Forestry Commission

# Science and Innovation Strategy For Forestry in Great Britain

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# 1. Introduction

1.1. Vision

"Great Britain will continue to be recognised as a world leader in sustainable forest management and woodland creation. The natural capital of our woodlands will be seen as providing long term sustainable benefits, which are integral to the health and wellbeing of businesses and society."

Imagine 2020...

*The world's population climbs towards 9 billion. Global pressure intensifies for low carbon societies to combat rising energy costs and greenhouse gas emissions. Land productivity is a political priority for food, energy and resources for industry. The need to ensure the resilience and adaptability of ecosystems to the changing climate is understood and considered essential for the continuance of the crucial services they provide to society.*

*Forests, woodlands, and trees are highly valued for the role they play in delivering these benefits. They are more diverse, more productive, and ecologically richer. They are better integrated with other land uses, providing a safe haven and network for biodiversity, supporting the carbon balance for other rural industries, and sustaining a world leading forest industry. In towns and cities, they play a key role in cooling, mitigating temperature rises, and contribute to a healthy and active population.*

1.2. Key outcomes from the Science and innovation strategy to deliver the vision.

Evidence outcomes: Research commissioned to deliver the strategy will:

Outcome 1. Provide the evidence base for the delivery of healthy and resilient forest ecosystems to provide benefits for society.

Outcome 2. Give society the knowledge to deliver woodland management and expansion, as a component of sustainable land-use change.

Outcome 3. Provide the evidence base to allow the forestry sector to deliver a wide range of sustainable benefits from trees and woodlands to support growth in the British economy.

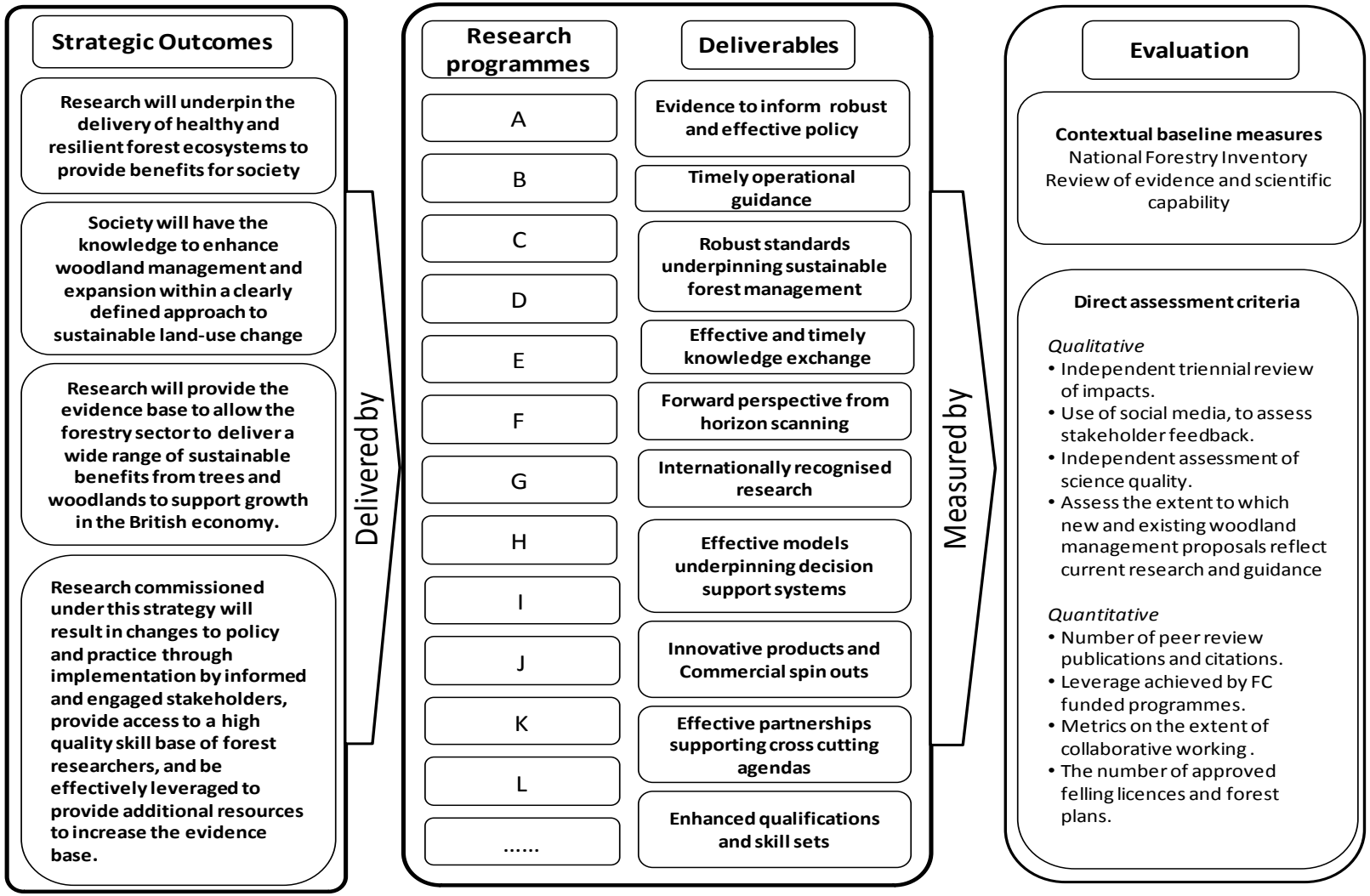
Delivery outcomes: Research commissioned to deliver the strategy will:

Outcome 4. Result in changes to policy and practice through implementation by informed and engaged stakeholders, provide access to a high quality skill base of forest researchers, and be effectively leveraged to provide additional resources to increase the evidence base.

Figure 1 indicates how the outcomes will relate to research programmes and their outputs, and how the success of the outcomes will be measured. These outcomes are strongly influenced by the strategic priorities of the Westminster Government, the devolved administrations, and agreed by stakeholders. (See Annex 1 for more details.)

Figure 1

How the Science and Innovation Strategic outcomes will be delivered and evaluated



Impact tends to be greatest when research is interdisciplinary. The focus on outcomes, rather than disciplines, is intended to encourage this. Research programmes commissioned under the strategy will be integrated from the start to ensure that the synergies between social, biological, and physical sciences are obtained to deliver more effective impacts. The strategy also recognises the crosscutting linkages across outcomes, such as economics, social science, and resource description, and these will be reflected in the future research programmes.

### 1.3. Strategic review

The research delivered under this strategy is purchased by the Forestry Commission on behalf of the Westminster Government, the devolved administrations, and their stakeholders. This strategy is based on a series of stakeholder engagement meetings conducted in England, Scotland and Wales during 2012, and on a public consultation exercise in 2013. These endorsed the strategic outcomes, and helped to identify the key research areas for the next generation of research programmes. These address, as far as possible, a shared research agenda across the three countries, which is managed by the Forestry Commission. This may be complemented by research commissioned directly by the devolved administrations in response to specific requirements.

### 1.4. Key values assumed in the strategy

- Collaborative working with colleagues and others, across government and the wider sector, to ensure that trees, woods and forests meet the needs of people in each part of Britain.
- A bold and ambitious professional approach to evidence achieving high standards of quality, efficiency and sustainability and continual learning
- Relationships and collaboration with colleagues and other stakeholders will be built on trust and openness to facilitate effective knowledge exchange.

# 2. The context within which the Strategy operates

This Science and Innovation Strategy describes how the evidence it purchases will help to deliver the key outcomes. The Forestry Commission and devolved administrations will apply the evidence to support policy development and delivery. These are complex issues due to population pressures, and land values in Great Britain, which make forestry development more challenging than in many other European countries. In providing the evidence base, the strategy complies with the Government's approach to the management and use of science, research and engineering in government[1]. This takes a strategic approach working within

[1]Science & Engineering in Government - BIS (2009).

established codes and guidelines. It is responsive to current political priorities, while taking a longer term perspective, so is flexible while delivering sufficient continuity.

Sustainable development[2] underpins the policies of the UK government and the devolved administrations. Research will be guided by the common purpose and principles adopted by these policies (See Annex 1), namely stimulating economic growth, maximising wellbeing and protecting our environment, without negatively impacting on the ability of future generations to do the same. Sustainable forestry practice, as set out in the UK Forestry Standard[3] is a common requirement for all countries, increasingly being required to integrate effectively with other rural and urban land-uses and wider government policies.

*The UK Forestry Standard, based on the findings of extensive research and endorsed by stakeholders and Ministers in all four countries, provides the low burden, risk based framework for policies and practices to deliver the standard for sustainable forest management in the UK and sets the benchmarks by which progress towards it can be measured.*

Forestry policy is a fully devolved responsibility of the separate administrations in England, Scotland and Wales (See Annex 1). To reflect this, the strategy will contribute to a distinct range of priority areas across each country. It will also support the delivery of strategies on cross border issues such as biodiversity, plant health, and climate change. The long standing research relationship with Wales and the Northern Ireland Forest Service will be formalised through memorandums of understanding.

Research needs to reflect wider issues, for example European nature and environmental directives and the EU Plant Health Regime. It also needs to complement the UK forest industry's research interests and priorities, which are set out in the UK National Research Agenda for the European Forest Technology Platform. Europe is an important collaborator with and contributor to UK forestry research and the strategy acknowledges the important role it has to play through networks such as 'COST Actions' and ERA-NETs.

### 2.1. Dealing with uncertainty

The outcome based approach adopted by this strategy will allow uncertainty in a complex environment to be addressed through interdisciplinary thinking and solutions. This will help science to make sense of global events, such as financial crises, coupled with climatic changes resulting in increasingly extreme biotic and abiotic events, to provide some certainty for long term decisions.

[2] Mainstreaming sustainable development – The Government's vision and what this means in practice (UK, 2011); The Government's economic strategy (Scotland, 2011); Sustainable Development Bill (Wales – Under consultation 2013)
[3] http://www.forestry.gov.uk/theukforestrystandard

The need for clean water, resilient ecosystems, and good air quality require those of us who live and work in Britain to understand that we are all stewards of the environment, looking after it for future generations. Increasing energy costs and a desire to de-carbonise through the use of renewable energy are impacting on forest cover, land use and landscapes. These are changes to more traditional approaches to land management, which require a greater understanding of the value and nature of the trade-offs to ensure that policies are not delivering unintended consequences. Close collaboration with the science strategies (See Annex 1) of other departments will deliver much more effective and well balanced results. Climate change remains a cross cutting issue for all administrations, and the issues identified in the 'Combating Climate Change - a role for UK forests' report[4], emphasizing the need for a concerted programme of research aimed at both mitigation and adaptation, remain valid.

These threats and challenges demand new information about species choice, management, land use, pest epidemiology and control. However, they are also developments which suggest an 'exciting new world' in which forestry has much to offer.

Forestry is a long term commitment and research requires an intelligent vision about the forces that will influence UK woodlands over the next 50 years, to enable them to best serve the changing demands society will place upon them. Horizon scanning, defined as *'The systematic examination of potential threats, opportunities and future developments, which are at the margins of current thinking and planning'*[5] is increasingly used to help Government develop policies informed by evidence and futures analysis.

For forestry and woodlands, this should be a cross-cutting activity with other government agencies, which may already have developed alternative land-use and society scenarios for the future. To encourage this, the Forestry Commission and the DEFRA agencies are supporting an Environment horizon-scanning capability at Cranfield University (CERF).

The CERF project works with the UK Government's Foresight Programme[6]. Since 2002, this programme has undertaken in-depth projects, using cutting-edge science combined with futures analysis, to address long-term cross-cutting opportunities and challenges. By combining these two horizon scanning processes, the sector will have the information and skills required to adapt to operating within a complex environment by enabling it to detect problems and to identify strategic opportunities.

[4] www.forestry.gov.uk/**readreport**
[5] Defra 2002
[6] www.bis.gov.uk/**foresight**

# 3. Mission and rationale

## 3.1. What the Forestry Commission does

The Forestry Commission is a non-ministerial department of government. With the formation of Natural Resources Wales in 2013, the Forestry Commission remit now covers England and Scotland. However, it continues to deliver research and other services to Wales under a cross border agreement. Its mission is to protect and expand forests and woodlands and increase their value to society and the environment. It aims to achieve this through facilitating the work of stakeholders and by developing a supportive framework for a sustainable forestry sector to enable it to deliver tangible benefits to society, whether economically, socially or environmentally. The research delivered under this strategy is purchased by the Forestry Commission on behalf of the Westminster Government, the devolved administrations, and their stakeholders.

## 3.2. Rationale for government science

Evidence-based policy is a well-established principle in the UK. Thus policy-related research is a key function of government and its non-departmental bodies. The Forestry Commission, both nationally, and in the devolved forestry administrations, funds research, contributes to policy development and delivers policy through its support for forest and woodland owners and managers. In addition, the separate administrations share the needs of private forest owners for well-founded research to support the management of the national forest estate, currently 27% of GB forest area.

Investment in public science supports a successful innovation system by providing knowledge assets, infrastructure and trained people that help organisations, whether public or private, seize opportunities. The private sector generally does not have the incentive to invest in knowledge made publicly available because it may not deliver a financial return[7]. To reflect this 'market failure', the Forestry Commission undertakes to fund research, particularly the more applied, longer-term research that may not always have immediate application, but has the potential for enabling the sector to address future challenges. This includes a number of research areas such as tree health, tree breeding, climate change adaptation, and assessing the non-market benefits of ecosystem services, which will have implications for future forestry practice.

[7] http://www.hm-treasury.gov.uk/d/spend04_sciencedoc_annexes_090704.pdf (P6)

# 4. Evidence Outcomes

## 4.1. Outcome 1. Research will provide the evidence base for the delivery of healthy and resilient forest ecosystems to provide benefits for society

*Key messages*

- Science delivered in support of this outcome will help to sustain investor confidence in forests and woodlands.
- Science will help to identify new options for forest management to address the threats posed by climate change and pests and diseases.
- Science to support the delivery of healthy and resilient forests will deliver the widest possible range of societal benefits.

*The context for outcome 1*

Woodland owners, whether public or private need to have confidence that their investments are sufficiently resilient to deal with the environmental and societal challenges their woodlands are faced with in the course of a long life. More extreme climatic events and the recent increase in threats from pests and diseases require expert and timely science to ensure this confidence is maintained, and the benefits from the ecosystems remain sustainable.

The National Ecosystem Assessment[8] concludes that:

> *'The natural world, its biodiversity and its constituent ecosystems are critically important to our well-being and economic prosperity, but are consistently undervalued in conventional economic analyses and decision making.'*

The assessment highlights the benefits which woodlands do, and can, provide to society, such as the role of safeguarding biodiversity and ecosystem resilience. However, it acknowledges that the evidence base linking changes in ecosystems to human well-being is incomplete, and tends to be biased towards assessments based on economic value, largely ignoring less well quantified health values and un-quantified shared social values.

Plant and tree health is a major priority for all governments within the UK, and this outcome needs to be delivered in a collaborative way across governments, academia, and the research sector working closely with stakeholders. The joint Forestry Commission/Defra Tree Health and Plant Biosecurity Action Plan[9] was developed with help from a wide range of stakeholders from across the forestry

[8]http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx
[9]http://www.defra.gov.uk/food-farm/crops/plant-health/action-plan/

and research sectors, including the Devolved Administrations. It sets out an integrated approach to dealing with the increasing biosecurity threats to Britain's trees and forests, and emphasises the need for an effective evidence base to inform decisions.

Forestry Commission biosecurity research will complement work being undertaken by both Defra and the Living With Environmental Change Tree Health initiative, and support the delivery of the recommendations of the Defra Biosecurity Taskforce.

### 4.1.1. Research to deliver the outcome

*Are Great Britain's forests in good health? The evidence requirements to deliver this outcome will address:*

- Understanding the impact of invasive pest species[10] at the ecosystem level and finding technically and financially effective ways of anticipating new threats, rapid detection and identification, monitoring, and improving response strategies[11], biosecurity controls and practical measures for addressing them through;
    - Horizon scanning to detect and prepare for new pest and disease threats before they arrive;
    - Understanding the nature, condition, and distribution of forest types and species within British woodlands, including their silviculture, ecology, growth and yield, and exploring the future opportunities and threats identified by the evidence;
    - Learning how to manage forests to ensure that they are more resilient to tree health threats, through management practices and tree breeding approaches to identify a wider variety of "future proofed" tree species and understand their silviculture including establishment requirements, production cycle and timber qualities;
    - The increasing importance of the need to consider the "basket" of ecosystem services when evaluating the benefits provided by woodland to society at both landscape and ecosystem scales, such as flood and climate change mitigation and the role of trees;
    - Evaluating approaches to woodland adaptation and increasing resilience, focusing on the composition (species, origin, diversity, and stability of ecological communities) and management systems (silviculture and

[10] Pest species in this context includes alien and native insect pests, diseases, vegetation and vertebrates

[11] These include developing practical control measures using integrated pest management and if necessary chemical techniques.

regeneration systems) that effectively address climate change concerns. This should include understanding of forestry from regions that currently experience climates similar to those anticipated in Britain in the future;

- Maintaining or improving the biodiversity of woodlands, halting decline in species where possible but recognising limitations and sustainability of long term interventions. Considering the value of 'new' natives and ensuring both components and management build resilience in native forest ecosystems now and in the future.

## 4.2. Outcome 2. Society will have the knowledge to deliver woodland management and expansion within a clearly defined approach to sustainable land-use change

*Key messages*

- The strategy will deliver an evidence base to support increased societal use of forests and the services they can provide
- The application of science will enable forestry and woodland expansion as part of an integrated approach to sustainable land use
- Science will enable forestry and woodlands to play their part in addressing wider issues, such as flooding and biodiversity loss.

*The context for outcome 2*

In relation to other European countries with an average of 37% woodland cover[12], Great Britain is lightly wooded at 13% of the total land area[13]. The area of woodland in Great Britain is around three million hectares. While much woodland is well managed and to the UK Forestry Standard, there remain many areas which would benefit from improved management. The strategy will deliver the evidence to allow managers to protect and improve the forests and woodlands they already have, to provide a solid foundation for the future.

Woodland creation is an important tool for landowners and managers, business, civil society organisations and local communities to use to resolve problems and realise opportunities. Society values woodland because it provides multiple benefits. In many landscapes increasing the amount of woodland will increase the benefits that flow from them. These include:

- Supporting green growth in a productive and sustainable rural economy by:
    - increasing natural capital,
    - helping to tackle greenhouse gas emissions,
    - timber and fuel production to substitute for carbon intensive products,
    - sequestering carbon.

[12] FAO Global Forest Resources Assessment 2010
[13]http://www.forestry.gov.uk/pdf/NFI_GB_woodland_area_stats_2010_FINAL.pdf/$FILE/NFI_GB_woodland_area_stats_2010_FINAL.pdf

- Providing places that people and communities value highly and want more of for recreation, health benefits, and enhanced rural and urban landscapes;
- Restoring disturbed habitats, and developing habitat networks and new native and non-native woodlands to support adaptation to climate change.
- Helping to manage ecosystem services, such as sustainable flood management, and protection of soil and clean water resources.

Woodland expansion is a significant land use change. It will require a sound evidence base for effective policy and investment decisions. For example, forestry can complement and support agriculture by reducing carbon footprints and increasing the amenity of farms.

### 4.2.1. Research to deliver the outcome

*Does society have the knowledge to improve and expand woodlands in the face of increasing land pressures? The evidence requirements to deliver this outcome will address:*

- Identifying methods[14] to successfully increase Britain's woodland cover and the percentage of woodlands under recognised management plans (i.e. consistent with the UK Forestry Standard);
- Developing a greater understanding of the human impact on forest management including; forestry culture and community woodland ownership/governance, and approaches to human interactions with wildlife;
- Quantifying the location, scale of delivery, and physical benefits of woodland creation and management on ecosystem services (such as improving water quality, soil conservation, and flood prevention/alleviation and carbon storage) and comparing different woodland types with different types of existing land use;
- Developing multi disciplinary tools to help managers identify and evaluate those new woodland sites that may offer the best potential to deliver the most ecologically efficient basket of ecosystem services;
- Developing advice on approaches to address forest fragmentation, and land use connectivity issues;
- Integrated and interdisciplinary social research across the rural and environmental sectors to learn what motivates landowners and managers to take up incentives and adopt other delivery mechanisms for land use change through sustainable long term management;
- Research to better understand the nature of the forestry workforce, in particular the workforce profile, in the coming decades. This is vital to ensure an adequate workforce profile is available to meet future projected timber forecasts and ambitions to expand the forestry sector.

[14] This includes understanding human interactions and improved regeneration techniques

## 4.3. Outcome 3. Research will provide the evidence base to allow the forestry sector to deliver a wide range of sustainable benefits from trees and woodlands to support growth in the British economy.

*Key messages*

- The strategy will deliver an evidence base to support a thriving and sustainable rural economy
- Science will ensure that forestry can play a significant role in delivering a low carbon economy
- Science will produce new tools for more effective decision making

*The context for outcome 3*

The natural capital in woodlands can deliver many public benefits and make a significant contribution to the UK economy from the value that is added to forestry goods and services. For example, the wood-processing industry is internationally competitive, regional economies benefit from a wide range of tourism facilities, and the screening effects of forests and trees can significantly increase the value of housing, and of land for development. Research shows how sustainably managed forests and trees can help mitigate climate change, provide means of flood management control, and help to cool towns and cities. These are issues of direct relevance to both the rural and urban environments.

Valuing and accounting for natural capital is a major step in enabling the benefits of forest ecosystem services to be realised in the economy. Work will also continue to incorporate forest ecosystem services values into cost-benefit analysis and to build on the evidence gathered in the UK National Ecosystem Assessment. Two further important initiatives were introduced in the 2011 Environment White Paper. The Natural Capital Committee aims to improve understanding of the value of natural capital to help prioritise actions to support and improve the UK's natural assets. The Ecosystem Market Task Force has set out a vision for how nature is critical to achieving economic objectives, and has recommended market opportunities to work towards this vision.

The forestry and woodlands sector has a key role to play in supporting the rural and wider economy by increasing the value of the market and non-market benefits that forests can deliver. Science will provide knowledge for use by policy makers, by forestry and woodland owners and practitioners, and by users of forestry goods and services to bring about this outcome.

### 4.3.1. Research to deliver the outcome

*How can the knowledge base be improved to support the rural economy? The evidence requirements to deliver this outcome will address:*

- Supporting the forest industry with research to optimise timber growth, recovery and utilisation. This will be delivered through the maintenance of a

network of permanent sample plots, and by adopting an environmentally and financially sustainable multi-benefit forest management approach, which will investigate the potential for alternative silvicultural systems, regeneration, and novel tree species;

- Continuing to investigate ways to improve the efficiency of the timber value chain. This will focus on genetic improvement of trees in relation to wood and timber properties to develop methods and technologies that deliver market requirements and wider forest products, that add most value;

- The development of forest ecosystem service markets to support economic growth and contribute to averting risks from ecosystem degradation. This will concentrate on understanding the value of rural and urban ecosystem services, whether cultural, social, environmental, or economic and devising mechanisms for their associated evaluation and payment, and developing systems for natural capital accounting;

- The development of sophisticated interdisciplinary tools and models to support decision making in forest, ecosystem, and wider land management to achieve sustainable and beneficial outcomes and better understanding between foresters and other parts of society. This will ensure that forestry contributes to the low carbon economy by using National Forest Inventory data, linked to financial and yield appraisal. Carbon and timber production will be assessed, to allow scenario planning for different management options including the development of renewable energy policy.

# 5. Delivery outcomes

## 5.1. Outcome 4. Research commissioned under this strategy will result in changes to policy and practice through implementation by informed and engaged stakeholders, provide access to a high quality skill base of forest researchers, and be effectively leveraged to provide additional resources to increase the evidence base.

*Key messages*

- The interdisciplinary approach to the science delivered by the Strategy will ensure that research commissioned under it is fit for purpose, credible, and robust.
- Collaboration and partnership will deliver more effective results and lead to enhanced capability.
- Stakeholder engagement in designing research programmes will lead to improved uptake and application.

*The context for outcome 4*

Research Councils (UK) define economic and societal impacts as' The demonstrable contribution that excellent research makes to society and the economy[15].'

The 2013 evaluation of the Science and Innovation Strategy[16] at that time identified a number of important impacts, which were attributable to the research commissioned under the strategy. However, it also identified some areas, particularly in knowledge exchange and stakeholder engagement, where the delivery of the strategy could be improved. This strategy addresses these in a number of ways.

- It commits to greater involvement of stakeholders in the setting of research priorities, and the way in which research knowledge is exchanged;
- It adopts an interdisciplinary approach to specifying the research programmes to be commissioned; and
- It is focussed on the outcomes it will achieve, and the impacts they will deliver for the UK forestry sector, and wider society.

These improvements will enhance the impact this strategy will have, and ensure that research commissioned under it is fit for purpose, credible, and robust. The strategy will balance the need for high impact peer reviewed journal papers, and applied science made available for practitioners through effective dissemination. This will maintain the respect for British forestry research within Europe and further afield, which has been earned by scientists with a sound understanding of

[15] http://www.rcuk.ac.uk/kei/impacts/Pages/meanbyimpact.aspx
[16] Laura R. Meagher, PhD, Technology Development Group and Stephen Hunter, PhD. Report for Forestry Commission 2013.

forestry practice, combined with many years of international collaboration.

Effective collaboration and partnership working will allow the research budget to extend its reach. This will deliver the best value for money as well as excellent and interdisciplinary science. British forestry research is already well networked, both nationally and internationally, with a large number of partnerships and collaborative projects. Leverage in the context of this strategy is as much about broadening expertise, skills and capability, as it is about funding. The Forestry Commission will work to promote and facilitate opportunities for collaboration through its programmes with Forest Research, and the science it commissions from other providers.

***Strengthening environmental partnerships***

*The Forestry Commission belongs to the Living With Environmental Change partnership. This comprises 22 public sector organisations that fund, carry out and use environmental research and observations. They include the UK research councils, government departments with environmental responsibilities, devolved administrations and government agencies. Collaborative projects include the National Ecosystem Assessment, the UK Earth Observation Framework, and the Tree Health and Plant Biosecurity initiative. These, and others, bring together pooled resources to deliver much more impact than individual organisations could deliver on their own.*

### 5.1.1. Actions to deliver the outcome

*The actions required to deliver outcome 4 will include:*

- Active engagement with stakeholders in specifying the research programmes and their outputs to deliver the strategic outcomes, and understanding the barriers to behaviour change which will ensure that the results of research are adopted and become part of normal activity;
- Ensuring academic credibility and career progression by specifying outputs in the scientific literature and at conferences and science workshops in the development of research projects and programmes;
- Additional support for new skills and capability delivered through the joint Bursary Award Scheme set up by the Forestry Commission in partnership with the Scottish Forestry Trust. This benefits PhD and Masters research, and will continue through the life of this strategy;
- Promoting and increasing the number of forestry qualification opportunities/skill sets (for example silviculture practices and woodfuel systems) before and at degree level to assist the development of a skilled forestry workforce;
- Continued support for young researchers to gain experience and qualifications

through mentoring and expert supervision. Holding annual seminars to bring together students, supervisors, policymakers and practitioners to provide an opportunity to learn more about post-graduate environmental research being funded by the Forestry Commission. These will provide opportunities for knowledge exchange that will shape future research;

- Support for all researchers funded by the Forestry Commission to attend relevant international conferences, to communicate regularly with colleagues abroad and to keep forestry research in touch with foreign opinion relevant to sustainable forest management in the UK. Where feasible, secondments and exchange visits will be used. In addition, visiting scientists from out with the UK will be encouraged to participate in research programmes to bring new perspectives, and share their knowledge and experience;

- Encouraging innovation through forestry researchers working with experts in other sectors, such as finance and animal genomics, to share knowledge and skills;

- Partnership working and active liaison with other organizations and government departments, to highlighting the role that forestry can plan in delivering their agendas to optimise the efficiency and impacts of research commissioning. This includes developing business partnerships with stakeholders and experts from beyond the forestry sector to develop a network of knowledge and expertise that will foster inter-dependence between business and ecosystems;

- Improving the levels of co-funding with the devolved forestry administrations and the forestry sector, through making the research agenda more transparent and cross cutting;

- Developing formal, productive links with professional bodies and educational establishments to generate research synergies, and increase the uptake of the outputs of commissioned research by offering continuing professional development hours at structured dissemination events;

- Establishing better connections with professional and trade bodies inside and outside the traditional forestry sector to integrate forestry research with that being undertaken in other land uses.

# 6. How research is commissioned

*Key messages*

- The strategy has been designed to accommodate flexibility in addressing future research needs
- There is a stronger focus on peer review of research programmes than in previous strategies
- The design of future research programmes will follow a new process with much greater stakeholder involvement.

6.1. Responsibility for this strategy, and for the research programmes commissioned under it, lies with the Forestry Commission Research Strategy Management Board. The Board is chaired by the Forestry Commission's Head of Corporate and Forestry Support and membership comprises senior policy leads from FC England and FC Scotland and the Welsh and Northern Ireland Governments, the FC's Chief Scientific Advisor, and the FC's Head of Analysts.

6.2. Research on trees, woods and forests is a highly specialised area, and has been successfully led by Forest Research for many years. This, coupled with the lack of commercial opportunities, and the wide application of much of the research has resulted in most of the core capacity being retained in the public sector. The bulk of research, around 90%, commissioned by the Forestry Commission to deliver the forerunners of this strategy has been delivered by the Forest Research Agency. The remainder of the funding has been used to build additional capacity, and provide a benchmark for the rest of the research. This is not unique, and reflects the model in other parts of government, particularly in the area of environmental research. Figure 1 below illustrates the research governance and process.

6.3. To deliver the Strategy's outcomes, we will use and comply with The Government Chief Scientific Adviser's Guidelines on the Use of Scientific and Engineering Advice in Policy Making[17]. This sets out four key messages for government departments to:

- identify early the issues which need scientific and engineering advice and where public engagement is appropriate;
- draw on a wide range of expert advice sources, particularly when there is uncertainty;
- adopt an open and transparent approach to the scientific advisory process and publish the evidence and analysis as soon as possible; and
- work collectively to ensure a joined-up approach throughout government to integrating scientific and engineering evidence and advice into policy

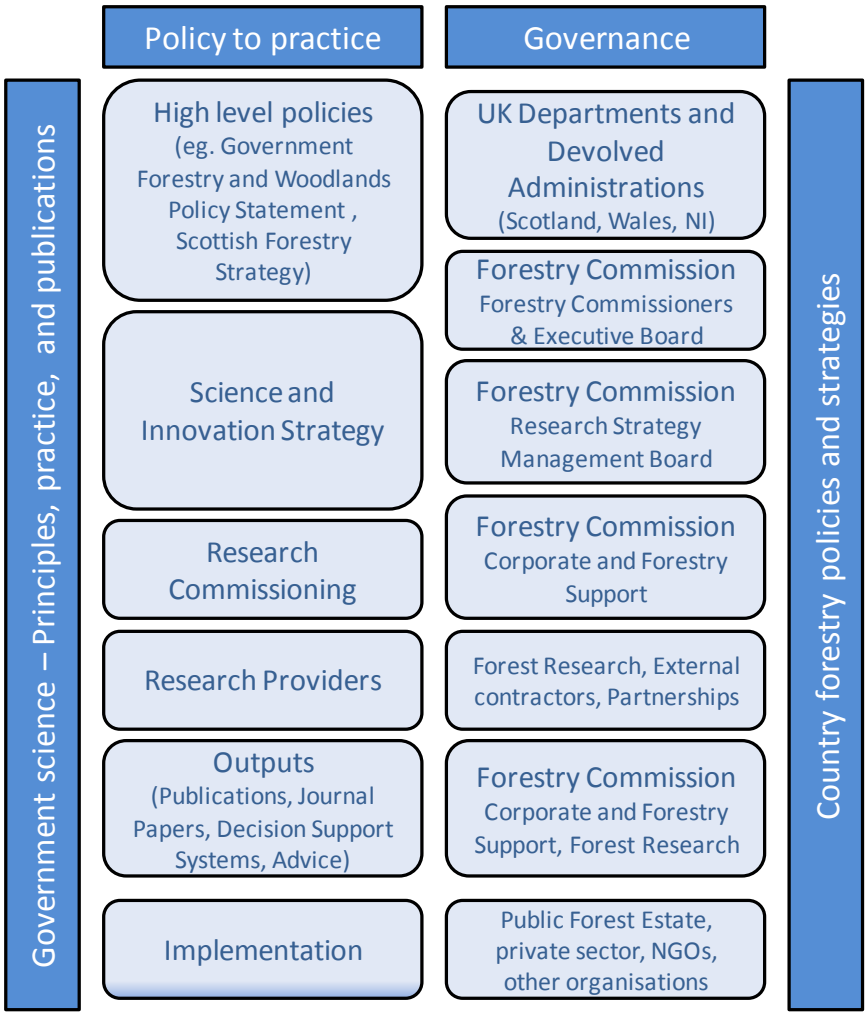
[17]The Government Chief Scientific Adviser's Guidelines on the Use of Scientific and Engineering Advice in Policy Making, June 2010. Available on www.bis.gov.uk/assets/goscience/docs/g/10-669-gcsa-guidelines-scientific-engineering-advice-policy-making.pdf

making.

6.4. This strategy has been developed to be flexible enough to cope with many possible changes to the external environment. These include the need for UK deficit reduction, the outcome of the referendum on independence for Scotland, and structural changes for forestry in Wales. However, some key principles underpin the future commissioning of research.

- Maintaining a critical mass of core capability to enable rapid response to emerging issues.
- Collaborative commissioning to access and develop new expertise and capability, will complement that available from Forest Research
- External peer review of research commissioning proposals will ensure that the science to be delivered is of the highest quality, relevant, and appropriate.
- There must be ample opportunity for stakeholders, both public and private, to engage in the formulation of the research commissioning briefs to improve transparency and ownership of results
- Research proposals must be explicit about the impacts they are expected to deliver on application.

Figure 1
Research Governance and process



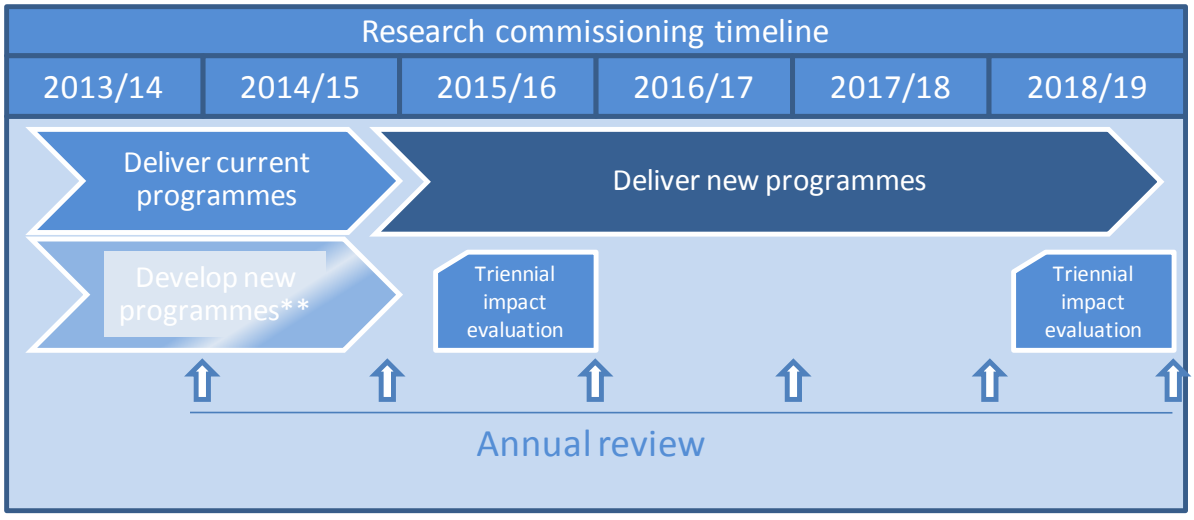
6.5. Quality assurance through external peer review of research proposals is now best practice in a number of other departments, and will be implemented under the strategy for both research commissioned from Forest Research, and from other providers. Peer review in this context will cover the science methodology and programme outline in the proposal, as well as the science which is being commissioned. This should ensure that the quality and relevance of the science remains high. Members of the Forestry Commission Expert Committee on Forest Science will have a role in the external review of the commissioning documents alongside other external reviewers from academia and the forestry sector.

6.6. Research programmes funded under SR10 (See Current Research programmes) will continue to run until 2014/15, by which time the future funding and organisational structures should be clearer. This provides time to consider what research needs to be commissioned to follow on. For this reason, the strategy is not prescriptive in the way that previous ones have been. The inter-regnum will provide time for reflection on future policy needs to build interdisciplinarity, and outcome focussed research proposals.

6.7. This will allow engagement with a wide range of stakeholders to consider how best to set priorities, which meet their needs and aspirations, within the resources available. The timeline for the process is indicated in Figure 2 below.

6.8. This strategy will start the process, which will be managed by the Forestry Commission. It will result in a detailed research programme, which is fit for purpose, forward looking, and will meet the needs of the sector towards 2020.

Figure 2
The research commissioning timeline




** Use outputs from stakeholder engagement to develop interdisciplinary research questions and programmes of research.

# 7. How research is communicated

*Key messages*

- Research delivered under the strategy will be designed to provide the maximum impact for policy development or operational practice.
- Science will be translated into publications which generate optimum levels of knowledge exchange and stakeholder adoption.
- Where appropriate, new technologies and media will be used to make access to research as simple and universal as possible
- The strategy will adopt a targeted approach to knowledge exchange.

## 7.1. Introduction

Science is not an end in itself. The outcomes of research should inform forestry policy and guide forestry practice to ensure that Britain's forests and woodlands continue to be managed as a sustainable and resilient resource. This requires a strengthened knowledge base to allow future decisions to be based on robust, reliable and up-to-date evidence. The knowledge base will be open and accessible to create an environment that stimulates innovation and the development of products and services that will be of benefit to both the forestry sector and wider society.

Communication will be more than an activity carried out at the end of research programmes; the ongoing exchange of knowledge between those who carry out the research and its end users are key issues for this Strategy. Much of this translation relies on Forestry Commission analysts to convey complex scientific issues in a straightforward and easily accessible way. The most effective way to strengthen communication is through the direct involvement of the user communities in both the conduct of research and the formulation of research programmes – and knowledge exchange mechanisms will be established to achieve this. Direct participation will not only promote shared understanding and collaboration, it will increase the resources available for disseminating it to as wide an audience as possible.

Harnessing all available resources will be important over the period of this Strategy; reducing budgets and tighter controls on expenditure mean traditional and passive approaches to communication, such as printed publication, will be replaced, where appropriate, with newer and more innovative communication technologies – especially where these will more effectively reach the target audiences. Such technologies also have the advantage of being faster and more far-reaching – critical in the face of emerging threats and rapidly changing situations that have characterised forestry in the past five years, most recently the response required to tackle *Chalara* ash dieback disease.

## 7.2. Audiences and end users

Research results will continue to be shared with existing stakeholders but new audiences will also be identified to bring about the changes necessary to deliver the outcomes in this strategy. This will involve improving targeting and tailoring communications channels to ensure that the right messages reach the right people at the right time.

*Working with policymakers (knowledge and evidence base)*

The need for scientists and policymakers to work together has never been greater. Gaps in the two-way flow of policy and science information have the potential to lead to key emerging scientific findings not being reflected in government policy in a timely manner and funding opportunities being missed. The strategy will improve and build on science-to-policy activities, identify opportunities and routes that best inform decision-making and ensure that outputs of research are relevant, fit for purpose and communicated in an appropriate, accessible and timely way.

*Working with forestry practitioners (delivering the UKFS)*

The governments in the UK have set out their approach to sustainable forest management in The UK Forestry Standard[18] and its series of supporting Guidelines. This approach is based on internationally recognised science and best practice. The research commissioned under the strategy will continue to support and develop the guidance for managers and practitioners. It will enable them to cope with emerging issues such as climate change and pest and disease threats to create productive and resilient forests and woodlands.

## 7.3. Putting it into practice

There are a number of ways in which the applied impacts of the research commissioned previously can be improved, and these are detailed below.

*Improving stakeholder engagement*

Creating more open channels of communication will improve dialogue with external and internal stakeholders. Increasing the number of programmes with steering groups or user groups will promote wider involvement of end users in research projects. New technology will be explored, to crowd-source[19] ideas and opinion online from a wider range of stakeholders that will feed into the formulation of our research proposals and support innovation,

*Getting the balance right*

[18] The UK Forestry Strategy will be reviewed during the lifetime of this strategy, and will be updated regularly to take account of legislative and regulatory changes.

[19] The practice of obtaining needed services, ideas, or content by soliciting contributions from a large group of people, and especially from an online community, rather than just from traditional employees or suppliers.

25% of research spend across the whole research programme will be allocated to communication activities. While this might mean less, or slower delivery of, research – it is a worthwhile trade off on the grounds that research effectively communicated is an excellent investment. Communication activities will be properly accounted for within the specifications of individual programmes – whether provided by Forest Research or through external organisations – to ensure that dissemination is seen as an integral part of every project. This will help with communications planning to maximise the impact of the research.

*Working in partnership*

The Forestry Commission is committed to working with a wide range of other organisations, institutions and individuals – to share knowledge and expertise and work towards partnership in communication as well as in research. Key partners in communication have been identified as:

- Environmental partnerships – making best use of communications networks through, for example, the Living With Environmental Change partnership
- Professional bodies and educational establishments – collaboration on Continuing Professional Development
- Business community – effective communication through trade articles and the financial press, and making use of stakeholder capacity for wide and effective knowledge exchange
- Scientific community – through the recognized route of published papers
- General public – by engaging public participation in scientific research or 'citizen science', which is an important new area for this Strategy.

*Volunteers now have the opportunity to contribute to a wide range of science projects using social media and web-based technologies. The recording capabilities of new generation smartphones and other mobile devices make it easier and more feasible to collect large datasets. The Forestry Commission is piloting and evaluating the use of citizen science to assess the extent to which the forestry sector can use these new techniques. For example, recent tree pest and disease outbreaks have been reported using mobile or internet 'apps', such as TreeAlert, and the further use of this technology will be explored.*

*Advice and guidance*

Forestry Commission analysts will provide a link between the scientists and end users of research, for example policymakers and practitioners. They will co-ordinate communications around commissioned research and analyse and re-purpose outputs to add value to the results of research and ensure its applicability to target audiences across a wide range of networks throughout the UK.

***Case study: Developing guidance on Ash dieback***

*The discovery of ash dieback in Britain in 2012 led to an urgent demand for a quick solution and specialist information on the disease and guidance on its containment. Media and public interest levels were unprecedented. Urgent advice was required on a range of practical forestry and arboricultural issues, from the management of ash woodlands and forest trees to urban and hedgerow trees.*

*Defra and the Forestry Commission were tasked with the development of a disease control strategy and producing management guidance for landowners and practitioners. As there was little experience of the disease in the UK, the Forestry Commission had to work with scientists and experts from Forest Research and European research institutions to understand the disease and its implications for forests and woodlands in the UK.*

*To produce rapid guidance in the face of an emerging threat to Britain's forests and woodlands and a rapidly changing situation, a stakeholders meeting was convened. Using video and tele-conferencing facilities this allowed scientists, forestry experts, practitioners, arboriculturists, landowners and NGOs from across the UK to share knowledge and ideas, and explore options for a range of scenarios.*

*The exercise was aided by information provided from European sources and the willingness of the stakeholder group to respond with suggestions and comments on very short deadlines. This resulted in the collation of information and expertise to produce robust and wide-ranging advice to woodland owners and managers in just three weeks. The guidance is subject to ongoing dialogue and will be updated as new information emerges. www.forestry.gov.uk/chalara*

## 7.4. Improving communication channels

A wide range of communication channels will be employed over the period of this strategy to improve the accessibility of forestry research and ensure that key outputs are better targeted towards end users. Effective targeting will involve considering whether outputs will be published digitally or in print, or via new media such as mobile apps or face-to-face events and webinars.

*Research catalogue*

A new portal and online catalogue for forestry research will replace the existing suite of web pages and improve the accessibility of commissioned research. This will have a dedicated search facility for all forestry research across Great Britain. It will have options to view current programmes, outputs of research, forest and woodland data and statistics, and an online archive. It will be supported by links to other research libraries and data repositories and supply RSS feeds to partner organisations on breaking news on research.

*Open access publishing*

The Forestry Commission will publish more research in Open Access[20] and hybrid journals over the period of this Strategy. This is in line with the clear policy direction of the UK Government towards support for 'Gold' open access publishing – where publishers receive their revenues from authors rather than readers, and so research articles become freely accessible to everyone immediately upon publication.

*Practical outputs*

In addition to delivering high-quality science papers, applied research that is fit for purpose and application in everyday practice must be delivered. This requires a balance between the demands for peer-reviewed scientific publication and the need for practical outputs; the commissioning process will therefore be actively managed to ensure an appropriate balance.

*Technical publishing*

The outputs of research and guidance on good forestry practice will be published in a new rationalised framework outlined in The UK Forestry Standard. The online publications catalogue[21] will continue to be developed as a repository for all official publications, including guidance and research reports. All new publications will be produced as eBooks[22]. In some cases, and in particular for the practical information contained in Field Guides, hard copy will continue to be the preferred format. The Forestry Commission Strategic Publications Group, made up of technical communication experts and policy advisors from England, Scotland and Wales, will provide a framework for technical publishing activities across the Forestry Commission and act as a source of expertise and guidance on good practice.

The series of Research Notes will be expanded and improved, and will be used to present key research outputs and interim results for policymakers and practitioners in a concise, accessible way. These will summarise lengthy or complex science papers and replace internal reports and grey literature. Magazine articles will also be produced for the business and trade press to disseminate information about work programmes, including initiatives such as the Woodland Carbon Code and work on ash breeding and resistance.

*New media*

The opportunities for interacting with stakeholders through new media are growing. These will be exploited wherever they can help to reach target audiences in a cost -effective and efficient way.

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[20] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/32493/12-975-letter-government-response-to-finch-report-research-publications.pdf

[21] http://www.forestry.gov.uk/publications

[22] Either PDF or ePub format

The Strategy will make use of:

- Crowd sourcing technology to engage stakeholders, generate ideas and opinion online and provide opportunities for feedback on research proposals.
- Webinars to share presentations, seminars and workshops over the Internet, in real time, with audiences across geographically dispersed locations.
- Podcasts and video presentations by experts to talk about work, demonstrate practical techniques, and reach wider audiences.
- Twitter feeds to send alerts and updates on new publications and research outputs (@FCPubs).
- eNewsletters and Bulletins on research outputs to website subscribers.
- Apps and eBooks for mobile smartphones and tablets – particularly for field identification and other material designed for use on the move.

*Decision support tools*

Decision support tools are an effective way of translating research into operational practice. Where this is appropriate they will be developed. One recent example is the Forester system, which underpins the Forestry Commission's inventory and forecasting capability. The wider forestry sector has access to other tools such as ForestGales[23] and Ecological Site Classification[24].

*Tailored communication activities*

Over the past five years, tailored communication activities have been designed to disseminate the results of forestry science to a wide range of stakeholders. These have included programme steering groups and focus groups. In addition, conferences, seminars and workshops that supplement traditional approaches, such as published papers and reports, have proved to be successful. Specific events, where researchers can talk about their work and its results, are well received. For audiences of practitioners, workshops that combine presentation with practical demonstration – seminar room with forest excursion – are especially appreciated. These events also increase the opportunity for the feedback of ideas from the field to scientists.

Face to face communication is highly effective, and experience strongly reinforces the value that it provides. However, it demands a committed and expert staff resource that requires careful development and deployment. Opportunities to improve this will be explored.

[23]http://www.forestry.gov.uk/fr/forestgales
[24]http://www.forestry.gov.uk/esc

*Access to data*

Forestry Commission data complies with the UK Government's 'Unlocking Innovation' and 'Inspire' projects, which seek to give access to a wealth of government data.[25] A new online system to record all the details of Forestry Commission data sets will be made available for anyone who wishes to view it.

Micro-data may be provided to bona fide researchers in the academic sector and to consultants undertaking research commissioned by government. Data may be released under arrangements described in a Service Level Agreement, a Concordat, contracts, and confidentiality declarations. All reports, maps, data and other outputs arising from the National Forest Inventory programme of work are available to access.

[25] http://data.gov.uk/library/open-data-white-paper

# 8. Evaluation

As this strategy employs an outcomes based approach to research, evaluation of the effectiveness of this strategy needs to include both contextual measures and more direct assessment criteria.

## 8.1. Contextual Baseline Measures

1. The National Forest Inventory (NFI) programme reports on the current state of key forest metrics at national level and, over time, trends in these metrics. Data from the NFI will be used to form a judgement on whether British forests are healthy, resilient ecosystems providing a sustainable flow of products and services to society.

2. An independent review of the evidence and current scientific capability available to address known and emergent threats to Britain's forests and woodlands will be undertaken.

## 8.2. Direct Assessment Criteria.

*Qualitative*

1. An independent triennial review of the impacts (policy or land use/management decisions affected) of research purchased (including associated decision support tools).

2. Collecting stakeholder feedback on perceptions of the science delivered under the strategy, through the use of social media tools.

3. Independent assessment of science quality by the Expert Committee on Forest Science.

4. Review of grant scheme applications and management plans for the public forest estate to assess the extent to which new and existing woodland management proposals reflect current research and guidance

*Quantitative*

5. Number of peer review publications and citations, through annual collation of research statistics, including both journal papers and technical guidance.

6. Leverage achieved by FC funded programmes, by annual collation of additional funding obtained through collaboration and partnership working where FC research programmes are included as part of a wider project or programme.

7. Metrics on the extent of collaborative working (across government and the wider sector) in both commissioning and delivery of research purchased.

8. The number of felling licences and forest plans approved each year under the UK Forestry Standard and the total areas of woodland captured under these plans.

Progress on these measures will be reported annually to the Research Strategy Management Board, and will be compiled in a published report. This annual report, combined with the published Catalogue of research will support this process, and aid the transparency of our research procurement programme.

# 9. Annex 1 – Links to other policies and strategies

**England**:

Government Forestry and Woodlands Policy Statement (January 2013):
http://www.defra.gov.uk/publications/files/pb13871-forestry-policy-statement.pdf

Natural England, ThinkBIG (September 2011): How and why landscape-scale conservation benefits wildlife, people and the wider-economy.
http://publications.naturalengland.org.uk/publication/30047

White Paper (June 2011) - The Natural Choice: securing the value of nature
www.official-documents.gov.uk/document/cm80/8082/8082.pdf

UK National Ecosystem Services Technical report (June 2011), Chapter 27 Response Options, pg 1362: Forestry.
http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx

**Scotland**:

The Scottish Forestry Strategy 2006
http://www.forestry.gov.uk/pdf/SFS2006fcfc101.pdf/$FILE/SFS2006fcfc101.pdf

Scottish Forestry Strategy Implementation Plan (2012 -2015):
http://www.forestry.gov.uk/pdf/SFSImplementationPlan2012-2015.pdf/$FILE/SFSImplementationPlan2012-2015.pdf

Strategic Directions for the National Forest Estate (2012-2015):
https://consult.scotland.gov.uk/forestry-commission-scotland/strategicdirections

The National Forest Estate Strategic Plan (2009-2013):
http://www.forestry.gov.uk/pdf/StrategyPlanInteractivePDFreduced.pdf/$FILE/StrategyPlanInteractivePDFreduced.pdf

Variety is the Spice of Life (May 2012) - Action for Nature on Scotland's national forest estate.
http://www.forestry.gov.uk/pdf/fcs-biodiversity-publication.pdf/$FILE/fcs-biodiversity-publication.pdf

**Wales**:

Forestry Commission Wales Corporate Plan (2012 - 2015):
http://www.forestry.gov.uk/pdf/CorporatePlan2012.pdf/$FILE/CorporatePlan2012.pdf

Woodlands for Wales (2009) (Welsh Assembly Government's Woodland Strategy):
http://www.forestry.gov.uk/pdf/EnglishWfWstrategy.pdf/$FILE/EnglishWfWstrateg

y.pdf

Woodland Management for Birds (2009) - A guide to managing woodland for priority birds in Wales:
http://www.forestry.gov.uk/pdf/WoodlandmgmtbirdsWalesEnglish1.pdf/$FILE/WoodlandmgmtbirdsWalesEnglish1.pdf

**Northern Ireland:**

Northern Ireland Forestry - A strategy for sustainability and growth
http://www.dardni.gov.uk/forestservice/strategy-for-sustainability-growth.pdf

**Other UK departments:**

**Department for Business, Innovation and Skills:** This site outlines what work is being funded
https://www.gov.uk/government/topics/science-and-innovation

**Foreign and Commonwealth Office:** Science and Innovation Network established in 2000 (Science and Innovation Network is now managed by BIS) Science and Innovation News:
http://ukincanada.fco.gov.uk/en/about-us/working-with-canada/uk-science-innovation/sin-news/

**DECC**:
Science and Innovation Strategy:
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/48335/5107-decc-science-innovation-strategy-2012.pdf

**DFID**:
Research strategy:
http://www.dfid.gov.uk/Documents/publications1/research-strategy-08.pdf

**Defra**:
Evidence Investment Strategy:
http://www.defra.gov.uk/publications/files/pb13471-eis-110427.pdf

**Research Councils UK:** Together Transforming Research into Innovation - a review:
http://www.innovateuk.org/_assets/pdf/other-publications/transformingresearchinnovation_web%20final.pdf