



Forest Research

CORPORATE PLAN 2005-2008



Forest Research

The research agency of the Forestry Commission

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Corporate Plan 2005–2008



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INVESTOR IN PEOPLE

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Executive Summary

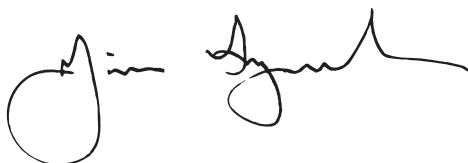
The Forest Research Corporate Plan 2005–08 presents the strategic focus for the Agency, in both scientific and business terms over the forthcoming three years, together with the current external influences on Forest Research (FR). The overall aim is to provide an evidence base coupled with innovation for sustainable forest management in a multi-functional landscape within Great Britain and internationally. Over the period covered by this Corporate Plan, FR aims to continue to grow as an internationally recognised centre of excellence for trees, woodlands, forests and their ecosystems, and for their value to society.

The specific aims and objectives for FR for the period under consideration continue to be partly derived from the recommendations of the Forest Research Quinquennial Review. In particular, the Corporate Plan encourages improvement in programme initiation and delivery of outputs alongside high-quality science and science-based services. Initiatives for improving knowledge transfer will also be developed, representing an increased emphasis on communication and innovation.

The Corporate Plan emphasises the importance of evaluation in the form of performance measurement and robust processes ensured by Quality Assurance accreditation. Seven Key Performance Indicators are included and these will measure achievement of FR's business objectives for 2005–08. They cover science quality, knowledge transfer efficiency, customer satisfaction and financial objectives. The plan encourages the further development of collaborative working within the FC, the forestry industry and beyond in the wider environmental / scientific communities.

The Forestry Commission is FR's main customer. Over the forthcoming year, FR will engage with and implement the Business Improvement Programme recently instigated by the Forestry Commission Director General, where necessary embarking constructively on culture change. FR will also engage with implementation of the soon-to-be released Forestry Commission Science and Innovation Strategy. FR will continue to develop new partnerships and widen its portfolio of research projects supported by external funders.

Key financial information is presented to establish FR's business plan for 2005–08. Staff, depreciation and capital costs are expected to increase as a result of the continuing need for investment in buildings, scientific equipment and IT systems. Investment and staff numbers will be influenced by the level of income achieved in order to meet the overall requirement of full cost recovery.



Professor Jim Lynch

Chief Executive

April 2005

Introduction

This 2005–08 Corporate Plan presents the strategic focus for the Agency, in both scientific and business terms over the next three years, coupled with the current external influences on Forest Research (FR). Improvements in the quality of science and science-based services will continue to be achieved by developing the technical expertise and collaborative working skills of FR staff and by effective programme initiation and delivery. Joint working with other research providers, users and funders in the UK, Europe and world-wide to exploit opportunities is already well established and continues to be a priority for FR. Programmes of research, development, monitoring, inventories and scientific services will be designed to be well integrated with partner organisations, and will address the National Forestry Strategies for England, Scotland and Wales.

This Forest Research Corporate Plan updates the previous Corporate Plan 2003–2006 by looking forward to the years 2005–2008. Every corporate plan is an evolving document and as such this new plan builds substantially on the previous version, reflecting requirements specified in the Framework Document agreed in 2003. Detailed information is provided on Forest Research's strategic objectives, its resources and key themes of its scientific work. The plan also details how FR's performance will be measured.

The fundamental objective of the Forestry Commission continues to be the promotion of sustainable forest management within Great Britain and internationally. Research and development provide an essential component of the way the Forestry Commission acts on behalf of the three country administrations to provide the benefits of sustainable forestry in a multi-functional landscape. In the past decade, the emphasis of British forestry policy has shifted away from a focus on timber production in upland areas to an interest in multi-functional forest and woodland management for a diverse range of benefits. FR will continue to explore facets of sustainable forestry which increasingly cut across its programmes, such as the social, economic and environmental components.

There is increasing understanding world-wide of the key importance of sustainable forest management for the wider environment. This prompts the need for good supporting science, increasingly including environmental and social sciences. As a forestry and science-based Government Agency, FR will keep pace with scientific and technical developments globally and will maintain world class expertise and excellence in applied forest research. Over the period covered by this Corporate Plan, FR aims to continue to grow as an internationally recognised centre of excellence on trees, woodlands, forests and their ecosystems, and on their value to society. Over this period, forestry, environmental and land-use policies and objectives will continue to change. Public and political concerns over the sustainable use of resources, responsible environmental policies and the desire for community engagement will also continue to develop. It is important that FR maintains its flexibility in order to respond to such developments.

The previous Corporate Plan built significantly on the results of the Quinquennial Review (FRQR) 2002–03, which noted very strong support for the role of the Agency amongst Ministers and administrations in England, Scotland and Wales. Progress has been made towards the recommendations in the FRQR, in particular relating to the way research needs are determined and programmes commissioned and in the development of FR's internet site. This emphasis will continue through 2005–08 and FR will engage with and implement the soon-to-be released FC Science and Innovation Strategy. FR will continue to work with FC England, FC Wales and FC Scotland following the Forestry Devolution Review and resources have been allocated accordingly. In addition, within the Forestry Commission country budgets, funds will be made available to provide more active interface with Forest Research. One of the key mechanisms envisaged is the creation of Research Liaison Officers, to be funded by GB core and based at FR. Although the details are still being finalised, it is anticipated that this will considerably enhance opportunities for knowledge transfer.

New initiatives for improving knowledge transfer will also be developed representing increasing emphasis on a broad range of communication and innovation challenges. This plan gives details of continued emphasis on knowledge transfer and the development of opportunities for innovation and exploitation of science, responding to increasing emphasis on this agenda across government-sponsored research. This will include further business development and an increased focus on producing appropriate outputs from FR research. The importance FR gives to innovation is reflected by the setting up of a dedicated Innovation Fund (funded by the FC) which will ensure that FR is flexible and responsive to emerging opportunities. Improving the communication of research results to all key target audiences will continue to be a priority.

FR is dedicated to achieving and maintaining appropriate standards of quality in order to meet the needs of its work programmes and the requirements of its internal and external customers. Improving Quality Assurance standards is a high priority in FR and our immediate benchmark is to meet the Guidelines set out in the Joint Code of Practice for Research issued in 2003.

During 2004, changes in the structure of FR were made to improve team and cross-disciplinary working. Over the period of this Plan, processes and opportunities for such working will be prioritised. The 2003–06 Forest Research Corporate Plan set a new agenda, placing emphasis on the training and development of staff to meet the high quality performance requirement. This emphasis will increase in 2005–06 to enable Forest Research to continue to evolve in the challenging and increasingly competitive research environment. It will also exploit the opportunities offered by devolution and continue to develop business partnerships which are complementary to Forestry Commission work.

Responding to the competitive environment of UK government and particularly science spending (in line with the Gershon Efficiency Review) and the reduction in profitability of the UK forestry sector, the FC Director General has initiated a review process Business Improvement Programme across the whole of the FC. FR will incorporate and implement the findings of the initiative, where necessary embarking constructively on culture change.

Background

Forest Research was established as an Executive Agency on 1 April 1997. The Agency is part of the Forestry Commission, which is a government department headed by a Board of Forestry Commissioners established by statute (the Forestry Act 1967, as amended). Forest Research exercises the powers of the Forestry Commissioners to carry out research and to disseminate the results of such research, in pursuit of their duties. The Forestry Commission reports collectively and individually to Ministers in the Department for Environment, Food and Rural Affairs, the Scottish Executive and the Welsh Assembly Government (the Forestry Ministers).

The formal title of the Agency is the Forestry Commission Research Agency. For ease of reference, it is called Forest Research. The Agency employs 278 people across England, Scotland and Wales. Most staff are located at research stations in Hampshire and Midlothian with the remainder working in a network of field stations.

Much of FR's work is funded by the Forestry Commission with Corporate and Forestry Support (C&FS) acting as purchaser of research and other services in support of forestry in Britain. This specifically takes account of the individual needs of England, Scotland and Wales as customers. Other sources of income include Forest Enterprise England and Forest Enterprise Scotland, which purchase research, development and surveys related to the FC estate. In recent years, external (non-FC) funding has been won from government departments, the European Union, UK research councils, commercial organisations, private individuals and charities, and FR aims to increase these income streams over the period covered by this Plan.

Strategic Aims and Objectives

The objective of the Forestry Commission for its GB activities is, on behalf of all three administrations, to take the lead in development and promotion of sustainable forest management and to support its achievement nationally.

The Forestry Commission's aim is the sustainable management of our existing woods and forests and a steady expansion of tree cover to increase the many diverse benefits that forests provide to meet the needs of present and future generations.

Forest Research is a key component of the Forestry Commission, assisting the Commission to achieve its aims and objectives.

Forest Research does this by means of its top level 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.*

Forest Research's aims are to:

- *be an internationally recognised centre of excellence in forestry research;*
- *act in partnership with other organisations where appropriate;*
- *be efficient, cost-effective and commercially and environmentally aware in its operations;*
- *maximise income and recover full economic costs from research purchasers;*
- *be a caring and fair employer.*

Scientific Research and Technical Development

FR's overall aim is to provide an evidence-based approach for innovation in science leading to sustainable forest management in a multi-functional landscape within Great Britain and internationally. To achieve this aim it is essential that FR's scientific excellence is matched by its governance and processes and facilitated by its structure and management. Over the next three years, FR will continue to improve its regional, national and international profile which will enable FR to deliver high quality science and meet its business objectives. FR scientists will maintain links with UK and international organisations through regular involvement in conferences, links with universities and through active membership of various bodies (see Table 6). In this, FR will continue to make good use of the FC's regional and national networks.

Governance

FR's Framework Document sets out the relationship between FR, the Forestry Commission and Forestry Ministers, and gives a framework for the operation of the Agency within the Forestry Act 1967. The Framework Document outlines the financial regime within which FR operates. It specifies that FR must achieve full cost recovery from its services to customers, including a specified rate of return on capital employed. It also sets out the roles and limits of authority of FR's key staff and regulatory processes.

All research and development (R&D) purchased from FR by FC is specified in Service Level Agreements. Detailed statements are also agreed between FR and the FC research buyer, which spell out the Rationale, Objectives and Appraisal, Monitoring and Evaluation for each research programme (ROAME statement). FC's Research Strategy, published on the FC website at www.forestry.gov.uk/research, shows how research purchased from FR fits into the FC's total R&D spend. It explains the FC's rationale for buying some research from FR and tendering other research to other research suppliers.

Research and development which FR undertakes for external organisations is covered by legal agreements with the funder. Such contracts are won by open competition in response to open calls for tenders. They currently include contracts for the EU, Defra, the Environment Agency, Office of the Deputy Prime Minister, Scottish Forestry Trust, UK Research Councils and other funders.

The Advisory Committee on Forest Research provides external advice to the FC and FR on the quality and direction of research. The Committee oversees the peer-review of the research programmes purchased by the FC and other funders from FR, principally through the appointment of Visiting Groups of external and international scientists and through consideration of their reports and implementation of action points. FR provides a secretariat for this Committee and for the Forestry Research Co-ordination Committee (FRCC). FRCC is an inter-organisational committee of UK funders of forestry research. Its objectives are to co-ordinate forestry and tree-related research and ensure appropriate integration and synergy in the research purchased by a range of UK funders.

FR's Executive Board (FREB) is made up of the Chief Executive, the Research Director, the five Heads of Science Divisions, the Human Resources Director and the Finance and IT Services Director. The composition of the FREB will be reviewed early in the 2005–06 financial year. FR's internal audit and review of systems quality and risk management are undertaken by FC's Internal Audit and are overseen by the FR Audit Committee. Membership of the Audit Committee comprises the FC Head of Internal Audit and FC Secretary from Internal Audit, alongside the FR Chief Executive, Research Director, Human Resources Director and Finance and IT Services Director.

Science strategy

Forest Research's science strategy reflects that of the Forestry Commission, but must also facilitate balance with the demands of other funders. FR's processes and structures will be further engineered to ensure that the organisation's skills are correctly balanced and its infrastructure and training investments keep FR fully competitive to address the needs of its main customer, the FC, and other customers. The shape of FR's current science programme is outlined below. The FC is in the process of finalising its Science and Innovation Strategy following consultations in England, Scotland and Wales. Once complete, FR will build upon this framework to develop its ongoing strategy to respond to FC's needs while blending the FC focus with the demands of other external funders.

A number of other key research funders including Defra and SEERAD have also recently published their revised forward strategies including funding for research, and the UK government continues to be strongly committed to increasing spending on research and technology. Over the period covered by this Plan, FR will continue to take advantage of such opportunities, often working collaboratively with other organisations. Co-funding of research projects is expected to become increasingly widespread both by the FC and other research funders, as demonstrated by the Rural Economy and Land Use Programme recently developed in co-operation between Defra, Economic and Social Research Council (ESRC), the Biotechnology and Biological Sciences Research Council (BBSRC) and the Natural Environment Research Council (NERC). Forest Research was recently successful in obtaining partial academic analogue status from BBSRC, and this will enable FR to engage in funding initiatives with partners.

Since the UK government's commitment to increasing research and development spending is strongly focused on knowledge transfer, all research organisations are now expected to develop their skills in identifying, protecting and exploiting Intellectual Property. Forest Research is actively addressing the issues raised around IP and this area is expected to grow in importance over the period of this Plan. Currently the Forestry Commission, including Forest Research, is not permitted to enter into joint ventures, because of the specific provisions of the Forestry Act. The Forestry Commission has applied for a Regulatory Reform Order to remove this particular barrier. Although this is unlikely to be accepted before April 2006, such a change would obviously widen the options available to Forest Research in the exploitation of its intellectual property. Joint working also creates new demands on the organisation – both Defra and BBSRC require organisations to meet their joint code for Quality Assurance system.

Organisational structure

During 2004, FR underwent structural changes which were designed to streamline management and to enhance cross-functional working. These included amalgamating 11 branches into 5 science divisions:

- Tree Health
- Biometrics, Surveys and Statistics
- Ecology
- Forest Management
- Environmental and Human Sciences

The science divisions sit alongside:

- Technical Services Unit
- Communications Group
- Finance and IT Services Group
- Personnel and Administration Group

FR is currently reviewing the structure and work pattern of the Technical Services Unit to ensure this invaluable resource to scientists and the wider FC continues to be productive and cost-effective. The results of this review will determine the future functioning of the TSU.

Resources

Human Resources and Investors in People

The Agency has a permanent staff of 245 full-time equivalents and a total staff of 275 including fixed-term and short-term temporary appointments and sandwich students (Table 4, page 32). There are c. 120 research scientists and staff involved in technical development, c. 85 staff providing technical support and surveys and the balance providing administrative support and other specialist services such as library, photographic and information services.

All staff are employees of the Forestry Commission and the Agency has common personnel management systems and policies with the rest of the FC. FR is the employer of choice for many who want to work in forestry or tree-related research and has held Investor in People status since December 2000; accreditation is reviewed regularly.

FR places strong emphasis on the development of safe working practices and the welfare of staff. The Agency has its own Health and Safety Advisers and makes use of the Forestry Commission Health and Safety Officer. Staff welfare is provided for by a network of Forestry Commission Regional Welfare Officers. FR complies with all relevant safety legislation and acts as a responsible employer. There is a well-developed mechanism for collective discussion with the relevant trades unions and staff relations in FR are generally good.

Reportable accidents have averaged around two per hundred employees per year in recent years. The level of absence in the Agency currently averages 6.2 days per employee per year with 78% of staff absent for five days or less per year.

To ensure that FR is able to recruit and retain staff with the qualities needed, that they have the skills and expertise required to carry out the work expected of them, that they are motivated to deliver the outputs expected of Forest Research and that they are treated fairly, FR will:

- Provide leadership training for management and supervisory staff in the Agency.
- Contribute to the development of common Forestry Commission personnel systems and policies including pay and grading, non-pay benefits, terms and conditions of service, recruitment by fair and open competition on merit, equal opportunities and performance management procedures.
- Identify and implement steps to encourage a greater diversity of applicants for jobs in the Agency aimed at increasing the number of women, disabled people and people from ethnic minorities at all levels within the Agency and avoiding unfair discrimination.
- Continue to implement 'family friendly' policies including flexible working patterns and part-time employment.
- Monitor health and safety procedures, take action to reduce the number of workplace accidents and investigate measures to reduce avoidable absence due to accidents or ill health.
- Provide staff welfare services via the network of FC Welfare Officers.

- Provide opportunities for career development for researchers by a system of 'fluid grading' and individual merit promotion.
- Expect staff to behave towards each other in a way which is helpful, respectful and considerate.
- Facilitate and encourage the movement of staff between different parts of the FC and other organisations.
- Provide practical paid experience for sandwich students and provide industrial partnerships for PhD studentships.

Other resources

The Agency has two main research centres, Alice Holt Lodge in Hampshire and the Northern Research Station at Bush outside Edinburgh. There is also a network of 10 field stations and the Technical Development Branch (now part of the Forest Management Division) has three offices located in south Scotland, the Midlands and Wales. The total value of the physical assets, buildings and equipment in the control of the Agency is £11.6 million.

Measuring Performance

The sections that follow describe the top level FR targets for 2005–06 and the key performance indicators for achieving them. When measuring performance, it is necessary to understand the policy background within which FR operates. This background comprises:

- The UK's commitment to sustainable forestry
- The three forestry strategies for England, Scotland and Wales
- The Government's policy on science and research
- The research priorities derived from these requirements, which are identified in the Forestry Commission's Research Strategy.

Forest Research's performance over the next three years will be measured in four target areas:

- Research excellence and high quality science collaboration
- Development of communications, innovation and knowledge transfer
- Customer satisfaction
- Financial targets.

Research excellence and high quality science collaboration

Peer review and recipients of advice must be satisfied that research supporting knowledge transfer meets recognised quality standards of design, conduct and analysis of experiments. The science carried out should be designed to test hypotheses which are innovative and give new insights which enhance the quality of advice.

To satisfy current standards for the quality of research FR will:

- Provide an intellectually stimulating environment and encourage collaboration with specialists in other institutes throughout the world.
- Publish peer-reviewed scientific papers in quality scientific journals.
- Build partnership working and wide-ranging collaborations to complement FR's areas of expertise.
- Review the quality and relevance of research using external experts (Visiting Groups).
- Publish on the FR website the full report of Visiting Groups as soon as reports are discharged.
- Provide good quality facilities and support services.
- Appoint well-qualified staff and provide appropriate training and development.
- Work towards achieving and maintaining appropriate standards of quality, meeting the Guidelines set out in the Joint Code of Practice for Research issued in 2003.

> Key Performance Indicators 2005–06

To publish 45 papers in peer-reviewed scientific journals.

To engage an external Visiting Group to review the work of the Biometrics Division for quality and relevance of research.

Development of communication, innovation and knowledge transfer

FR will seek improved processes and routes to communicate the outputs of research and development to key target audiences including forestry practitioners, policymakers, conservationists and scientists. FR will also look for opportunities to widen its customer base and evaluate the commercial potential of its work with a view to exploitation.

There is a degree of confusion over the way the wider forestry community (including FR and FC) uses words such as technology transfer, knowledge transfer, dissemination, communication and innovation. During the first year of this Corporate Plan, FR will consult and subsequently agree precise working definitions of the many closely related terms. Mutual understanding of these terms will assist precise targeting of FR's key audiences, improve processes and reduce opportunity for misunderstanding.

FR will:

- Actively develop new partnerships to enhance and widen the scope of FR research and related services and report on partnership working in the 2005–06 Annual Report on Forest Research.
- Include coverage of progress in the commercialisation of FR outputs and of environmental action in the 2005–06 Annual Report on Forest Research.
- Continue to develop the FR website to communicate research findings to external audiences including a subscription service which will be launched during 2005–06.
- Further develop the FR intranet to improve internal communications with FR/FC staff.
- Match innovative science with innovative approaches to dissemination and knowledge transfer, for example using electronic communication to reach new audiences.
- Target specific audiences with high-quality technical outputs pitched at an appropriate level of specialisation and considering the audiences preferred communication method, e.g. seminars or publications such as Practice Guides and Bulletins.
- Exploit cost-effective new media to reach new key audiences, raising the profile of FR and the FC in areas such as health promotion.
- Improve quality assurance processes applied to publications.
- Monitor, log and evaluate the usefulness of external presentations and events to which FR staff provide contributions.

> Key Performance Indicators 2005–06

In addition to peer-reviewed journal papers FR will publish 25 reports, FC publications and articles with significant FR authorship.

Increase number of hits on FR website research pages by 15% during 2005–06.

Customer satisfaction

Customers seek outputs from FR which meet their needs with respect to quality, timeliness and cost. Charges are agreed in advance of work being undertaken and the nature and timing of outputs are specified while recognising the inherent uncertainty of much research. FC customers for research projects and services are asked to assess their satisfaction with the quality and timeliness of delivered outputs.

To meet customers' needs FR will:

- Encourage and assist customers, particularly C&FS, the FC's three National Offices and FE England and Scotland to identify their research needs and forecast future requirements and funding.
- Alert funders to new research opportunities.
- Maintain and develop competence in areas of importance to the FC.
- Ensure that our research capability and capacity reflect the trends made known by customers.
- Respond to changing demands by retraining specialists, redeploying staff within the Agency and the Forestry Commission and making sure that support services are delivered in a flexible manner.
- Monitor customer satisfaction with the quality and timeliness of outputs.
- Widen the customer base by encouraging collaboration and co-funding by customers.

The key performance indicator for this goal is the level of customer satisfaction.

> Key Performance Indicators 2005–06

To achieve an overall customer satisfaction rating of at least 90% with no programme having a rating below 80%.

Financial targets

Forest Research operates within the Financial Framework set by the Forestry Commission. The Agency is required by its Framework Document to achieve full cost recovery from selling services to customers, including a 3.5% return on capital employed. The Agency manages its finances and prepares its annual accounts on the accruals basis (see Table 1, page 30). Total capital employed in the Agency is almost £11.6 million of which £10.8 million are fixed assets and the balance net current assets (see Table 2, page 31).

To encourage inter-Divisional co-operation while maintaining financial discipline, Forest Research operates a system of internal cross-charging. Each Division is required to pay for services received and make a net contribution to the Agency's overall financial target. Monthly reports are provided of income and expenditure to date. Forecasts of income and expenditure are updated regularly and corrective action taken where necessary.

For the Forestry Commission's cash management purposes it is necessary to calculate the net cash surplus or requirement (see Table 3, page 32). The Agency's cash is managed centrally and reporting procedures are in place to facilitate control. In an increasingly competitive business environment FR must be able to demonstrate that it is efficient and provides value for money. The FRQR recommended that 'the amount of externally generated funding' be used as a key performance indicator. The two indicators: 'unit cost of a researcher day' and 'unit cost of support services' will continue to be used to compare on a year-on-year basis.

The Agency is required to recover the full economic costs of its activities through charges for its services while maintaining competence in areas of importance to the Forestry Commission.

To achieve this, FR will:

- Use accounting systems which readily identify costs and allow accurate costing to be done in advance of work being undertaken.
- Invest in facilities and equipment wherever this represents value for money.
- Continue to be encouraged to bid for external funding for new projects and to develop their project costing and management skills. FR benefits from maintaining a flexible and customer-centred approach.
- Develop an integrated, Agency-wide, quality-assured approach to data management and set standards for model development.
- Ensure that there is a good fit between the Agency's capability and capacity and customers' requirements and funding by maintaining close links with customers.
- Set charges to clients at rates to ensure recovery of full economic cost in line with Treasury guidelines.

- Develop staff through training in accordance with Investors in People.
- Monitor and seek to reduce the average number of days sick per employee to eight or less per year.
- Monitor and seek to increase the number of FR staff 'satisfied' with their job as reported in the FC's biennial surveys of the views of all staff.
- Reduce resources and costs when the existing capacity is not required and there is no likelihood of new customers being found.
- Work with the wider FC to examine, as a potential major project, the options for obtaining best value from the Alice Holt site.

> **Key Performance Indicators 2005–06**

To achieve reductions in unit costs of both a researcher day and support services in 2005–06 relative to 2004–05.

To achieve at least 100% cost recovery including a return on capital employed of 3.5% in real terms.

To achieve an income of at least £2.0 million from customers other than the Forestry Commission in 2005–06.

Research Themes

The core of FR's current work is focused on understanding the nature of sustainability as it applies to woodlands and forests. Social, economic and environmental dimensions contribute to sustainability. The principles of sustainable development have become a major influence worldwide, and policymakers and practitioners need to be clear which forestry practices support sustainability.

The following pages group selected current research programmes under functional themes or areas of interest. This approach has been adopted to encourage cross-divisional working and greater synergies. The full list of the research programmes currently being undertaken by FR is provided in Table 5 (page 33).

People, trees and woodlands

Sustainable development emphasises the need to consider social, economic and environmental concerns in forestry. Social issues are therefore a fundamental part of sustainable forest management.

Different individuals, groups and organisations within society have diverse needs and expectations of trees and woodlands. Increasingly, they also expect to have an opportunity to contribute to sustainable forestry decisions. Research into *People, trees and woodlands* will therefore engage with people to understand the current and potential contribution of forestry to contemporary society.

Research objectives

Research in this area aims to develop and disseminate understanding about the relationships between people and forestry to enable the development of guidance and good practice on the social contexts. It falls into a number of inter-related themes:

- Economy and livelihoods
- Education and learning
- Governance and public involvement in forest planning
- Health and well-being
- Monitoring and evaluation of the social impacts of trees and woodlands
- Non-timber forest products
- Public access, recreation and tourism
- Rural development
- The ways in which people value trees and woodlands
- Urban forestry

Research programmes

Economic integration of urban consumers' demands and rural forestry production
Economy and livelihoods
Education and learning
Forests for recreation and nature tourism (FORREC)
Forests, trees and human health and well-being
Governance and public involvement
Health and well-being
Non-timber forest products (biological products)
Public access, recreation and tourism
Social and cultural values of woods

Protecting trees

Forest Research seeks to promote environmentally acceptable measures of preventing and controlling damage to Britain's trees. Improving the management of native and newly established exotic problem species is a major focus. Understanding the nature and reasons for observed problems can promote sustainable management of the organisms concerned.

The ever-growing global trade in plants, timber and the use of wood-based packaging material provide many pathways for pests and pathogens to escape their native habitats. Over the past decade, several new pests and diseases have been found in the UK, and some have established with serious economic consequences. Forest Research has several research programmes aimed at understanding and assessing the risk that some of these organisms can pose.

Research objectives

Key research programmes form an important line of defence by identifying new pests and diseases which have entered the UK and monitoring any changes in the health of UK trees as well as providing advice on common tree disorders and how to manage them.

Awareness of the impact of climate change on the severity of some existing pest and disease problems is also crucial, since climate has a major influence on behaviour and population dynamics of many organisms. Effective control methods must be practical at a range of scales, while also conforming to woodland certification demands to minimise chemical use.

Research programmes

Research programmes directed at protecting trees from diseases and vertebrate and invertebrate pests are grouped into five major areas:

Tree health monitoring

Condition survey of non-woodland amenity trees
Forest Condition Survey
Disease Diagnosis and Advice (service)
Pest Diagnosis and Advice (service)

Plant health – exotic pests and pathogens

Phytophthora ramorum: 'Sudden Oak Death'
Red band needle blight
Woodland survey of *P. ramorum*
Research and management to support EU Protected Zone status for various pests and pathogens

EU collaborative projects

Plant health risk and monitoring evaluation, using pinewood nematode in Portugal as a model system (PHRAME)
Risk assessment of *Phytophthora ramorum*, cause of Sudden Oak Death in the USA (RAPRA)
Modelling of *Heterobasidion annosum* in European Forests (MOHIEF)
Interreg IIIA project (Ireland and Wales) on control of *Hylobius abietis*

Established tree problems

Impacts of insects on tree growth
Dieback of birch
Phytophthora diseases of broadleaf species

Management and control of pests and diseases

Non-chemical protection against pathogens
Integrated forest management of *Hylobius*
Control of *Hylobius*
Protection of woodland ecosystems against mammals
Management of grey squirrels
Deer population ecology
Herbivore impacts on woodland ecosystems

Land regeneration and urban greening

Forest Research have been conducting research and providing technical advice on establishing greenspace on brownfield, degraded and contaminated land for over 40 years. Greenspace can successfully be established to provide a wide range of socio-economic, health and environmental benefits. There are, however, many challenges in designing and implementing solutions for sustainable greenspace development specifically with regards to:

- Site investigation
- Contamination
- Soil and water resource management
- Achieving integrated remedial solutions.

Research is designed specifically to address these issues in a robust systematic way in collaboration with industry-based, government and research organisations. The key objective is to conduct cutting-edge research that can be disseminated as best practice guidance to stakeholders involved in restoration and greenspace creation on brownfield and contaminated land.

Research objectives

Research in this area aims to develop and disseminate understanding to achieve the sustainable development of urban greenspace from brownfield and contaminated land. It falls into a number of inter-related themes:

- Achieving the sustainable development of greenspace
- Social, economic and environmental benefits of greening
- The role of vegetation in remediation
- Cost effective remediation and restoration for greenspace creation
- Prioritising site development
- Evaluating the role of greenspace in sustainable development

Research programmes

Site investigation and prioritisation
Environmental benefits and impacts of greenspace development
Contamination and integrated remediation
Site restoration
Remediation through waste utilisation
Development of decision tools and best practice guidance

Woodland biodiversity

Woodland biodiversity is a valued component of sustainable forests, contributing to the ecological functioning and health of woodland ecosystems, and providing interest and enjoyment pleasure for visitors. Our research on woodland biodiversity aims to support and inform management that conserves and enhances these qualities.

Research objectives

Current challenges include:

- Supporting the move to continuous cover forestry (also known as low impact silvicultural systems) with appropriate advice on the impact of these systems on biodiversity; their modification to enhance biodiversity; and the role of wildlife may play in limiting their success.
- Developing integrated decision support tools to provide guidance to land managers on managing habitats and species, whether these are protected (such as those covered by Species Action Plans or Habitat Action Plans) or commonplace.
- Providing guidance on the effects on biodiversity of management at the landscape scale – encompassing a wide range of organisms and the integration of various land uses. Existing projects in this area include BEETLE and ESC-GIS.
- Understanding the benefits and identifying methods of restoring habitats such: ancient woodland, heathland and woodland pasture.
- Developing and recommending Biodiversity Indicators for use in monitoring the effectiveness of policy and practice in British forestry.
- Undertaking tree and habitat protection in ways that are deemed acceptable to the public. Forest Research's skills in understanding and modelling population behaviour and dynamics are essential for the improved management of deer, grey squirrels and other exotic fauna and flora which threaten Britain's native species and landscapes.

Research programmes

Genetic conservation
Lowland native woodlands

Evaluating woodland resources and potentials

Understanding the potential of Britain's woodland resources relies firstly on maintaining an accurate picture of the extent, location and composition of our woodlands. Data on public and private sector resources is collected from a variety of sources (including the National Inventory of Woodland and Trees and sample plots that characterise and quantify the UK growth of managed forest stands). Mensurational techniques develop and evaluate measurement systems to assess tree growth and forest yield.

Forest Research's ability to quantify Britain's woodland resources enables the wood processing industries to assess the potential for UK raw material - invaluable where management techniques change or new markets develop. Recent analysis shows that UK biomass can make a very real contribution to the reduction of fossil fuel use, to help mitigate the effects of climate change and meet UK renewable energy targets.

To simulate the potential impacts of afforestation and management practice, process models of forest structure, growth and yield are integrated with models which describe water and carbon cycles in forest stands and this results in a better picture of optimum land uses. Utilisation of UK timber also depends on timber quality. Collaborative projects (e.g. Compression Wood and MEFYQUE) enable timber producers to understand how to improve their raw material for the construction industry and help to ensure that wood can compete with other materials.

Research objectives

A top level objective for Forest Research, in partnership with forest industries, is to increase the competitiveness of British-grown forest products. This is achieved by

- Collecting data on both private and public sector woodlands in a 10-year cycle, the National Inventory of Woodland and Trees (NIWT). Geographic Information Systems (GIS) enable the data to be easily manipulated and compared with other datasets.
- Testing novel methods of inventory capture, such as remote sensing and mobile telemetry equipment, to improve the efficiency of data collection.
- Assessing current and future yields by mensuration.
- Simulating potential impacts of afforestation and management practice. Process models of forest structure, growth and yield are being integrated with models which describe water and carbon cycles in forest stands to provide a better picture of optimum land uses.
- Collaborating with other research teams leading to integration of base models with models which describe the water and carbon cycles in forest stands results. Such models are vital to understanding optimum land uses.

In the renewable energy sector, biomass can make a very real contribution to the reduction of fossil fuel use, helping to mitigate the effects of climate change. Forest Research is playing its part to support this developing industry, for example:

- Exploratory work on the use of biomass in hydrogen fuel cells
- Haulage and drying trials
- Knowledge transfer, including the publication of woodfuel factsheets
- Review of woodfuel resources for DTI strategy.

Research programmes

Compression wood in conifers (COMPRESSIONWOOD)

Modelling and forecasting timber yield and quality in Europe (MEFYQUE)

Sustainable forest management

Sustainable forest management implies the stewardship and use of forests to provide a range of benefits over time. International agreements and national policies require foresters to demonstrate that their forestry practices meet independent criteria of sustainability. This has led to promotion of 'multiple-use' management – developing varied forests containing stands of different species, ages and structures. This is a major challenge to foresters because many existing forests comprise regular stands of a small number of species designed to maximise wood production. FR is exploring new approaches to woodland establishment and tending to support policies aiming to increase the species and structural variability of forests.

There is also a need for woodland management to maintain a positive cash flow and FR research also seeks to reduce management costs, and add value to British timber and non-timber products including wood energy and biomass initiatives.

Research objectives

The overriding aim of FR research is to make forest management more predictable, profitable and sustainable by providing the knowledge and tools to select and manipulate site, species and silviculture to achieve desired outcomes. This aim encompasses a wide range of research activities which include:

- Developing cost-effective methods of establishing trees which ensure that potential for quality timber outputs is maintained.
- Implementing computer-based decision support tools which synthesise available knowledge on best silvicultural practice.

- Providing guidance on suitable thinning and stand tending measures which maintain quality without increasing the risk of wind damage or the loss of non-market benefits.
- Providing advice on safe working and harvesting practices in forests.
- Evaluating the potential of continuous cover forestry (CCF) in different forest types and researching the limiting factors to success.
- Carrying out studies on appropriate silviculture for use in the restoration and expansion of upland native woodlands (specifically pinewoods, upland oakwoods and birchwoods).
- Carrying out research and other development to support the expansion of the use of woodfuel in support of renewable energy initiatives.
- Investigating the silviculture of mixed species stands.
- Carrying out fundamental studies into seed, seedling and tree physiology in support of applied silvicultural research.
- Providing advice to foresters, woodland owners, policy makers, and other interested parties on the best practices required to implement sustainable forest management.

Research programmes

Alternative establishment systems
Alternative silvicultural systems (lowlands)
Alternative silviculture systems (uplands)
Eco-engineering and conservation of slopes (ECOSLOPES)
Environmental protection during forest operations
Establishment and maintenance operations
Harvesting and utilisation operations
Health and safety for forestry operations
Integrated establishment systems for the uplands
Seed and seedling biology
Silviculture of upland native woodlands
Small scale operations
Tree stability and climate
Woodfuel

Tree improvement and forest genetics

FR research aims to increase the quality of commercially grown species and to ensure that stock of the most appropriate genetic origin is used in forest establishment. This must address the specific purpose of planting, regional and local geographical variation, and predicted climatic variation. Forest Research is utilising new methods in biotechnology to deliver the products of its tree breeding to the industry and an appreciation of underlying genetic structures to policymakers. These include a range of DNA marker systems and micropropagation technologies.

Research objectives

The objective of Forest Research's tree breeding programmes is significant increases in the desirable qualities of commercially grown trees, both conifer and broadleaved species. For commercial growers, the ideal tree has a fast growth rate, good straightness and branching characteristics and high wood density with no defects. Traditional tree breeding methods have been followed through the selection of good quality individuals ('plus trees'), testing their progeny to evaluate the inheritance of their observed quality and reselecting the best parents for the production of improved material. Seed orchards and mass vegetative propagation of plants raised from small quantities of elite seed have been the main methods used to make the products of breeding available to the industry, while techniques involving somatic embryogenesis combined with cryopreservation are under development. Current products from the programme show over 20% increase in growth rate, a slightly lower rise in stem and branching quality and no overall fall in timber density.

Work is concentrated on Sitka spruce as Britain's principal commercial species, but improved material of Scots, Corsican and lodgepole pines, hybrid larch and Douglas fir is also available. Widespread recent planting of broadleaved species has created an increased focus on their improvement, particularly birch, ash and oak. Partnership through the British and Irish Hardwoods Improvement Programme (BIHIP) is vital to work in this area.

Molecular techniques, using several DNA markers, are used to understand the genetic origin and structure of our native tree populations. Post-glacial migration routes and gene flow at the individual population level are the main areas of study. This research can inform the development of genetic conservation policy within the Forestry Commission. Molecular markers are also being developed to identify quantitative selection traits in parallel with the Sitka spruce breeding programme.

Research programmes

Breeding and production of conifers
Dormancy and cold hardiness in forest tree seedlings (COLDTREE)
Intra- and interspecific geneflow in oaks (OAKFLOW)
Selection and testing of conifers
Fifty years of tree breeding in Britain

Woodlands and the environment

The environment is one of the cornerstones of sustainable development, and a proper understanding of how woodlands and forests interact with it is vital. Our research on physical environmental issues aims to ensure that forestry policies and practice can support this objective for land management.

Research objectives

Research on the physical environment is currently split into several interlinked programmes. These include:

- Effects of forests and forestry on water quality and quantity
- Effects of atmospheric pollution on forest ecosystem dynamics
- Effects of climate change on forest ecosystem dynamics, and development of adaptation strategies
- The sustainability of forest soils
- Intensive forest monitoring
- Forest carbon dynamics

Research programmes

Climate change

Environmental Change Network (ECN)

Forest carbon dynamics

Historic environment

Intensive long-term monitoring of forest ecosystems (Level II programme)

Soil sustainability

Collaborative programme

NERC Centre of Excellence on Terrestrial Carbon Dynamics (CTCD)

Key Financial Information: Establishing FR's Business Plan for 2005–08

Table 1 Income and Expenditure 1998–2008

>	98/99 Actual	99/00 Actual	00/01 Actual	01/02 Actual	02/03 Actual	03/04 Actual	04/05 Forecast	05/06 Planned	06/07 Planned	07/08 Planned
	£000	£000	£000	£000	£000	£000	£000	£000	£000	£000
Income										
C&FS	9,800	9,985	9,812	9,474	9,425	9,640	10,084	10,426	10,426	10,426
FE (countries only from 03–04)	1,046	1,242	1,342	1,307	1,187	378	281	368	377	387
OTHER FC	169	26	100	372	221	1,168	1,081	1,250	1,345	1,356
Non-FC	1,347	1,334	1,116	1,258	1,675	1,651	1,936	2,000	2,350	2,500
Total Income	12,362	12,587	12,370	12,411	12,508	12,837	13,382	14,044	14,498	14,669
Expenditure										
Staff Costs *	6,857	7,205	7,177	7,320	7,528	7,997	8,360	8,893	9,139	9,200
Depreciation	344	400	396	405	389	485	481	546	598	645
Other Costs	4,283	4,436	4,217	4,117	3,963	3,945	4,136	4,194	4,346	4,400
Total Expenditure	11,484	12,041	11,790	11,842	11,880	12,427	12,977	13,633	14,083	14,245
Operating Surplus	878	546	580	569	628	410	405	411	415	424
Cost of Capital	496	520	519	556	620	384	405	411	415	424
Net Surplus/(-)Deficit	382	26	61	13	8	26	0	0	0	0
Indicative staff numbers			277	275	280	278	278	275	270	260
Average per capita staff cost			£25,910	£26,618	£26,886	£28,766	£30,072	£32,338	£33,848	£35,385

*Includes salaries, ENI and Superannuation.

Table 2 Balance Sheets at 31 March 2005

>	98/99 Actual	99/00 Actual	00/01 Actual	01/02 Actual	02/03 Actual	03/04 Actual	04/05 Forecast	05/06 Planned	06/07 Planned	07/08 Planned
	£000	£000	£000	£000	£000	£000	£000	£000	£000	£000
Fixed Assets										
Land & Buildings	7,131	7,198	7,174	8,319	8,765	9,123	9,231	9,359	9,483	9,630
Other Assets	1,044	984	1,219	1,449	1,613	1,644	1,569	1,778	1,892	1,938
Total Fixed Assets	8,175	8,182	8,393	9,768	10,378	10,767	10,801	11,137	11,375	11,567
Current Assets	907	600	636	731	1,193	1,661	1,686	1,195	1,574	1,276
Current Liabilities	248	252	261	742	660	865	891	799	764	804
Net Current Assets	659	348	375	-11	533	796	795	396	810	472
Total Assets less Current Liabilities	8,834	8,530	8,768	9,757	10,911	11,563	11,596	11,533	12,185	12,039
Taxpayers Equity										
General Fund	6,393	5,941	6,160	5,869	6,523	6,926	6,729	6,434	6,850	6,639
Revaluation Reserve	2,441	2,589	2,608	3,888	4,388	4,637	4,866	5,099	5,335	5,400
Total	8,834	8,530	8,768	9,757	10,911	11,563	11,596	11,533	12,185	12,039

Table 3 Cash Flow 1998–2008

>	98/99 Actual	99/00 Actual	00/01 Actual	01/02 Actual	02/03 Actual	03/04 Actual	04/05 Forecast	05/06 Planned	06/07 Planned	07/08 Planned
Operating Surplus	£000 878	£000 546	£000 580	£000 569	£000 628	£000 410	£000 405	£000 411	£000 415	£000 424
Depreciation	344	400	396	405	389	485	481	546	598	645
Changes in working capital	201	311	-27	386	386	-280	-546	-287	-413	-469
Total Cash Flow Generated	1,423	1,257	949	1,360	1,403	615	340	670	600	600
Less:										
Capital Expenditure	-161	-258	-587	-513	-503	-364	-340	-670	-600	-600
Net Cash Surplus/(-)deficit	1,262	999	362	847	900	251	0	0	0	0

Table 4 Trends in Staff Numbers (full-time equivalents)

>	97/98 Actual	98/99 Actual	99/00 Actual	00/01 Actual	01/02 Actual	02/03 Actual	03/04 Planned	04/05 Planned	05/06 Planned
Permanent Staff	£000 256	£000 246	£000 240	£000 245	£000 246	£000 246	£000 245	£000 243	£000 235
Other Staff	34	31	35	35	32	32	30	28	25
Total	290	277	275	280	278	278	275	270	260

Summary Tables

Table 5 Main programmes of research, development and monitoring

FR Division	Programme	Programme leader(s)
Biometrics		
	Modelling of biomass crops	Robert Matthews and Ian Tubby
	Measurement systems	Ewan Mackie
	Monitoring and forecasting forest growth and yield	Robert Matthews
	Woodland assessment surveys	Graham Bull
	FC core model	Sam Evans
	Remote sensing	Juan Suárez
Ecology		
	Ecological site classification	Duncan Ray
	Ecology of upland native woodlands	Richard Thompson and Colin Edwards
	Lowland native woodlands	Ralph Harmer
	Biodiversity evaluation and indicator development	Jonathan Humphrey
	Decision support for biodiversity	Duncan Ray
	Genetic conservation	Joan Cottrell
	Impact of herbivores	Robin Gill
	Landscape ecology	Kevin Watts and Chris Quine
	Management for habitat quality	Jonathan Humphrey, Russell Anderson and Helen Armstrong
	Species Action Plans	Alice Broome, Roger Trout, Chris Quine and Brenda Mayle
	Improvement of broadleaved species	Sam Samuel
	Protection of woodland ecosystems against mammals	Roger Trout
	Management of grey squirrels	Brenda Mayle
Environment and Human Sciences		
	Carbon dynamics in forests	Mark Broadmeadow
	Climate change impacts	Mark Broadmeadow
	Environmental Change Network	Sue Benham
	Environmental monitoring and evaluation of forest ecosystems (<i>formerly</i> Effects of air pollution on trees)	Nadia Barsoum and Andy Moffat
	Forest hydrology	Tom Nisbet
	Reclamation of man-made sites for forestry	Tony Hutchings and Danielle Sinnott
	Soil sustainability	Elena Vanguelova
	Forestry and human health	Liz O'Brien and Paul Tabbush
	Social factors in forest design	Max Hislop and Suzanne Martin
	Social forestry	Paul Tabbush and Liz O'Brien
	Heritage and archaeology	Peter Crow

FR Division	Programme	Programme leader(s)
Forest Management		
	Breeding and production of conifers	Steve Lee
	Selection and testing of conifers	Steve Lee
	Timber properties	Barry Gardiner
	Alternative establishment systems	Ian Willoughby and Richard Jinks
	Alternative silvicultural systems for conifers	Bill Mason, Colin Edwards and Sophie Hale
	Integrated establishment systems for the uplands	Alan Harrison and Mike Perks
	Management of woodfuel crops	Andy Hall, Paul Webster and Duncan Ireland
	Silvicultural systems in the lowlands	Gary Kerr
	Tree stability and climate	Barry Gardiner and Bruce Nicholl
	Management of upland native woodlands	Richard Thompson and Colin Edwards
	Machinery and methods	Bill J. Jones, Colin Saunders and Steve Morgan
	Safety and ergonomics	Bill M. Jones and Colin Saunders
	Seed and seedling biology	Peter Gosling and Richard Jinks
Tree Health		
	Integrated forest management (<i>Hylobius</i>)	Hugh Evans, Roger Moore and David Wainhouse
	Tree health monitoring	Steven Hendry and Katherine Thorpe
	Diagnosis, investigation and advice	David Rose, Sarah Green and Joan Rose
	Dieback of birch	Sarah Green
	Diseases of broadleaves	Joan Webber
	Entomology advisory service	Christine Tilbury
	Impact of pests	Nigel Straw
	<i>Phytophthora ramorum</i> and <i>P. kernoviae</i>	Joan Webber, Sandra Denman, Clive Brasier and Anna Brown
	Plant health (exotic pests)	Hugh Evans
	Red band needle blight	Anna Brown
	Control of <i>Hylobius</i>	Stuart Heritage
	Non-chemical protection	Joan Webber and Katherine Thorpe
Technical Services Unit		
	Site monitoring for <i>P. ramorum</i> and <i>P. kernovii</i>	Norman Day and Alistair Whybrow
Chief Executive's Office		
	Innovation fund	Jim Lynch and Peter Freer-Smith
Chief Executive's Office		
	Knowledge transfer	Jim Lynch and Peter Freer-Smith

Table 6 Forest Research's links with UK and international organisations

- > **International Union of Forest Research Organisations (IUFRO)**
- > **European Forest Institute (EFI)**
- > **Edinburgh Centre for Tropical Forests (ECTF)**
- > **Committee of Heads of Agricultural & Biological Organisations Scotland (CHABOS)**
- > **South East Climate Change Network (SECCN)**
- > **Tropical Forest Resource Group (TFRG)**
- > **UNECE International Cooperative Programme, Forests**
- > **Parliamentary and Scientific Committee**
- > **UK Agencies and Universities**
- > **International Agencies and Universities**

Table 7 Summary of Key Performance Indicators 2005–08**Research excellence and high quality science collaboration**

- To publish 45 papers in peer-reviewed scientific journals.
- To engage an external Visiting Group to review the work of the Biometrics Division for quality and relevance of research.

Development of communication, innovation and knowledge transfer

- In addition to peer-reviewed journal papers FR to publish 25 reports, FC publications and articles with significant FR authorship.
- Increase number of hits on FR website research pages by 15% over figure for 2004–05.

Customer satisfaction

- To achieve an overall customer satisfaction rating of at least 90% with no programme having a rating below 80%.

Financial targets

- To achieve a reduction of both unit cost per researcher day and unit cost of support services in 2005–06 relative to 2004–05.
- To achieve at least 100% cost recovery including a return on capital employed of 3.5% in real terms.
- To achieve an income of at least £2.0 million from customers other than the Forestry Commission in 2005–06.

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