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UK TREES AND FORESTS

Trees and forests can provide a range of benefits that are often complementary. Some of these benefits derive from green space in general, but forests may also offer unique opportunities. The social and environmental value of woodland and forest in Great Britain has been estimated to be worth up to £1 billion a year[1]. This POSTnote explores the issues surrounding the sustainable management of existing and new forest in the UK.

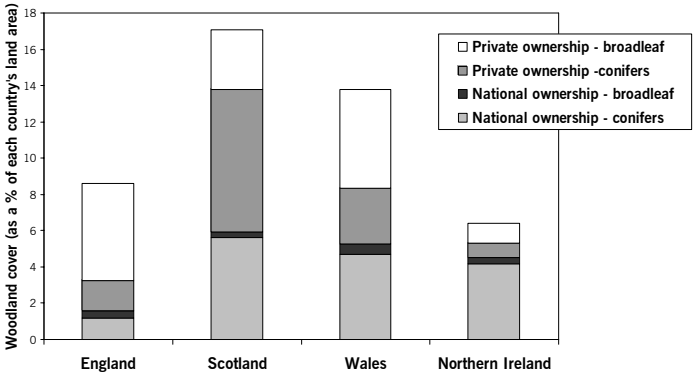
Background

Most of the UK was once covered by forest. Clearance for timber, fuel, and agriculture meant that by 1900, forest and woodland[2] cover had fallen to about 5% of its land area. Timber demand during the First World War led to the creation of the Forestry Commission in 1919, with the aim of building up a strategic timber reserve. Large scale forest planting took place, mainly of productive non-native conifer species (such as Sitka spruce, native to North America) on land of marginal value for agriculture. One such example is Kielder Forest in Northumberland. The area of woodland has now risen to 11.6% of the UK land area (or 2.8 million hectares).

The amount, type, and ownership of woodlands vary within the UK (Fig. 1). The majority of native trees, such as oak, are broadleaves (with flat leaves rather than needles), but some, such as Scots pine, are conifers. Woodland is considered 'semi-natural' if it is composed of locally native species. A small proportion of this woodland is classed as 'ancient', as it dates back to at least 1600 AD (or 1750 AD in Scotland[3]), and is often biodiverse and of cultural importance (an example being Sherwood Forest). Around 30% of forest is owned by the devolved governments and managed by the Forestry Commission or the Department of Agriculture and Rural Development (DARD) in Northern Ireland. However, only a small amount of this is semi-natural or ancient woodland.

In recent decades, increased interest in nature conservation and recreation has led to a national and international policy move, away from a primary aim of timber production towards forestry that provides multiple benefits. 'Sustainable forest management' aims to provide social and environmental goods, to maintain an economically viable forestry sector and to protect these benefits for future generations.

Figure 1. The woodland resource in the UK.



Data source: Forestry Commission Statistics and Forest Service (NI)

UK forest as a sustainable resource

Forests and trees can provide economic, social and environmental benefits. Often these are complementary, but trade-offs can be required between economic timber production and aims such as public access or increased biodiversity. Best practice guidelines, and incentives such as management grants, help to promote high environmental and social standards in commercial forestry (Box 1), reducing the risk of environmental damage such as acidification of water or soil erosion during harvesting.

Economic value

The forestry and wood processing sectors make a significant contribution to the UK economy, producing £7.2 billion in gross value added[4]. The UK forestry industry produces 9 million cubic metres of timber each year, but this represents only 18% of the total wood products used. Most wood is imported and although the majority comes from Europe, achieving a sustainable

wood processing sector requires ensuring the legality and sustainability of timber from all imported sources.

The creation and active management of woodlands on agricultural land (encouraged by government incentives), can benefit the rural economy by helping to provide opportunities for farm diversification and a range of rural enterprises (such as producing charcoal, craft businesses or timber processing).

Box 1. The UK Forestry Standard and certification

Government grants are available throughout the UK for forest management (including re-stocking of felled areas) and the creation of new woodland that provides public benefits. Schemes in Great Britain provided £39.6 million in such grants in 2005-2006. The UK Forestry Standard[5] specifies the management standards that must be met to receive grants and to qualify for required felling licences, as well as giving best practice guidelines on how the standards can be achieved. It also forms the basis for forest monitoring and the independent UK Woodland Assurance Standard[6] . This latter scheme ties in with international protocols (for example those of the Forest Stewardship Council) and provides independent certification of sustainable forests and wood products. The scheme covers all the nationally owned estate and increasing amounts of privately owned forest, with 43% of UK forest now certified. Public procurement policies have been introduced requiring wood used in public buildings to be from certified, legal sources.

Social benefits

Forests and trees provide a range of social benefits for local communities and visitors. These include:

- 167,000 **jobs**, many of them in rural areas;
- public **access** and opportunities for **recreation** and tourism, including sports such as mountain biking;
- opportunities for exercise, contributing to **improved health**;
- allowing people to **experience nature**, view wildlife and 'get away' from urban life, contributing to mental well-being;
- preserving **cultural heritage**, including ancient 'veteran' trees and archaeological sites;
- opportunities for outdoor **education** through initiatives such as Forest Schools;
- aiding **social inclusion** (bringing disadvantaged people back into the community). Community forestry initiatives, such as England's Community Forests, aim to enhance quality of life and to build stronger communities, by involving local people in the creation and management of woodland near deprived areas. Larger scale initiatives such as the National Forest (Box 2) and Central Scotland Forest have similar aims.

Environmental value

Woodland and trees also perform a variety of valuable natural functions ('ecosystem services'):

- **protecting soils** from erosion;
- **reducing flooding** in some catchments by intercepting rain water and reducing run-off in storm events;
- helping to **reclaim contaminated land**;
- **providing shelter**, shade and cooling in urban areas, and wind breaks on farmland;
- **conserving biodiversity**. Broadleaved woodland contains more than twice as many rare species, listed in the UK Biodiversity Action Plan, as any other UK habitat. Conifer plantations can also have significant value as habitat for birds, fungi, invertebrates and some protected species such as the red squirrel and capercaillie;
- contributing to limiting climate change by taking up and retaining atmospheric carbon (**sequestration**) and **reducing CO_2 emissions** by the use of wood as a source of bio-energy. Producing materials such as steel and concrete can cause large emissions of CO_2 and wood has great potential as a low carbon material[7], especially when used in products with a long life span.

There remains much debate over tree planting for carbon sequestration and carbon offsetting schemes. Carbon sequestration by trees can play a role in mitigation, but this does not replace the need for strategies to cut emissions. For example it is estimated that three quarters of the national land area would need to be planted to make car use by existing UK drivers carbon neutral[8]. Planting on some areas, such as peat soils, could result in an overall release of CO_2 although some other forest soils may act as carbon stores. There are also doubts over the permanence of forest carbon reservoirs[7].

Wood from forest management (as well as energy crops such as willow) can be used as fuel to produce heat or electricity. Trees take up carbon as they grow, and this is released by burning, so there is no net release of CO_2 to the atmosphere (except small emissions from harvesting, transport and processing). Schemes can be on a local scale, using wood boilers to heat houses or schools for example. Alternatively, heat or electricity can be produced at a larger scale in biomass energy plants. Conversion of biomass to energy is most efficient if heat created during electricity production is utilised and if fuel is sourced from the local area to minimise transport.

Box 2. The National Forest.

The National Forest is a government initiative covering an area of 518 square kilometres in the Midlands. The aim is to increase woodland cover to 1/3 of this land area whilst demonstrating sustainable multi-purpose land use. From a baseline of 6% in 1991, woodland cover is now 17%.

The Forest aims to grow high quality timber, as well as to provide a framework for other activities, including farm diversification and regeneration of former coal-fields. New jobs are being created and local wood-based industries encouraged. 13,000 local people have been involved in the Forest's creation through volunteering, tree planting and art activities. Many more make recreational or school visits.

The Forest also aims to bring environmental benefits by providing large scale ecological change. The National Forest has resulted in considerable and varied habitat creation, the linkage of previously isolated ancient woodlands and the establishment of new nature reserves.

The policy context

The UK is internationally committed to sustainable forest management, having adopted the Statement of Forest Principles at the 1992 Rio Earth Summit and agreed a general declaration at the Helsinki Ministerial Conference on the Protection of Forests in Europe (1993). The Statement of Forest Principles states that to achieve

sustainable forest management, "forest resources and forest lands should be managed to meet the social, economic, ecological, cultural and spiritual human needs of present and future generations". The EU has no direct jurisdiction over forestry and policy is decided by member states. However, some EU legislation is relevant to the forestry sector including the Common Agricultural Policy, EU Habitats and Species Directive, Environmental Impact Assessments, and the Water Framework Directive.

UK forestry policy is devolved. The England Forestry Strategy is currently being revised by the Department for Environment, Food and Rural Affairs (Defra) and is expected in summer 2007. It is likely to focus on the provision of environmental and social benefits by woodland. Policy in Scotland and Wales is set through the national offices of the Forestry Commission on behalf of the devolved governments. A review of the Welsh strategy[9] is being considered and a new Scottish Forestry Strategy[10] has just been published, recognising the importance of issues such as climate change, community woodlands, and the needs of a growing timber processing sector. In Northern Ireland, the Forest Service (an agency of DARD) retains a strong focus on the economic importance of forestry and the need to increase woodland area. Other stakeholders which influence UK policy include industry bodies such as the Confederation of Forest Industries (ConFor) and environmental non-governmental organisations such as the Woodland Trust.

Issues

Active woodland management helps to provide non-market benefits such as biodiversity and public access. To encourage private woodland owners to manage woodland for such benefits, it is recognised that they need to generate income. This could be from finding markets for the wood produced (including opportunities offered by concern over climate change, such as the emerging bio-energy market) or from government incentives for management. There is debate over government's role in supporting forestry and the wood processing industry. ConFor feel more action is needed on the economic side of forestry by supporting market development and promoting industry competitiveness. Others (including Defra) feel the Government's focus should be on providing social and environmental benefits of woodland by whichever mechanism is most effective.

Economic viability

The UK forestry industry operates in a competitive, global environment and after steep falls over the last few decades, timber prices are now rising slightly. There are emerging skills shortages and uncertainty over long term prices for timber, leaving a question mark over the economic viability of some future UK timber production.

International markets for timber and wood products are growing, especially in Eastern Europe and China. There is also potential for growth in the UK market, especially in supplying wood fuel for energy generation and to meet a growing market for other wood products. Industry initiatives such as the 'Wood for Good' campaign are helping to develop potential markets. Interest is also growing in timber use in sustainable building.

Diversifying conifer plantations

Most conifer plantations in the UK consist of blocks of trees of the same age. In young plantations, the trees can be very dense, so little light reaches the forest floor, reducing the abundance of other plants and wildlife. Plantations are typically felled in large blocks on reaching maturity, and then re-planted. This system is appropriate in some areas (such as where other approaches would result in considerable damage from wind), but does not always provide maximum environmental and social benefits. Alternative management systems are becoming increasingly important (Box 3).

Box 3. Future options for conifer plantations.

Continuous cover forestry is a management approach that maintains a forest cover over time by the selective felling of single or small patches of trees. Such systems can produce a more diverse forest structure and may be less costly to re-stock. 'Woodlands for Wales' has set a target of converting 50% of the national estate to these systems. The approach is also being implemented in Scotland and parts of England. One barrier to success is the lack of skills and experience with these systems in the UK.

Some conifer plantations were created on the sites of ancient broadleaved woodland. There is now considerable commitment to restoring these PAWS (plantations on ancient woodland sites) to semi-natural woodland. Many PAWS still contain remnants of the ancient woodlands they replaced, such as ancient trees, ground flora and archaeological sites. As a result, the biodiversity and cultural value of restored PAWS should be greater than that of new woodland created from farmland. Plantations were also established on open habitats, such as heath and bog, before the importance of these habitats was fully recognised, and there is a consensus that some of these areas should be restored to their original state.

Semi-natural and ancient woodland

Some ancient and semi-natural woodlands are at risk from development and even where woods are protected for their conservation value (for example, as designated Sites of Special Scientific Interest), their wildlife may still be under threat from human activities. The populations of many woodland bird species (used as an indicator of habitat condition) have declined dramatically since the 1970s, possibly due to changes in the structure of woodlands as a result of neglected management[11].

Threats to woodland habitats and biodiversity include:

- **Increasing fragmentation**. Small patches of woodland, isolated by other land uses, are more vulnerable to change and can support fewer species than larger areas.
- **The decline in woodland management**. Over the last century, active management of woodlands for timber has declined. This has led to a reduction in open areas within woodlands, on which many species rely, contributing to a decrease in biodiversity.
- **Overgrazing**. Increasing deer numbers (including four introduced species) are an issue across the UK. Deer are a part of the woodland ecosystem, but overgrazing affects tree seedlings, ground flora and other wildlife. In upland areas, sheep can also cause overgrazing.
- **External influences such as pollution**. Threats from acid rain have declined due to restrictions on the

release of sulphur dioxide, but localised air pollution can still be a problem. Fertiliser and pesticide drift from adjacent farmland is an issue in woodland edges.

- **Invasive species**. Some non-native species (such as rhododendron and grey squirrels) pose threats to woodland ecosystems by damaging or out-competing native species. Insect and fungal pests, and disease such as Dutch Elm Disease, can also cause damage[12].
- **Impacts of recreational users**. Trampling can have locally significant impacts on woodland ground flora and disturbance by humans and dogs may affect wildlife such as breeding birds.

Impact of climate change on UK forests

Climate change is likely to affect semi-natural woodland and plantations. Scientists and the public are already observing changes in the timing of seasonal events, probably due to warmer temperatures. Bud opening in oak is happening up to two weeks earlier than in the 1950s[13]. Current research focuses on modelling the responses of tree species to different climate scenarios and there is considerable uncertainty in estimates.

Theoretically, higher levels of carbon dioxide could increase the rate at which plants convert water and carbon dioxide to essential nutrients and hence stimulate plant growth. However, some species may become less productive in the areas where they are currently growing. For example, mature beech trees in SE England may be vulnerable to drought, although beech is unlikely to disappear entirely from the region. Some commercial species, such as Sitka spruce, could become more productive in areas such as SW Scotland. The distribution of tree species may alter as a result of changes in temperature, rainfall and windiness. Insect and mammal pests are likely to be an increasing problem due to decreased winter mortality, but the impacts on fungal disease agents are less clear[13]. It is difficult to assess the cumulative effects of these changes on woodland ecosystems. Extreme events such as droughts or disease may determine the future composition of woodlands.

Woodland creation

Creation of new woodland may help to tackle problems such as woodland fragmentation and to increase the resilience of ancient woodland species to environmental change (by creating forest habitat networks). However, it may take time for the full ecological benefits of large scale woodland creation to become apparent. If new woodland also has a social and economic rationale, location close to end users is likely to be desirable. Whilst there is general agreement between NGOs and government that increased woodland area across the UK is desirable, there is disagreement over the need for national targets for new woodland creation. Some stakeholders (such as the Woodland Trust) feel this would inspire people and give an idea of the 'job to be done'. Such targets, if adopted, would ideally be built up from estimates of woodland required at regional or local levels, to meet different social, economic and environmental needs[14].

Integrated landscape management

Many of the challenges facing UK forestry may need to be tackled at the landscape scale at which many ecosystems function (for example, the area of a river basin). Forests are influenced by, and have impacts on, surrounding land uses. Integrated land management plans may be needed to take this into account. Co-ordinated action at the regional and national level, by a range of government departments and stakeholders (industry, NGOs and land users outside the forestry sector), is desirable to achieve this. An example of a collaborative approach in practice is the Deer Initiative, set up to manage deer populations (mainly by culling) across different land uses including forest and woodland.

Overview

- The potential of forestry to meet sustainable development goals and to provide complementary environmental, social and economic benefits is now recognised at national and international levels.
- The UK Forestry Standard and the UK Woodland Assurance Standard help to ensure high environmental and social standards in UK forestry.
- Climate change provides opportunities for the forestry sector (such as the new woodfuel market) but may be a significant threat to some woodland ecosystems.
- Integrated management approaches at landscape scales may help meet challenges facing UK forests and ensure that they provide maximum benefits.

Endnotes

1 Willis, K.G. *et al*. (2003) *The Social and Environmental Benefits of Forests in Great Britain*; Report to Forestry Commission.
2 The terms 'forest' and 'woodland' are used interchangeably here, to describe a tract of predominantly tree covered land.
3 The date used in Scotland results from the use of different historical records to set a threshold for 'ancient' woodland.
4 cebr (2006) *The economic contribution of the forest industries to the UK economy*
5 Forestry Commission (2004) *The UK Forestry Standard*
6 UKWAS (2006) *The UK Woodland Assurance Standard* (2nd ed.)
7 IEA Bioenergy Task 38 (2005) www.joanneum.at/iea-bioenergy-task38/publications/faq
8 Broadmeadow, M. and Matthews, R. (2003) *Forests, Carbon and Climate Change: the UK Contribution.* FC IN48
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10 *The Scottish Forestry Strategy* 2006 (SE/2006/155)
11 Amar, A. *et al*. (2006) *What's happening to our woodland birds?* RSPB research report 19.
12 Forest Research (2006) *Protecting Trees* http://www.forestresearch.gov.uk
13 Broadmeadow, M. and Ray, D. (2005) *Climate Change and British Woodland.* FC IN69
14 *Pers. Comm*. Keith Kirby, Natural England, 2006

POST is an office of both Houses of Parliament, charged with providing independent and balanced analysis of public policy issues that have a basis in science and technology. POST is grateful to Rachel Gaulton for researching this briefing, to the British Ecological Society for funding her parliamentary fellowship, and to all contributors and reviewers. For further information on this subject, please contact the co-author, Dr Jonathan Wentworth, at POST.

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