encountered. They decided to try their hands at acting to show how differing views and backgrounds can hamper mutual understanding.

In their performance, Vanesa and Claudia took on the roles of a UK-based researcher and a local Bosnian resident facing a range of environmental hazards. They used this example to show how problems can arise from the difference between having a purely technical-based approach to the issue and having actually experienced environmental pollution in a real life context. For example, the dispersion of fine coal ash particles by wind can affect breathing and health, but also brings local inhabitants daily frustrations that a technical approach might not anticipate, such as depositing dirt around their homes and staining washing. The play was based on the researchers' experiences in ongoing European project RECOAL, which is developing and testing new methods for the remediation of coal ash deposits and affected water resources in the West Balkan region.

Held at Mansfield College, Oxford, the conference gathered together an international group of researchers from a wide variety of disciplines, such as law, politics, anthropology and theology, combining their wide understanding of this complex issue.

For more details visit the conference website at **www.inter-disciplinary.net/ptb/ejgc/ejgc.htm**

More information on project RECOAL can be found at **www.forestresearch.gov.uk/fr/INFD-63KE8Y**

Soil experts group

We may not often stop and think about soil, but a thorough understanding of it underpins all environmental research and, with the European Soils Directive about to come into force, soil is starting to be given much greater attention by policy makers.

The South East England Soils Discussion Group (SEESOIL), affiliated to the British Society of Soil Science, carries out field visits, conferences and workshops on themes relating to soil science, soil management and exploitation. Earlier this year, the group met at Alice Holt in Surrey to discuss forest soils and the current soil research carried out at Forest Research.

The group considered the impacts on soil of pollution and climate change, as well as soil surveys and monitoring. They also discussed the role of forest soils within the wider environment, such as the forest ecosystem, archaeology and hydrology. A number of Forest Research environmental scientists made **presentations** to the group, after which visitors were taken on a field trip to several sites where FR is currently working on soil analysis under a range of research programmes, including the Environmental Change Network, Level II Intensive Forest Monitoring Network, Soils and Archaeology, Soil and the C-cycling and fluxes.

Winter 2007 meeting

The next SEESOIL conference will take place soon at the University of Surrey on 11 December. The theme for the meeting is 'Soil and water conservation', which covers conservation issues within both agricultural and natural soil-water systems, the impacts of human activity, and the management and maintenance of soils as 'fit for purpose'. Other topics will include the implementation of legislation and how this may affect ecosystems. More details on the upcoming conference can be found at **www.forestresearch.gov.uk/fr/INFD-77DD7N** or by contacting SEESOIL secretary, **Elena Vanguelova**.

Soil scientists testing the texture and the smell of the surface water gley soils at Alice Holt forest

Fire suppression seminars

Even in Britain's soggy climate, fire can be a threat to forests, heaths and moorland, and as a result foresters and landowners worldwide have learnt techniques for its management and suppression. In Scotland, the Fire and Rescue Service is encouraging use of this expertise by forming Wildfire Groups made up of both fire professionals and landowners, such as private estates and the Forestry Commission. This new closer working recognises the knowledge and experience of land managers in dealing with fire.

In the same vein, the Institution of Fire Engineers (IFE) recently organised a number of seminars on Fire Suppression for an audience of fire consultants and Fire and Rescue staff. Amongst the invited speakers were Forest Research's Ian Murgatroyd, Colin Legg of Edinburgh University and Michael Bruce of Glen Tanar Estate.

Ian presented details of a study comparing the water quantities used by different pumps and methods to suppress similar fires. Conventional, small, low-pressure water suppression systems used 4 litres of water per metre of fire front, while high-pressure jet-wash pumps, (similar to the type used for vehicle washing) used less than 1 litre per metre of fire in order to suppress heather and grass fires. For rural fires, this is particularly important, since the nearest water source may be some distance from the fire front.

The discussion also covered other techniques in fire suppression, such as team working with beaters, which can be used as a stand-alone system or alongside water-based systems to reduce water usage rates. Detailed information was given on fire breaks, and other management issues were considered, such as strategic planning, e.g. controlling fires at known defensive points based on previous fire history. Case study data was also used to compare the performance of suppression systems (i.e. beater, pump and helicopter) to fire rates of spread.

The seminars received lively feedback and were a useful means of discussing fire suppression techniques for the UK.

For more details of FR's work on fire management and suppression techniques, contact **Ian Murgatroyd**.

How do trees behave and change underground?

Like icebergs, trees hide much of their structure beneath the surface. Their root systems are vital but often a poorly investigated element of natural ecosystems. As the environment is now rapidly changing, variations in soil are causing root system processes to alter, which may in turn have consequences for tree water and nutrient uptake, carbon balance and tree stability.

A network of European researchers have been working together on woody root processes. The group was established as part of European concerted research action Cost E38 'Woody roots processes' (2004–2008). The main goal is to better understand the topic, improve methods of measuring root responses to environmental change and identify funding sources for collaborative research in this key area of environmental research. The project has three working groups focusing on: 1) roots as indicators of environmental change, 2) fine root dynamics and 3) modelling coarse root structure.

Elena Vanguelova and Bruce Nicoll from Forest Research presented some of the research findings at the 4th International Symposium on Physiological Processes in Roots of Woody Plants in Bangor this September.

Bruce ran a workshop on '3D architecture of coarse root systems — measurement and analysis' along with Fred Danjon from INRA (Bordeaux). The workshop covered software tools that can help analyse root system data, and focused on issues including architectural analysis, tree stability, and root system plasticity as a response to several environmental factors.

Elena, who has led working group 1, presented the results of the group's research into 'Bio-indicators of stress in tree fine roots'. Elena said: "Although studies on fine-root responses to environmental changes are labour-intensive, they can yield useful information about damage and indicate long-term changes in ecosystem functioning".

There will be a series of outputs from this EU Cost Action, the first being a special issue of *Plant Biosystems* called 'Advances in Woody Root Research', volume 141, published in November 2007, which contains seven review papers written by the three working groups. For more details, visit: **www.informaworld.com/smpp/title~db=all~content=g785821717~tab=toc**

For further information on this subject, contact **Elena Vanguelova**.

Information Note

Evaluating biodiversity in fragmented landscapes: the use of focal species
A Eycott, K Watts, D Moseley and D Ray (FCIN089)

Technical Note

Cleaning mechanised pesticide spray equipment
Bill J Jones (FCTN017)

These publications are available to download or order from Forestry Commission Publications — see **www.forestry.gov.uk/publications** for more details.

Practice Guide

Raising trees and shrubs from seed
Peter Gosling (FCPG018)
Price £5.50 **www.forestry.gov.uk/forestry/HCOU-4VXJ5B**

This Practice Guide introduces the principles and practical methods for collecting, storing and propagating from seed a wide range of woody species commonly grown in the British Isles. It is aimed partly at anyone interested in raising a relatively small number of plants, and partly at commercial growers – as a useful reference but without the legal aspects. The Guide begins with information on flowering and fruit development, and recommendations for small–scale collecting, handling and processing. It then provides detailed advice on storage, dormancy and pretreatment methods for over 100 woody species. It gives suggestions of 'things to try' to hasten dormancy breakage in the most time consuming and dormant species. The Guide concludes with some tips on sowing seeds and raising seedlings.

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Forestry and Climate Change

Edited by P H Freer-Smith, M S J Broadmeadow, J M Lynch, Forest Research, UK

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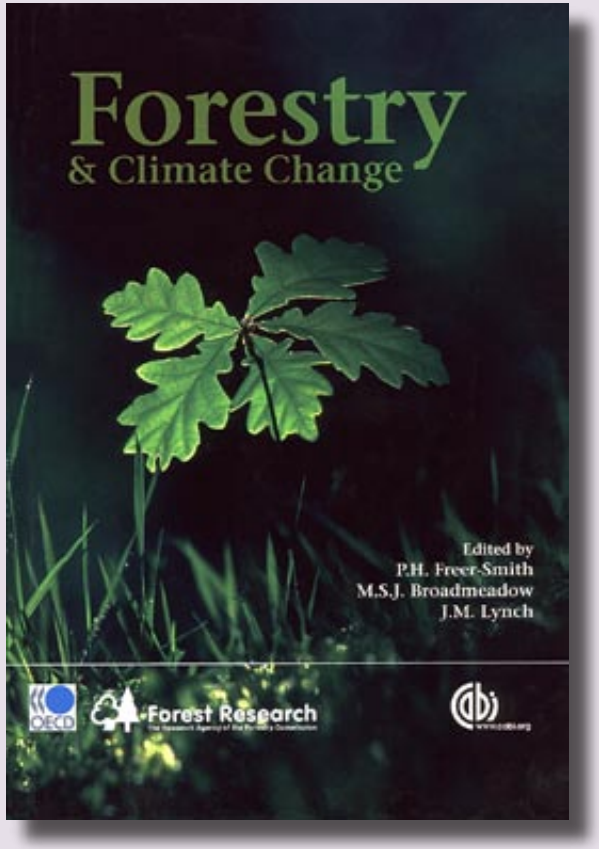

Climate change is one of the greatest challenges we face - both in terms of its potential impact on our societies and the earth, and the scale of international co-operation that is needed to confront it. Emerging as a component of the international dialogue on the environment and climate, the role of forests in influencing earth systems will need to be assessed. Drawing together perspectives from researchers and policy makers, this book explores how forests will interact with the physical and natural world, and with human society as the climate changes. Also considered is how the world's forests can be managed to contribute to the mitigation of climate change and to maximise the full range of economic and non-market benefits. Providing an examination of the science, a detailed consideration of the science policy interface and the international frameworks and conventions, this book is valuable reading for all those interested in sustainable forest management, climate change and the associated environmental sciences.

For more details visit **www.forestresearch.gov.uk/fr/INFD-78WK8M**

Assessing and communicating animal disease risks for countryside users

This programme will help those involved in the countryside to understand better how to deal with diseases such as Lyme Disease, how to communicate the degree of risk effectively, and how to encourage preventative action.

www.forestresearch.gov.uk/fr/infd-77cekt

Investigation of canopy throughfall and interception

Detailed study of the rainfall interception process and evaluation of the applicability of Gash's model of canopy interception.

www.forestresearch.gov.uk/fr/infd-789eqq

New pathways for health and well-being

Research to understand and overcome barriers to accessing woodlands.

www.forestresearch.gov.uk/fr/infd-78pdpc

Urban networks for people and biodiversity

Habitat networks are a key mechanism for reversing the effects of fragmentation on biodiversity while delivering other social and environmental benefits. This research aims to clarify and propose a direction for the implementation of networks in urban environments.

www.forestresearch.gov.uk/fr/infd-78qj6p

Full details of FR's events are available from the FR website: **www.forestresearch.gov.uk/events**

30 November 2007
Impacts of climate and vegetation cover on water erosion of contaminated soils – Cecile De Munck.
Research Update Seminar, 10.10–10.30, Alice Holt

30 November 2007
Geological information and technology in support of social science, a view from the British Geological Surveys Soils Programme – Professor Barry Smith (BGS)
Seminar, 14.00–15.00, NRS (click **here** for more details)

7 December 2007
Climate change and ecosystems services – a complex systems approach – Professor Terry Dawson (University of Southampton)
Seminar, 14.00–15.00, (click **here** for more details)

11 December 2007
Soil and water conservation
SEESOIL winter meeting — covering conservation within both agricultural and natural soil-water systems, impacts of human activity, management and maintenance of soils as 'fit for purpose' and the implementation of legislation and how this may impact on ecosystems.
Continuing Education Centre, Senate House, University of Surrey, Guildford. 10–16.30.
http://www.forestresearch.gov.uk/fr/INFD-77DD7N

14 December 2007
Designing an integrated forest monitoring system – Geoff Morgan
Research Update Seminar, 10.10–10.30, Alice Holt

(cont.)

11 January 2008
The Forest Growth Model; impacts or inputs – Tim Randle
Research Update Seminar, 10.10–10.30, Alice Holt

18 January 2008
Payments for Ecosystem Services: perspectives from the United States – Gregory Valentin and Jenna Coull
Seminar, 14.00–15.00, NRS (click **here** for more details)

1 February 2008
Tree seed biology, climate change and local seed source (The 'seedy' side of Forest Research) – Peter Gosling, Shelagh McCartan, Mark Broadmeadow and Jo Clark
Research Update Seminar, 10.10–10.30, Alice Holt

8 February 2008
Forests, trees, human health and wellbeing – Dr Richard Mitchell (University of Edinburgh)
Seminar, 14.00–15.00, NRS (click **here** for more details)

22 February 2008
Woods full of old stuff – the role of FR in preserving the historic environment – Peter Crow (EHSD, AH)
Seminar, 14.00–15.00, NRS (click **here** for more details)

7 March 2008
Species and habitat conservation for plants: projects and perspectives at Plantlife Scotland – Deborah Long (Plantlife Scotland)
Seminar, 14.00–15.00, NRS (click **here** for more details)

2008 lecture series

17–19 September
SilviLaser 2008: LiDAR applications in forest assessment and inventory
Conference themes include LiDAR data fusion, forest applications, algorithm and techniques development, large-scale applications of LiDAR, operational LiDAR and new technologies.
www.forestresearch.gov.uk/silvilaser2008

Rare bird spotted

A rare bird, the Hoopoe (*Upupa epops*), was spotted last week on an FR research plot near the Surrey/Hampshire border. Eagle-eyed members of FR's Technical Services Unit, Tony Bright and Jamie Awdry, alerted Mike Young who was able to photograph it.