



Forest Research

ANNUAL REPORT AND ACCOUNTS 2003-2004



Forest Research

The research agency of the Forestry Commission

Forest Research

ANNUAL REPORT AND ACCOUNTS 2003-2004

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Advisory Committee on Forest Research

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Animal and Plant Studies
University of Sheffield

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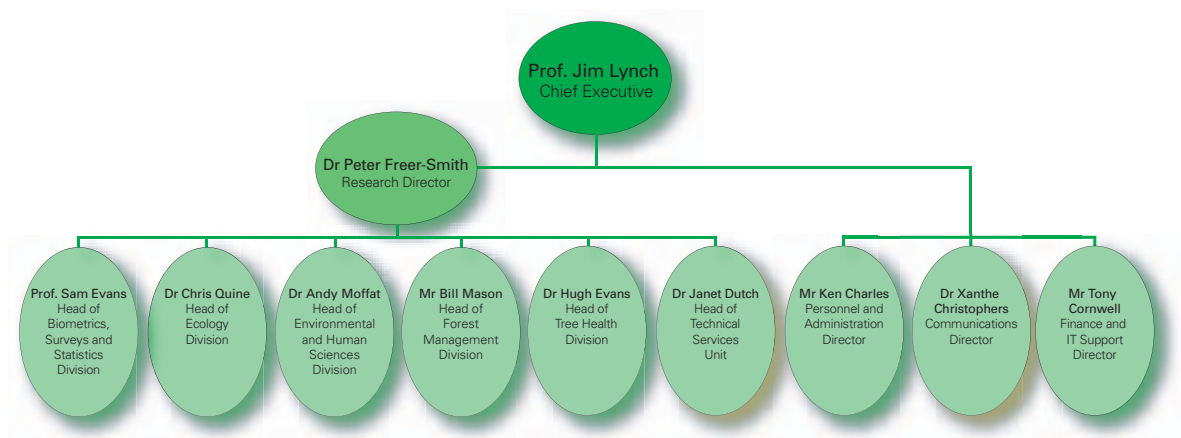
PROFESSOR M. JEGER

Head of Plant Sciences in the
Department of Agricultural
Sciences
Imperial College London

DR S.C. GREGORY

Forestry Commission
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During the compilation period of this Annual Report (spring 2003–spring 2004) the organisation structure shown on pages 141–145 was in place. The new organisation structure shown above was implemented in June 2004.



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Foreword



by Professor David Read, Vice-President and Biological Secretary of The Royal Society

Having spent a forty-year research career investigating the biology of roots and their microbial symbionts I find it refreshing now to be involved, as Chair of the Forestry Commission's Advisory Committee on Forest Research, in considerations of the bigger picture. Not that I make any apology for my subterranean past! It is arguable that foresters pay too little attention to that part of the system that supports and sustains the crop. We forget at our peril that, as a colleague in the Swedish forest industry recently put it to me – 'Halva skogen finns under ytan' – half the forest lies under the ground!

So, what do I see as the broader picture? We live in a landscape which, until 5000 years ago, was almost entirely covered by trees. Unfortunately the human inhabitants of these islands have not been the best custodians of this forest heritage. By the early part of the 20th century deforestation had reduced forest cover to around 3% of the land surface, and today we can claim little more than 12%. This is well below the value sustained by our European neighbours where the average, for

example, of all 25 EU countries is 35%. The new accession countries are also much better endowed with forest resource.

Belated recognition that we had failed to manage our forests in a sustainable way led governments to encourage afforestation programmes, albeit with only modest financial support, through the 20th century, but under conditions which placed considerations of timber yield above all else. Such constraints forced our predecessors in the forestry industry to concentrate on the selection, planting and rapid harvesting of fast growing species most of which were of non-native origin. It was an approach that was entirely justifiable in strategic and economic terms and was underpinned as a successful venture by rigorously executed programmes of forest research. However, as an exercise, it failed to win the hearts and minds of a public which had become largely urbanised on the one hand but increasingly environmentally aware on the other. While pure stands of Sitka spruce (or of Corsican pine) might make sense in economic terms because of the speed with which they

reached the time for clearfelling, they were not the most attractive to people who sought recreational refuge in rural environments. As someone who has enjoyed working in intensively managed boreal forest environments overseas, I have never understood why UK foresters got such bad press for their endeavours to establish productive timber crops, while agriculturalists were able, with relative impunity, to clothe the countryside with pure stands of equally alien plants. Why should the alien maize or rape (a cultivar as far removed from *Brassica napus* as one could possibly get!) escape these strictures?

Whatever, the reasons for these public perceptions, things are set to change. We will of course continue to require that our forests are productive, after all, timber remains among the top three raw material imports to the UK and as such represents a serious threat to our balance of payments. But yield will not necessarily be the driving consideration. The age in which economic factors were the sole determinant of forest succession seems set to be replaced by one that seeks to optimise the broader benefits of forests for the community. These benefits will rightly continue to emphasise productivity, but with this aspect tempered by the requirement to grow trees in ways that are more sensitive to the needs of the environment in general and of people in particular.

The notion that UK forests should be managed as multifunctional ecosystems is gaining increasing impetus. What, more specifically, are these additional functions and how will they be achieved? They derive in part from the visions established by essentially political conventions such as those of Kyoto and Rio, that forests must serve both as 'sinks' for excess carbon dioxide and as refuges of biodiversity. These require, respectively, increased longevity of forest stands and greater sensitivity in their processes of management and felling. The perhaps fortuitous fact that these new functions contribute to enhance the amenity value of forest environments for a people increasingly blessed with disposable income and leisure time should not escape our notice.

The new functions will be achieved by what, for the UK at least, are novel processes of silvicultural management, most notably involving diversification of stand structure and selective felling regimes. Collectively these approaches, which are often referred to as continuous cover forestry, while having great promise, also present enormous challenges to the forestry industry. This again is where Forest Research comes in, but the questions posed are more diverse in nature than those, essentially productivity based challenges which faced our predecessors. They involve, among many facets of sustainability, understanding of interactions between different tree species, and between the trees and their associates on the forest floor and in the canopy, knowledge of carbon dynamics, advanced modelling capabilities that enable prediction of long-term outcomes, and last but not least, the capacity to communicate with the public on the landscape and amenity aspects of proposed and developing management schemes.

What heartens me as incumbent to the Chair of the Advisory Committee is the openness, from top to bottom, with which the new ideas are being embraced by Forest Research. I have discussed these developments with innovative young and older members of the organisation who are not only enthusiastic about meeting the new challenges but are also prepared to work in an interdisciplinary way to enable fulfilment of the goals involved. The same vision has been demonstrated by those assembling the Advisory Committee itself. I am fortunate to be joined by colleagues with a wealth of experience from the pure and applied sciences, from industry and from the social sector, and so am confident that with this breadth of knowledge we shall be able effectively to assist Jim Lynch and his staff as they carry out the underpinning research required to enable realisation of the exciting new goals of forestry.



David Read



About Forest Research

Forest Research is an agency of the Forestry Commission and is the leading UK organisation engaged in forestry and tree related research.

Aims and objectives

The aims and objectives of Forest Research (FR) are to assist the Forestry Commission in achieving its high-level objective.

On behalf of all three administrations, to take the lead in development and promotion of sustainable forest management and to support its achievement internationally.

FR's aims

To support and enhance forestry and its role in sustainable development, by providing high-quality research and development in a well-run organisation.

FR's objectives

- To inform and support forestry's contribution to the development and delivery of the policies of the UK government and the devolved administrations.
- To provide research, development and monitoring services relevant to UK forestry interests.
- To transfer knowledge actively and appropriately.



Research funding

Much of FR's work is funded by the Forestry Commission with Forestry Group acting as purchaser of research and other services in support of forestry in Britain, including the particular needs of England, Scotland and Wales. Forest Enterprise was responsible for managing the FC estate during 2003–04, and purchased research, development and surveys specifically related to this estate. In recent years FR has successfully applied for external (non-FC) funding from government departments, the European Union, UK research councils, commercial organisations, private individuals and charities. Collaborative bids with other research providers and consortium funding have become increasingly important, placing emphasis on effective partnerships.

Activities

Research and development are an essential component in delivery of the benefits of sustainable forestry in a multifunctional landscape. FR's research, surveys and related scientific services address the social, economic and environmental components of sustainability. There is a focus on providing new knowledge and practical solutions based on high quality science. Our projects provide understanding, policy advice and guidelines on implementation of best practice (e.g. on forest hydrology, continuous cover forestry, timber quality, land reclamation to woodland, and restoration of native woodlands). Much of the research is directed at increasing the biodiversity, landscape and recreational benefits of woodlands.

Protection of GB woodlands from pests and diseases and predicting the impacts of environmental change are also overarching themes. FR works closely with the FC, the Commission of the European Communities and other international organisations to ensure compliance with international agreements on the sustainable management of forests and related subjects. The Agency also carries out work on genetic conservation, tree improvement, seed testing, method studies, product evaluation, crop inventory, surveys (*The national inventory of woodland and trees*) and monitoring.

Resources

The Agency has two main research stations, Alice Holt Lodge in Hampshire and the Northern Research Station on the Bush Estate south of Edinburgh. The main office of Technical Development is located at Ae in Dumfriesshire with subsidiary offices in the English Midlands and Wales. The Agency also has 10 field stations (the Technical Support Units) from which an extensive network of field trials, sample plots and monitoring sites is assessed. Contact information is given on the inside back cover of this Report. The Agency employs c. 300 people, not including visiting scientists and sandwich students. FR has published a Corporate Plan for the period 2003–2006 and copies are available from the Library at Alice Holt Lodge.



Chief Executive's Introduction




One year on...

As I embark upon my second year as Chief Executive at Forest Research, I have been reflecting on what challenges the organisation and its staff are likely to face in the year ahead.

The past year has been a demanding one but, although both the forestry sector and the UK science base face considerable challenges, the year has been characterised, above all, by the wealth of new opportunities which have arisen.

- We have enthusiastic endorsement from FC's new Director General, and from the Commissioners, to build the reputation of FR as a leading international centre of excellence for forest research.
- A large number of organisations, ranging from universities to blue chip companies, have expressed enthusiasm to work more closely with FR in projects which will show how forestry can assist innovation and add value to other sectors, such as health and natural resource management.
- Many practitioners' genuine desire to manage land sustainably offer significant opportunities for FR, whose staff's skills span such a wide range of disciplines. Forestry has a crucial role to play in effective integrated land use and other land users can learn much about sustainability from forestry.



I am simultaneously pleased and concerned that staff are working so hard to secure these opportunities. The ability to prioritise well will be one of the chief skills required by us all during the coming year. I believe that one of our most compelling priorities must be to build excellent long-term collaborations.

Innovation is critical if forestry as an industry is to flourish. Clearly stakeholders in the industry have ideas to input, but researchers also, by the very nature of their training and expertise, can input significantly. In consultation for future programmes it is therefore important that the researchers are seen as equal partners in the stakeholder fraternity.

When I joined the Agency I felt that the management structure was complex, did not facilitate communication, and was outwith the modern idiom of scientific organisations. The new structure outlined in this report (page 2) is simpler and we were fortunate in apportioning quality staff to truly represent the range of disciplines and skills which are needed to interact with our business portfolio.

As we strive hard to realise our potential achievement in science and its applications we need help and advice. Our Advisory Board has always been helpful to us and we are very grateful for the service given by our retiring members: Professor Hugh Miller, Professor Michael Usher and Dr Peter Savill. We are lucky that our new board led by Professor David Read, Vice-President of the Royal Society, represents leaders in the areas of science relevant to us. I am delighted that David has written our Foreword this year.

Long-term collaborations succeed only when there is true symbiosis. Whatever the topic, we first need to critically assess what FR can offer its clients and collaborators and to assess whether FR's planned course of actions will keep it at the forefront of the field in question. This requires FR to be constantly alert to its external horizons. We then need to strike a careful balance between giving customers value for money and not under-pricing the cost of our participation. In short, we require financial and scientific excellence in equal measure. The opportunity cost of participating in projects which do not meet both criteria is simply too high.

One of the highlights of our year was to be invited to exhibit at the prestigious Royal Society Summer Exhibition for which the competition to exhibit is intense and represents the best of exciting British Science. Our entry from the Tree Health Division entitled 'Biological cruise missile: beetle vs beetle in forest protection' was admired by many eminent people from all walks of life. Equally satisfying have been our multiple engagements out in the field such as our contributions to the woodfuel debate and social engagement within forestry. We will strive to reach as many stakeholders as possible with our message. (Update, October 2004: this will be facilitated by the appointment of a new Director of Communications, Dr Xanthe Christophers, who comes to us with extensive experience of communication particularly with her work in the Department for International Development (DFID) forestry programme).

I am also pleased that the Agency achieved its key corporate targets for the year, as shown in the table on page 10.

Targets and achievements over the past five years


Performance measure		1999/00	2000/01	2001/02	2002/03	2003/04	
Customer satisfaction	Target	95%	96%	96%	97%	90%	TARGET MET
	Achieved	96%	97%	97%	98%	97%	
Peer-reviewed papers	Target	38	43	48	48	45	TARGET MET
	Achieved	43	48	48	48	45	
Unit cost/research day (unweighted) 98/99 = 100	Target	94	94	94	92	90	TARGET MET
	Achieved	86	82	81	79	78	
Unit cost of support services	Target	98	96	94	92	89	TARGET MET
	Achieved	95	92	86	84	82	
Cost recovery	Target	100%	100%	99%	100%	100%	TARGET MET
	Achieved	100%	101%	100%	100%	100%	
Reports, FC Publications and articles	Target	-	-	-	-	25	TARGET MET
	Achieved	-	-	-	-	25+	
Income from customers other than FC	Target	-	-	-	-	£1.5m	TARGET MET
	Achieved	-	-	-	-	£1.65m	
Review of silvicultural & entomology programmes	Target	-	-	-	-	Complete	TARGET MET
	Achieved	-	-	-	-	Complete	

2003–04 Research highlights

This year's research highlights are again presented by interdisciplinary theme. This reflects the way in which we have increasingly been working. These team contributions summarise many of the year's main findings, put them in the context of the overall programme and direct the reader to full accounts of the research. This introductory section of the report is followed by seven main articles which provide a comprehensive account of selected subjects where important issues have arisen and where major progress has been made.

Together the research highlights and main articles thus provide a comprehensive account of the results of FR's research programmes as completed during 2003–04 (a list of these is provided on pages 134–139). The portfolio of FR's work reflects the UK and international aspiration to achieve sustainable forestry. The need for research and scientific understanding in order to protect forestry has recently been

re-emphasised by the amount of work required on *Phytophthora ramorum*, *Dothistroma pini*, *Cameraria ohridella* and other pests and diseases. Our work in the area of social forestry has continued to expand, reflecting an ongoing and exciting change in forestry. As for the protection work, new EU consortiums have been developed and funded to take forward our social forestry research and significantly better progress will result in both areas. Equally the development of sustainable forest management continues to raise applied research questions, and the work described on direct seeding of Sitka spruce is a good illustration of how progress can be made through close joint working with the forestry industry (Forest Enterprise in this instance). For our biodiversity work the close links with the conservation bodies have been particularly helpful in recent years with excellent work on native woodlands, protected species and woodland birds now under way.



FR's relatively new interest in the establishment of woodland on contaminated land has also formed the basis for new collaborations and funding. Monitoring, data management and modelling continue to be developed across the range of our programmes and a number of decision support systems are now available, with others being developed. The timber quality and genetic conservation programmes are producing important results and the planning of the new National Inventory of Woods and Trees (NIWT2) has gone well. Adjusting forestry practice in response to climate change, consideration of carbon dynamics, the development of woodfuel and economic appraisal are areas where our efforts are likely to intensify over the next few years. Finally, effective knowledge transfer and exploitation of research results have been receiving, and will continue to receive, increased attention.

New Advisory Committee on Forest Research

Five exciting new appointments have been made to the Advisory Committee on Forest Research. These appointments will increase the diversity of science advice and help FR to generate the innovation which is necessary to serve its stakeholders. I am extremely pleased that some of Britain's most eminent scientists have chosen to work with us in this capacity. The Advisory Committee now comprises eleven members with Professor David Read, FRS, as Chairman of the expanded board. David is Head of the University of Sheffield's Department of Animal and Plant Studies. The other four new members are: Professor Roland Clift, FREng, OBE, who is Director of the Centre for Environmental Strategy at the University of Surrey; Professor Paul Jarvis, FRS, Emeritus Professor of Forestry and Natural Resources at the School of Geo Sciences in the Institute of Atmospheric & Environmental Sciences at the University of Edinburgh; Professor Catherine Ward-Thompson, Director of OPENSpace

research centre and Research Professor in Landscape Architecture at Edinburgh College of Art; and Professor David Evans, who was Head of Research & Technology at Syngenta International AG and now a consultant in the field of novel crop management solutions.

Six existing members of the committee were reappointed: Dr Christine Cahalan, Dr Peter Freer-Smith, Dr Steve Gregory, Professor Michael Jeger, Professor Brian Kerry and Professor Jim Lynch.

Thanks have been extended to three outgoing members of the Committee, all of whom have been generous with their time and highly supportive of Forest Research, and with whom FR will continue to have links in the future: Professor Hugh Miller, Professor of Forestry at the University of Aberdeen; Dr Peter Savill, Reader in Forestry at the Oxford Forestry Institute; and Professor Michael Usher, Department of Environmental Sciences at the University of Stirling.

Finance

Income in the year increased by 2.6% compared to the previous year. Within this an increase in Forestry Commission income of £353,000 was offset by a minor reduction in income from non-FC sources of £24,000 (1.4%). There was a 6% increase in payroll costs but reductions in other costs held the overall increase in operating expenditure to 4.6% over 2002–03 levels.

The target net operating surplus for the year of £384,000 was exceeded by £26,000, resulting in a full cost recovery performance of 100.2% against the target of full cost recovery (100%).

Capital investment at £348,000 covered a wide range of scientific and technical purchases including, notably, cryo-preservation and chemical analysis equipment, updated data capture systems as well as IT equipment and laboratory and office refurbishments.



A continuing programme of capital investment in infrastructure, facilities and equipment is essential if we are to maintain the high quality and cost effectiveness of our research.

People

The total number of staff employed by the Agency at year end excluding sandwich students and visiting scientists was 278 full-time equivalents.

Clive Brasier (Pathology) was awarded the honorific title 'Fellow of the American Phytopathological Society', for his outstanding contributions to plant pathology. Duncan Ray was made Deputy Co-ordinator of IUFRO work group 4.11.03 (information management and information technologies). Andy Moffat became a member of the international working group 'Geoscience for Land Use and Sustainable Development' under the auspices of the International Union of Geological Sciences. Paul Tabbush was confirmed as a Director of the Landscape Research Group which encourages education, research, interest and the exchange of information for public benefit, in landscape and its related fields.

Several staff were awarded higher degrees: Russell Anderson received an MSc (with distinction) in Forest Science at Edinburgh University; Elaine Abbott was awarded a distinction for her Napier University MSc thesis on the evaluation of young plantations as a habitat for fritillary butterflies; Joyce Rammell gained a BSc in Natural Sciences and won the Shot and Discus competitions at the Civil Service Athletics Championships and the Hammer Throw at the Scottish Championships.

Ken Williams retired in September 2003 after a total of 32 years with the Commission in Wales. Ken worked with Research & Surveys Branch initially at Betwy-y-coed Research Office and latterly at Gwydyr Uchaf (Llanrwst), as part of the Talybont Survey Team. After 10 years with FR

Ned Cundall left Tree Improvement to join his family on Vancouver Island. Ned's work included the evaluation of seed sources in ash, oak, sycamore, beech and birch in a series of nationwide trials. Ned was also instrumental in FR's membership of the European initiative on forest genetic resource, EUFORGEN.

Ernest Ward, Head of the Chemical Analysis Section at Alice Holt, retired at the end of March 2004 after nearly 18 years of service. Ernest developed the laboratories and provided an excellent analytical service for foliar, water and soil samples for FR, FC and the forest industry, greatly helping towards the application for UKAS accreditation. June Bell retired after 16 years with Forest Research. In addition to her work in Typing Services and Mensuration, June always supported staff events and took a leading role in Alice Holt Christmas productions.

New appointments to the Agency included: Dr Stuart A'Hara to work in Tree Improvement at NRS on molecular mapping/microsatellite markers; Carol Knight to work in Finance and Planning; Stephan Berthier from INRA, Bordeaux on a two-year Marie Curie fellowship, to work on the EU Ecoslopes project; Dr Elena Vanguelova to work as a biogeochemist at Alice Holt; Jane Poole to work as a statistician at Alice Holt; Stephen Bathgate to work at NRS as an analyst/programmer; Joe Hope who has joined Woodland Ecology at NRS as a research assistant; Dr Geoffrey Sellers to work on the EPSRC funded SUBR:IM project on urban greening and land reclamation; Dafydd Huw Thomas to work at Talybont as a forest hydrologist; Benjamin Griffin and Sam Catchpole to work with TSU at Talybont; Rene van Herwijnen to work on the use of novel composts in land remediation as part of the SUBR: IM project; Gary Ashdown as Head of Chemical Analysis at Alice Holt; Rory Cobb as field station manager at Alice Holt.

Visitors and events

Forestry Commissioners, including Tim Rollinson, newly confirmed as FC Director General, visited NRS in March 2004. At the start of their visit, I welcomed them with an outline of the organisational changes being introduced in FR, then followed a series of presentations on Tourism and forestry, Timber quality research, Biodiversity in forests, Genetic conservation of native species. Staff from BBSRC's Rothamsted Research visited Alice Holt to progress ideas for collaboration and developing partnerships with research council partners. The BBC filmed work being done on *Phytophthora ramorum* by Pathology at Alice Holt, as part of their Countryfile programme on 'Sudden Oak Death'.

A wide range of seminars, conferences and workshops were held at the research stations and forest sites. These included: FR/BBSRC Partnership workshop; Taking to the trees in West Argyle - a weekend of events showcasing treasures of the local forest; Innovations in restocking in Hafren Forest; History of southern Scottish woodlands; 'ROOTS': decision support system software for specifying new woodland on disturbed land; Small scale harvesting demonstrations in Shropshire, Herefordshire and Llanfylliu, Wales; Modeller's forum - an overview of FR modellers' projects; Forest Pathologists Group Meeting in Thetford: attended by UK/EU members.

FR was well represented at many UK and international conferences and meetings. These included: the All-party Parliamentary Group on Forestry in the House of Commons to review *Phytophthora ramorum*; the International Forestry Quarantine Research Group in Rome; Annual Contaminated Land Meeting; International Cleanup Exhibition; FRCC: Woodland birds in the UK; Sixth Regional Biodiversity and International Conference; The Royal Show at Stoneleigh, Warwickshire; Genetic conservation and management of British native trees; the South West Woodland Show.



'Woodfuel meets the Challenge' at the South West Woodland Show.

FR's short Research Update Seminars, held regularly at NRS and AH, have continued to be very popular and informative.

The Agency maintained its links nationally and internationally by hosting a variety of groups and individual visitors.

Our most valuable resource in Forest Research is our staff; I thank them sincerely for all the support they have given me during the year in delivering our mission and showing flexibility to the evolution of our structure. This is aided by the good internal relationships we have within FC and with the Forestry Commissioners. Similarly, our network of external relationships both at home and abroad is developing rapidly. Together we have massive scope to demonstrate the value of forestry research in developing sustainable land use and producing optimum economic returns for the industry that we support.

Professor Jim Lynch

Chief Executive