



WOODLAND
TRUST

Making woodland count Its contribution to our quality of life

*A report prepared by ERM in collaboration with
Professor Kenneth Willis for the Woodland Trust*

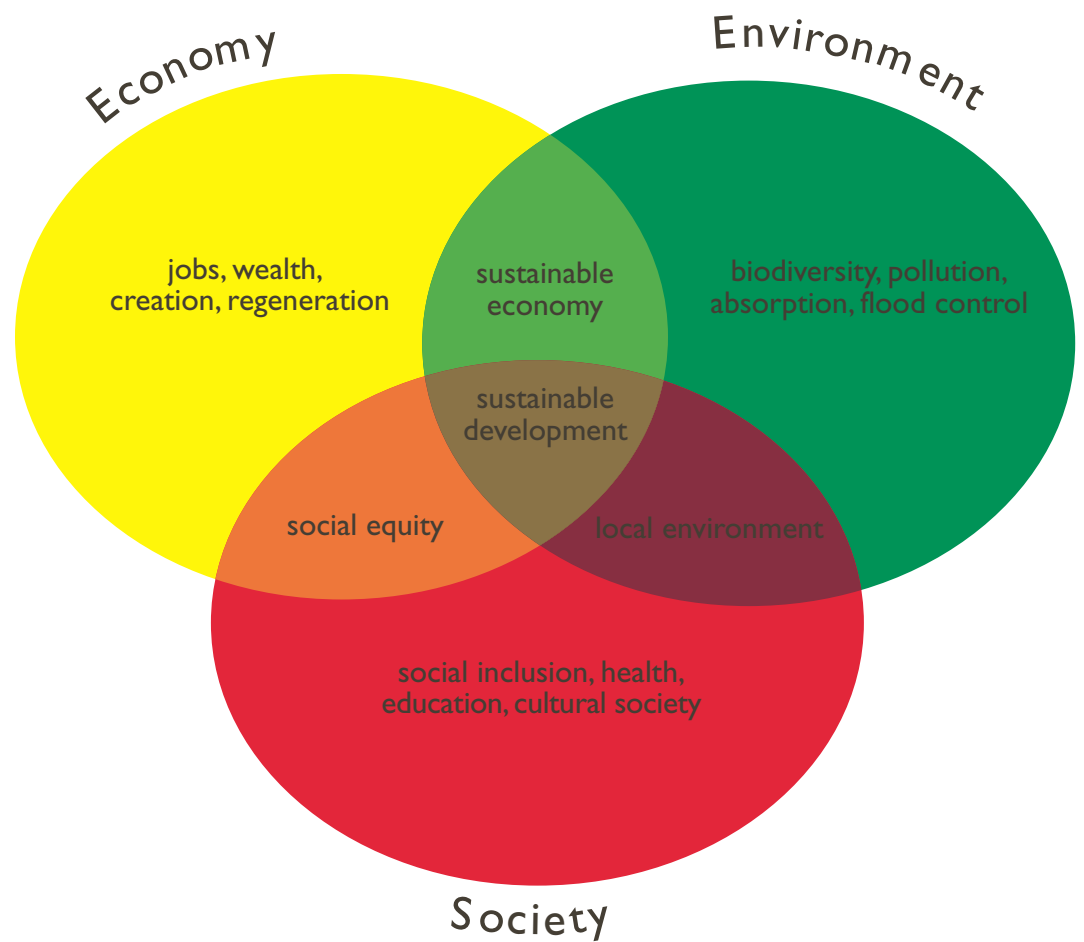


The Woodland Trust

Campaigning to keep woodland alive

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Introduction

Increasingly, society judges the investment of public and private funds in terms of sustainability, including the consideration of social, environmental and resource issues, alongside the more traditional economic values of jobs and wealth creation. This report, prepared by ERM in collaboration with Prof. Ken Willis for the Woodland Trust, illustrates the contribution woodland makes to our quality of life, through economic, environmental and social benefits. It also provides a sound policy rationale for continued public support for woodland and forestry in the UK.

Woodland contributes to our quality of life in the following ways:

- By providing a place for recreation and improving the quality of our surroundings.
- Contributing to our own and our children's education and allowing us to live a healthier life.
- Absorbing harmful greenhouse gases.
- Forming a vital component of many of our best-loved landscapes.
- Conserving our world's biodiversity by providing habitats for a wide variety of animal and plant species.
- Woodland is also the basis for the timber industry and can contribute to a more diverse rural economy.

These are just some of the benefits that are currently being derived from woodland. However, because of the difficulty in applying a monetary value to many of them, they are often overlooked when policy decisions are made.

Most people will have visited, lived near or appreciated the view of a woodland but rarely stop to consider the wider benefits that it provides. An aim of this report is to bring together the many categories of benefits attributable to woodland and illustrate the relevance of their contribution to our well-being and ultimately the sustainability of the wider economy.

UK Government policy on sustainable development includes the measurement of indicators that refer directly to woodland and others to which it contributes. The fact that these indicators are used to measure the quality of life and improvements in the UK economy means their importance cannot be underestimated. The range of contributions woodland makes to sustainable development is summarised in the diagram on page 1.

In this report, in line with the three pillars of sustainability, woodland benefits have been categorised as economic, social or environmental (see diagram on previous page). Woodland has the ability to contribute to the improvement of 11 of the 15 headline Quality of Life indicators for the UK and 21 of the national indicators (see Table 1, page 17). In addition, the area of woodland in the UK, the protection and expansion of ancient and semi-natural woodland and the sustainable management of woodland are national indicators in their own right. Woodland is a major contributor not only to UK sustainable development policy but also to policies on health, education, social inclusion, rural development and biodiversity.

This short report is the result of a larger project, which covers a literature review and description of all benefits related to woodland; the most accurate and reliable estimate of these benefits; a discussion of valuation techniques and an extensive bibliography. The full report entitled "Woodland- its Contribution to Sustainable Development and the Quality of Life", prepared by ERM in collaboration with Professor Ken Willis, is available from the Woodland Trust website at www.woodland-trust.org.uk.

The values quoted in this short report have been chosen as the most up-to-date and reliable estimations of a specific woodland benefit.

“Woodland has the ability to contribute to the improvement of 11 of the 15 headline quality of life indicators.”

“Woodland provides a wide range of benefits to individuals and communities.”

Social benefits of woodland

Woodland provides a wide range of benefits to individuals and communities. The main ones are:

- Health
- Education
- Social inclusion
- Cultural history, archaeology and heritage.

Often the social benefits of woodland are characterised solely in terms of their value as a recreational resource, but as illustrated here there is much more social value inherent in the woodland environment.

Health

The benefits of woodland relate to:

- Reduction of recovery times
- General health and fitness
- Wind and sun protection
- Noise absorption

Health benefits

Reduction of recovery times (1)

An American study illustrated that people reacted positively to a wooded landscape in the form of slower heartbeats, lower blood pressures, and more relaxed brainwaves.

A study of hospital surgical patients illustrated that those with tree views from their windows took ten percent less time to recover, and made fewer requests for analgesics than other patients.

General health and fitness (2)

A report commissioned by Advantage West Midlands concluded that recreational activities in forests account for 'significant reductions' in heart disease, stress and obesity. Trees also improve air quality and therefore help to fight respiratory diseases such as asthma and

bronchitis. The health benefits of walking and cycling in woodland beauty spots are estimated to save the National Health Service up to £4.5 million a year in the West Midlands alone.

Protection from wind and sun

In summer trees provide shade and block heat from the sun. The recent 2003 heat wave in Europe and the many related deaths shows how essential this is, especially in urbanised areas. The provision of shade is also recognised as essential in the combat against skin cancer. Trees can also serve as windbreaks thus reducing the need for extra heating.

Woodland has a demonstrable effect on improving people's health. Its presence improves recovery times, general health and fitness (including the reduction of risks for heart-related diseases and respiratory diseases), and mental health.

In addition, trees provide shelter against the elements, which has indirect health effects including providing shade against skin damage from the sun. The benefits of trees for protection against weather effects depend on the type of tree (evergreen, deciduous) and the location. Woodland can also help in reducing the levels of stress and anxiety caused by noise.

Noise absorption by trees is maximised by small woodland areas in relative proximity to settlements.

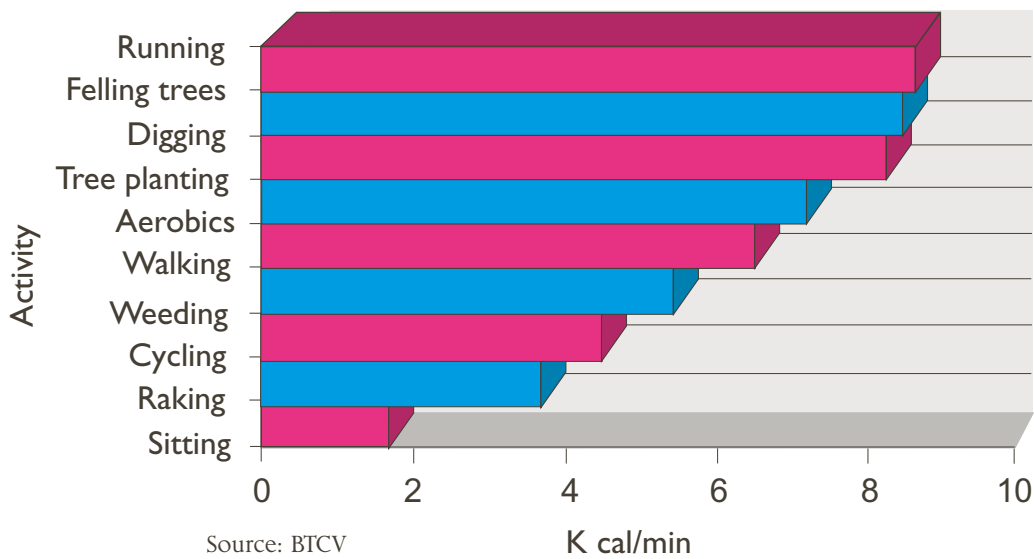
Woodland activities also provide health benefits in terms of exercise, socialising with others and a sense of well-being. The diagram on page 4 indicates the "exercise" value of some activities associated with natural spaces such as woodlands.

(1) Ulrich, Simons, Losito, Fiorito, Miles and Zelson (1991), Stress recovery during exposure to natural and urban environments, *Journal of Experimental Psychology II*, 201-230. Ulrich, Simons (1986), Recovery from Stress During Exposure to Everyday Outdoor Environments. In Barnes, Zimring & Wineman "The cost of Not Knowing", Environmental Design Research Association,

Washington DC. Cited in Hartig et al. (1991).

(2) Advantage West Midlands, 2003 and Forestry Commission, A Growing Resource: West Midlands Regional Forestry Framework Baseline Study, Forestry Commission.

Comparison of calories used during conventional fitness and Green Gym activities (1)



Community involvement in woodlands

‘We see Bellsquarry Wood as a great wildlife haven,’ says local resident Ann Street, who is active in the Bellsquarry Community Woodland Group, ‘and as a place of tranquillity. Although it’s only five minutes from Livingston town centre, it’s always peaceful in the wood – even though you sometimes meet half the village there as well! A lot of local people put a lot into the wood and we can do what we can to keep it the way we want it.’

Source: The Woodland Trust, *Broadleaf* Article, 2003

The greatest health benefits of trees are generated by small areas of woodland rather than large non-native commercial forests, including for example small clusters of trees outside hospitals and in city squares and other non-green urban areas. They contribute a vital component to open spaces in towns and cities. Improving the health of the overall population is one of the UK’s 15 headline indicators for sustainable development. The environmental factors affecting health (more specifically respiratory illness) and health inequalities

influence the UK’s performance against national Quality of Life Indicators. Woodland’s contribution to health improvements illustrates that a commitment to woodland is a commitment to improving the UK’s performance against its Quality of Life health indicators.



Bellsquarry Wood, WTP/LTony, Farnham

“We see Bellsquarry Wood as a great wildlife haven and as a place of tranquility”

local resident
Ann Street,
Livingston, Scotland

(1) Source: British Trust for Conservation Volunteers website www.btcv.org

“Everything we do in Clanger Wood is agreed in advance with the Woodland Trust and is directly linked to the National Curriculum.”

Peter Eyles, teacher, Trowbridge

Education

Woodland provides a means of learning about the natural environment and its relationship to human activities, helping to develop an awareness of the links between rural and urban areas and educating people about healthier and more environmentally friendly lifestyles.

Classroom in the woods

The significance of these attributes of woodland has been recognised in the creation of community forests. These have been established by the Countryside Agency and the Forestry Commission to create woodland for wildlife, work and education and recreational facilities close to half of England's population. Among their objectives are providing new opportunities for education and ensuring that urban schools are not disadvantaged in meeting the needs of the National Curriculum.

Other initiatives across the UK, which aim to improve forest education, include the Forest Education Initiative (FEI), which aims to

increase the understanding and appreciation of the environmental, social, and economic potential of woodland and the link between trees and everyday wood products. Forest Schools, which are part of the FEI, aim to maximise the learning potential of local woodland through frequent and regular visits and initiatives throughout the year. Teaching Trees is another project, which encourages the educational use of woodland (developed and funded by the Yorkshire Division of the Royal Forestry Society).

Pupils from a local school have 'adopted' Clanger Wood, near Westbury in Wiltshire, and are helping improve conditions for the fritillary butterflies for which this ancient wood is renowned. The scheme was the brainchild of Peter Eyles, who teaches science at the John of Gaunt School in Trowbridge. 'We have a tradition in the school for practical environmental work,' he says. 'Everything we do in Clanger Wood is agreed in advance with the Woodland Trust and is directly linked to the National Curriculum.'

Source: The Woodland Trust, *Broadleaf* Article, 2001



Clanger Wood, WTP/L/Keith Huggett



“Woodland clearly has a significant contribution to make to bringing sustainable development education alive and making it practical.”

A study for the South West of England estimated the annual expenditure on day trips and residential courses for woodland education. The South West estimated the financial value of the woodland assets for education to be in the region of £2.26 million annually⁽¹⁾. Based on this, a total annual value of £23.6 million was estimated for the whole of England. This is approximately £372 per 100 school children.

Woodland clearly has a significant contribution to make to bringing sustainable development education alive and making it practical.

Social inclusion

Social exclusion describes what happens when people and communities suffer from a combination of linked problems such as unemployment, poor skills, low incomes, poor housing, high crime environments, bad health and family breakdown⁽²⁾, a combination of which prevents them accessing fully the benefits their community can offer. Social inclusion is the process of trying to bring these people back into the community.

Woodland activities such as tree planting, walking and craft training can provide a forum for people of all ages and cultural backgrounds from local communities to come together and learn about, enjoy and improve their environment. The work carried out by the British Trust for Conservation Volunteers (BTCV) via its network of Green Gyms has demonstrated the social as well as health benefits of woodland and other nature conservation activities.

Woodland-based activities have also been successful in engaging ethnic minorities. The REACT⁽³⁾ funded New Leaf project in the West Midlands has undertaken a series of events, including community consultation, site meetings, walks and community work days with training in woodland skills.

The Woodland Trust launched a Community Woodland Network project in 2002 and this has identified more than 200 groups already in existence in England where there is evidence of communities pulling together through their shared focus and sense of responsibility for a local woodland.

⁽¹⁾ South West Regional Development Agency and the Forestry Commission, South West Woodland and Forestry Strategic Economic Study, 2002.

⁽²⁾ Government definition for social exclusion, ODFM, 2003. One of its aims is to extend the concept of community forestry to new areas and partners.

⁽³⁾ REACT stands for Regeneration through Environmental Action, and is a national programme developed by the Countryside Agency and delivered through local partners. One of its aims is to extend the concept of community forestry to new areas and partners.

Cultural history, archaeology and heritage

“British forests contain a diverse and rich collection of archaeological remains...the majority of ancient monuments within our forests pre-date the woodland itself...”

Trees are often important elements in the cultural history of the landscape. For example, Burnham Beeches near Maidenhead bring thousands of visitors each year, some of whom are attracted by the historical significance of the beeches, their management including pollarding, and their association with mediaeval farming practices. We are only just beginning to appreciate the cultural value of woodland to individuals and communities.

One study⁽¹⁾ considering the benefits of woodland in a cultural landscape found that people were prepared to pay to conserve native woodland, including grasslands, moorlands, walls, and archaeology. The value placed on the protection of woodland in the study area (in the Breadalbane Environmentally Sensitive Area) was estimated at 82p per household per year.

Visitor values

In a survey of visitors to the Yorkshire Dales National Park⁽²⁾, visitors valued the maintenance of traditional broadleaved woodland as equally important as the maintenance of dry stonewalls & barns and flower-rich hay meadows. In fact within the context of the cultural landscape, woodland, stonewalls, and meadows were seen as both substitutes and complements in provision for each other.

Archaeology and heritage

British forests contain a diverse and rich collection of archaeological remains. Some of this archaeology is associated with woodland management and woodland products both past and present, such as wood-banks, saw-pits, and charcoal-burning platforms. Interestingly the majority of ancient monuments within our forests pre-date the woodland itself, originating in a historic landscape that was essentially

agricultural. These include burial mounds, fortifications, earthworks, field systems, and standing stones.

History in the woods

A 150-year-old drystone dyke in Uig Wood on the Isle of Skye has been the focus of a major community project led by artists and craftspeople throughout 2003.

‘If we do not do something now,’ says woodland officer Paul Young, ‘in 50 years’ time the dyke may have disappeared altogether in places. That would be a tragedy. So we’re taking the opportunity to reinstate it as a piece of landscape and a piece of history, using local artists and craftspeople where we can. We hope also that the children of the island will weave a story around it and remember it and pass it on down the generations.’ In initiating the rebuilding project, the Woodland Trust Scotland wants not only to make sure that Uig Wood is stock proof, but to create an arresting and thought-provoking feature for people to enjoy.

Source: Woodland Trust, *Broadleaf* Article, 2003.

A recent study for the Forestry Commission⁽³⁾ considered the value of the protection provided by forests for archaeological artefacts. The value was estimated to range up to £247 per hectare of woodland. The cultural history, archaeology and heritage in our woodland contributes directly to its value to local communities and to tourism. The interpretation of this aspect of a woodland’s character adds significantly to its enjoyment.

(1) Hanley, Simpson, Parsisson, Macmillan, Bullock and Crabtree (1996). Valuing the Conservation Benefits of Environmentally Sensitive Areas. Report to the Scottish Office Agriculture, Environment and Fisheries Department. Macaulay Land Use Research Institute, Aberdeen.

(2) Santos (1998), *The Economic Valuation of Landscape Change*, Edward Elgar,

Cheltenham.

(3) Source: Macmillan (2002). *Social & Environmental Benefits of Forestry Phase 2*, Report to the Forestry Commission, Edinburgh.

Economic benefits

Woodland contributes to the strength of the economy in many different ways, including timber production and processing, employment creation, rural development, land regeneration and urban regeneration.

Timber industry

Woodland products surround us on a daily basis from our morning paper, to the furniture in our houses and offices and to the pencils we write with. These are all final products from the timber industry. The industry includes everybody from the timber growers and harvesters, to the processors such as the sawmills and pulp and paper manufacturers through to the secondary processors, which manufacture furniture, pallets, packaging and so on. It is worth noting that the timber industry is based on a renewable resource and has introduced voluntarily an independent auditing process for checking the sustainable credentials of its raw products (certification through the UK

Woodland Assurance Scheme) and the supply chain (the chain of custody through the Forest Stewardship Council).

Forestry is a small but growing sector of the economy. The contribution of forestry in England to GDP(1) was estimated at £380 million for 1999 (less than one per cent). However, over £1.6 billion has been invested in sawmills and paper and board mills over the last 15 years, and a further £2 billion is expected to be invested over the next fifteen years.

The volume of wood supplied from Britain's forests each year has more than doubled from 4 million cubic metres in the 1970s to nearly 9 million cubic metres today. This is predicted to increase to 15 million cubic metres by 2020, offering scope for further substantial investment in the processing industry.

The timber industry's role in sustainable development is mainly through its contribution to the continued growth of the economy and employment.

“The timber industry's role in sustainable development is mainly through its contribution to the continued growth of the economy and employment.”



WTPL/Tony Farnon

(1) Public and Corporate Economic Consultants (PACEC) (2000), English Forestry Contribution to Rural Economies Final Report. See also Forestry Facts & figures 2002, Economics and Statistics Unit, Forestry Commission..Estimated as net output estimated from forestry and processing directly.

“Establishing new woodland is an inexpensive way of restoring the quality of the landscape and soil whilst contributing to wider goals of community and economic regeneration...”

Employment

Woodland contributes to direct employment in the forestry sector, to indirect employment of suppliers of the timber industry and to employment supported by the increase in spending of those directly or indirectly employed through forestry and woodland conservation (the induced employment effect). The sector often provides jobs in rural parts of the UK where employment is scarce.

For commercial conifers or broadleaves the direct and indirect employment impact is estimated at 3.85 to 4.4 full-time jobs per 100 hectares although much of this impact occurs only at harvesting. It is clear that employment creation is dependent on the use of the woodland. For example, small-scale ‘farm’ woodland, without any logging will have much lower employment creation than large scale commercial forests. Similarly, the employment impacts of woodland improvement are less than for those for planting or harvesting.

In total, the timber industry is estimated to employ about 55,000 people in Great Britain. About 54% of this is employment supported through multiplier effects (i.e., indirect and induced employment), while the rest is directly related to the forestry sector (including everybody from timber growers to processors through to employment in forest education and forestry-related Government employees).

Land regeneration

A survey commissioned by English Partnerships revealed that some 17,000 hectares of previously developed land has lain vacant or derelict for nearly a decade(1). Much brownfield land has become damaged through activities such as mining, industrial pollution and waste disposal, and is associated with wider problems such as economic stagnation and environmental degradation. Contaminated land is hugely expensive to resolve, meaning that much polluted land remains derelict and abandoned, awaiting reclamation.

However, research has shown that planting fast-growing trees like willows and poplars can markedly enhance the natural degradation of the many pollutants in soils, including petroleum residues, oils, industrial solvents and paint residues(2).

Establishing new woodland is an inexpensive way of restoring the quality of the landscape and soil whilst contributing to wider goals of community and economic regeneration, often of prime concern in brownfield redevelopment. Woodland can also greatly enhance the visual appearance and amenity value of regeneration schemes.

A prime example of land regeneration using woodland is the Forestry Commission’s Newlands Project (North West of England), which uses a specially designed ‘Public Benefits Recording System’ to prioritise the planting and establishment of woodland on DUN sites (Damaged, under-used and neglected land) in terms of which ones would provide the greatest benefits. The scheme was launched by John Prescott on 14 July 2003 and is part of the North West Development Agency’s strategy to improve the image of the whole region.



WTP/L/Tony Farndon

(1) Study under the National Land Use Database projects, called Harcore carried out by Roger Tym & Partners over six months, 2002.

(2) Mersey Forest Brownfield Project, Brownfield Remediation to Forestry, Research Group.



“In buildings with trees, residents reported significantly better relations and stronger feelings of unity and cohesion with neighbours...”

Urban regeneration

Urban regeneration aims to bring people back into cities by improving the physical environment and addressing people’s social and economic needs.

Trees have been shown to have a positive impact in the urban environment. The benefits of trees to the community have traditionally been measured through their effect on real estate prices and business profits and it has been estimated that a 20% general tree cover added 7.1% to house prices in rural areas of central England and the Welsh Borders(1).

Trees are beneficial to community well-being

A study of residents assessed social ties, personal relations, and means of dealing with conflicts between family members and neighbours of residents who lived in tree lined streets compared to those in non-tree lined streets. In buildings with trees, residents reported significantly better relations and stronger feelings of unity and cohesion with neighbours, and greater reliance on more constructive and less violent means of dealing with conflict. This research is important because low self-esteem and disenfranchisement are often at the root of the drugs, crime, deprivation and social exclusion. Trees should thus form an important part of any urban regeneration policy (2).

(1) Garrod, G. and Willis, K. (1992) Valuing Goods’ Characteristics: An Application of the Hedonic Price Method to Environmental Attributes, *Journal of Environmental Management*, 34(1):59-76.

(2) Sullivan, W.C. and F.E. Kuo (1993). Trees, aggression, and violence in the home. *Proceedings of the 7th National Urban Forest Conference*. Minneapolis, Minnesota.

Rural development

“In some areas the tourist economy is directly linked to the presence of the woods...”

Rural development generally aims to improve the social and economic development of rural areas by encouraging environmental protection, improving agricultural structures and promoting equal opportunities.

Forestry contributes to rural development directly through employment in timber production and processing and also indirectly through landscape benefits which attract tourist revenues and local visitors.

The Woodland Grant Scheme (WGS), which provides incentives for the creation and management of woods and forests, aims to contribute to rural development through the creation of woodland and is designed to:

- create new woods and forests, increase wood production, improve the landscape, improve biodiversity or offer opportunities for recreation and sport;
- encourage sustainable management of woods and forests, particularly for ancient and semi natural woods;

- create jobs and improved economic importance in rural areas; and
- provide alternative uses for agricultural land.

Woodland recreation is another driver for rural development. Forests are amongst the UK's most popular visitor destinations, receiving about 350 million day visits a year (1). Forest-related tourism expenditure associated with tourism day visits, is estimated to be around £2.3 billion, over 3% of the total tourism expenditure in the UK (2). This can substantially benefit the rural areas linked to the forests and in some areas such as the New Forest, the tourist economy is heavily linked to the presence of the woods and specific forest holidays are promoted.

Rural development incorporates many issues identified as Quality of Life Indicators, such as improving the quality of surroundings and countryside quality, promoting tourism, and tackling social exclusion. Woodland's contribution to rural development therefore tackles sustainable development from many different angles.



Joyden's Wood, WYPL/Brian Aldrich

(1) Source: The Forestry Commission website, 2003.

(2) Hill, Courtney, Burton, Potts (2003) Forests Role in Tourism: Phase 2. Summary Report- Final for the Forestry Group (Economics and Statistics) of the Forestry Commission.

Environmental Benefits

Biodiversity

Woodland is home to a diverse range of wildlife, including tree species and other vegetation, and provides habitats for a broad range of birds, mammals, reptiles, amphibians and insects. As the terrestrial habitat most representative of original, natural, stable conditions, ancient woodland is home to more threatened species than any other habitat in the UK. This is supported by the UK Biodiversity Action Plan, which identifies that broadleaved woodland supports almost twice as many species of conservation concern as any other habitat e.g. more than twice as many as chalk grassland and almost three times as many as lowland heathland(1).

There is limited knowledge about the general public's preferences for biodiversity in forests. A study for the Forestry Commission reviewed current values for the UK's biodiversity in woodland assuming use values of biodiversity are captured in the recreational benefits. This study focused on the valuation of non-use values by using the "willingness to pay" (WTP) method. The study valued the absolute WTP values per household for an increase of 12,000 hectares from £0.33 for lowland conifer forest to £1.13 for lowland ancient semi-natural broadleaved forest.

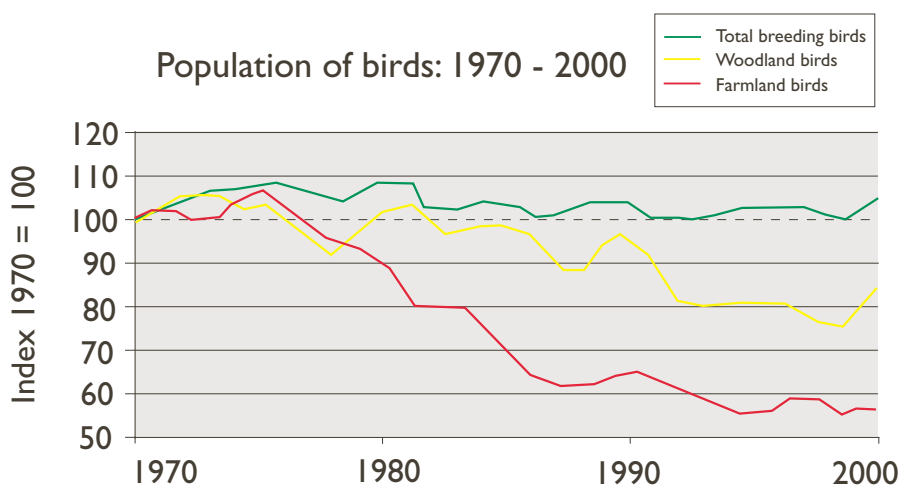


Another study (2) considering the wider economic and public benefits of forestry in Britain looked at several values of biodiversity and summarised an average household's willingness to pay between £11 and £53 per year to protect or improve the biodiversity of a particular woodland.

Biodiversity is vital to sustainability. The drafting of Biodiversity Action Plans, the protection of native species at risk, countryside quality and other biodiversity related indicators are all national indicators of the UK's progress towards sustainable development

One of the headline indicators of sustainable development for the UK relates to populations of farmland and woodland birds. Populations of various species have been in dramatic decline. The contribution of woodland management and woodland creation to a positive trend in populations of these birds is fundamental.

“As the terrestrial habitat most representative of original, natural, stable conditions, ancient woodland is home to more threatened species than any other habitat in the UK.”



Source: DEFRA, Royal Society for the Protection of Birds, British Trust for Ornithology

(1) Source: Woodland Trust Ancient Woodland Position Statement.
(2) Selman (2003), Putting a Value on Woodland. Frameworks for the Future, Quarterly Journal of Forestry, Vol.97, No.3.

“Woods and forests in the UK are some of the most popular visitor destinations, receiving around 35 million day visits a year and attracting millions of pounds of visitor spending...”

Landscape and recreation

Recreational benefits

The recreational benefits of woodland are recognised and accepted widely. The recreational benefits are made up of leisure benefits, health benefits and lifestyle benefits for people who seek emotional well-being which is particularly associated with woodland possessing ecological and cultural values.

Woods and forests in the UK are some of the most popular visitor destinations, receiving around 35 million day visits a year and attracting millions of pounds of visitor spending. Increasingly woodlands are managed to provide a wide range of recreational activities such as mountain biking and walking tours. Wildlife is also an important attraction for visitors and many farm woodlands continue to thrive on specialist sports such as shooting.

A 2003 Forestry Commission report estimated the recreational value of British forests, using the benefit transfer method, at £1.66 to £2.78 per person per visit. Another source (1) however estimates a value of £3.70 per person for visits that are solely for the purpose of visiting woodland. The latter also estimated that of the 350 million woodland leisure visits each year in England, over a quarter of those will stay long enough to spend money in the local economy.

The South West regional woodland valuation estimated the recreational benefits at £575 million including leisure, sports and tourism. In the West Midlands, about £144 million was estimated to be spent by visitors per annum.

Landscape benefits

Studies have shown that landscape benefits of woodland are maximised in a broadleaved ‘natural-looking’ woodland which is part of a patchwork of woods and fields and in close proximity to settlements.

Data on clear preferences for wooded or forested landscapes compared with the non-forested alternatives were only found for broad-leaved woodland in a peri-urban setting(2). For views from home, “willingness to pay” ranged from between £200 and £500 per household per year depending on model used and the forest configuration, while for views while travelling “willingness to pay” was in the range £155 to £330 per household per year. These values exclude recreational benefits.



Woodland’s role in broadening recreational and landscape benefits directly or indirectly contributes to the quality of people’s surroundings, access to green spaces, countryside quality and the promotion of public access and enjoyment of the landscape. These are all key components of the UK’s sustainable development policy.

(1) Selman (2003), Putting a Value on Woodland. Frameworks for the Future, Quarterly Journal of Forestry, Vol.97, No.3

(2) Willis, Garrod, Scarpa, Macmillan and Bateman (2000), Non-Market Benefits of Forestry: Phase 1.

Carbon sequestration

Carbon sequestration is the mechanism by which trees absorb carbon dioxide, release oxygen and store carbon. This makes a contribution to the reduction of CO₂ emissions and to the management of climate change.

Research suggests that the net amount of carbon sequestration attributable to forestry depends on a number of factors including the tree species, the rotation period, thinning, and productivity and volume of timber growth or yield class of the timber by species and the previous use of the soil.

From our research this report recommends the use of a value of carbon sequestered of £59 per tC(1). This valuation of carbon sequestration is widely debated but is taken from the most recent survey of valuation literature in the UK.

Another valuation used for carbon sequestration is the marginal benefit per tonne, which varies from £6.67 up to £14.67(2). A third approach would be to use a cost estimate based on the probable environmental damage caused when carbon is emitted. An estimate on this basis is £70 per tonne of carbon(3).

It is clear that woodland plays a very important role in the absorption of carbon emissions and therefore forms an important part of the policy package against climate change.

Flood alleviation

Woodland contributes to the quality of the natural environment in many ways including reducing the flood risk and lowering storm water flow. The impacts of trees on flood relief depend on what type of tree is planted and where.

More broadleaved woodland on the upland slopes can play a positive role in flood control. About a quarter of the rain that falls on outstretched leaves and branches evaporates and the rest drips slowly to the ground and soaks into the spongy leaf mould of the woodland floor, reducing run-off, soil erosion, siltation of lower lying lakes and rivers and the risk of flooding

Flood control has become more important in the light of the recent floods throughout the UK. The Environment Agency estimates that around 5 million people, in 2 million properties, live in flood risk areas in England and Wales. Floods directly affect the quality of the affected land and the river quality as well as having a direct impact on the economy through the insurance market. Woodland can play an important role in flood control in both upland and lowland locations.

The RSPB report Futurescapes suggests that not only can lowland woodlands absorb excess water, but they would also provide big gains in wildlife and open a new avenue for farmers to earn income.

A study for Northumberland estimated the value of woodlands for flood alleviation at about £1,200 per hectares(4). This estimate is based on the saving which can be made on engineering costs for flood control.



Urquhart Wood, WTP/LRoger Warhurst

“Carbon sequestration is the mechanism by which trees absorb carbon dioxide, release the oxygen and store the carbon.”

(1) Willis, Garrod, Scarpa, Macmillan and Bateman (2000), Non-Market Benefits of Forestry: Phase 1.

(2) Brainard, Lovett, and Bateman (2003), "Carbon Sequestration Benefits of Woodland". Social & Environmental Benefits of Forestry Phase 2. Report to the Forestry Commission, Edinburgh. Centre for Research in Environmental Appraisal and Management (CREAM), University of Newcastle.

(3) Estimating the social costs of Carbon Emissions, page 6, DEFRA 2002.

(4) Business Case for the Environment Research Study, Summary of Principle Findings, March 2003. RSKENSR Group, supported by: FC England, EA, The Countryside Agency, English Nature, Northumberland County Council, and the Northumberland Strategic Partnership.

“Sustainable woodland management is encouraging the positive effects of water on the environment while minimising the harmful effects.”

Pollution

Pollution absorption leads to improved air and water quality, which in turn leads to improved health and well-being. The type of pollutants absorbed by trees includes sulphur dioxide, carbon monoxide, nitrogen dioxide, ozone and particulate matter. Trees and woodland cleanse the air by intercepting and slowing particulate materials causing them to fall out of suspension, and by absorbing pollutant gases through uptake onto inner leaf surfaces. Large leaf conifers remove both solid particulates and dissolved pollutants from the atmosphere.

A Forestry Commission study estimated that net pollution absorption by woodland resulted in the saving of 65 to 89 lives per year, and reducing hospital admissions by 45 to 62 per year. This has a positive impact on the National Health Service.

The net increase in benefits attributable to pollution absorption by woodland for deaths avoided was estimated to range between £199,367 and £11,373,707 yearly in Britain(1).



A study has shown that the pollution cleansing effects of woodland can be optimised through the maintenance of tracts of stratified woodland or woodland belts of about 150 metres in width(2).

The reduction of air pollution is considered of prime importance and has been included as one of the 15 headline indicators for sustainable development and is linked to many of the national indicators including environmental factors affecting respiratory illness, quality of surroundings, concentration of selected air pollutants and ozone depletion.

Water quality

Water quality is improved by trees through the capture of atmospheric pollution and reduction of the negative impacts of agriculture on water quality. Sustainable woodland management is encouraging the positive effects of water on the environment while minimising the harmful effects.

Trees affect the chemical composition of water that runs off or through the ground in several ways. Woods act as air filters, removing damaging pollutants. In some areas trees can cause increased acidification of surface water and contribute to a decline in fish, but can also help protect water quality by stabilising river banks against erosion and removing dissolved pollutants in run-off from the surrounding land.

The Forestry Commission has set guidelines for removing the potentially harmful effects of forestry on water quality. Discussions with water company managers reveal that there were no negative impacts of forestry on water quality where these guidelines have been adhered to(3). Trees can reduce the amount of available water because they take up a considerable amount via their roots and canopies hold onto a portion of the rainfall which is then lost by evaporation. This is replaced by water sucked out of the ground by the roots. Sometimes this can reduce the amount of water reaching underground reserves and streams by a substantial amount.

The effect of woodland on water quality helps improve the UK's river quality, the quality of surroundings and helps to reduce the amount of dangerous substances in water.

(1) Powe & Willis (2002), Mortality and Morbidity Benefits of Air Pollution Absorption by Woodland.

(2) Smith (1978). Urban vegetation and air quality. Proceedings of the National Urban Forestry Conference, Syracuse, SUNY.

(3) Willis, K (2002) Benefits and Costs of Forests to Water Supply and Water Quality. Report to the Forestry Commission.

Conclusions and moving forward

Society values its natural heritage as long as it provides some form of benefit. While the policy and funding community express these benefits in the language of sustainable development by describing them as social, environmental or economic, the average person who sees, uses and appreciates woods understands their significance much more deeply and simply.

However to create political and financial support for the conservation and expansion of trees and woods, we have to present the possibilities and benefits that trees and woods provide in ways which match the political and financial frameworks within which we function. This is why this report has taken the approach of identifying tangible and financial benefits provided by woodland.

Accordingly we recommend that it should be a priority to promote further research into

defining and valuing more explicitly the benefits provided by woodland, specifically into less well-described benefits such as woodland's contribution to education, cultural history and archaeology, health improvements, land regeneration, social inclusion, and urban and rural regeneration and development.

We also recommend that on the basis of the existing case for the positive benefits of woodland, much greater emphasis should be placed by government, its agencies, businesses and the voluntary sector in national, regional and sub-regional strategies upon woodland's role in regeneration, rural renaissance, tourism, social inclusion, health and skills and learning.

Finally we recommend that much greater emphasis should be placed by funders on supporting woodland initiatives which place the value of woodland to society, the economy and the environment at their heart.

“...the average person who sees, uses and appreciates woods understands their significance much more deeply and simply.”



Cow Close, WTPJ/Keith Huggatt

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Where to find out more

The Woodland Trust is the UK's leading woodland conservation charity. We are committed to:

- No further loss of ancient woodland
- Restoring and improving the biodiversity of woods
- Increasing new native woodland
- Increasing people's awareness and enjoyment of woods

Established in 1972, the Woodland Trust now has over 1,100 sites in its care covering over 19,000 hectares (47,000 acres) of woodland. It offers free access to nearly all of its sites.

The Woodland Trust aims to conserve, restore and re-establish the UK's woodland. To carry out our work, we rely on the generosity of the public, industry, commerce, and agencies. If you would like to support us or would like more information about our work and membership details, please contact your nearest Woodland Trust office.

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The Woodland Trust
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