

June 2011

Natural Policy Choices

Why trees and woods matter



A report by ResPublica



ResPublica
changing the terms of debate

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About ResPublica

ResPublica is an independent, non-partisan UK think tank founded by Phillip Blond in November 2009. We focus on developing practical solutions to enduring socio-economic and cultural problems of our time, such as poverty, asset inequality, family and social breakdown, and environmental degradation.

Our research combines a radical, civic philosophy with the latest insights in social policy analysis, economic modelling, behavioural economics, management theory, social psychology and technological innovation to produce original, implementable solutions. We would like to foster new approaches to economic inequality, investment and group behaviour, so that the benefits of capital, trade and entrepreneurship are open to all. We believe that human relationships should once more be the centre and meaning of an associative society, and that we need to recover the language and practice of the common good. Our work seeks to strengthen the links between local individuals, organisations and communities that create social capital.



In association with the **WOODLAND**
TRUST

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Foreword

This report argues that, despite public awareness of our planet's fragility, making an effective case for protecting the natural environment requires solid evidence of the benefits to be gained. The following pages, therefore, highlight the positive contribution of our trees and woodland to sustaining our national well being.

Trees and woodland enhance our lives in multiple ways: by supporting a wide range of leisure activities; providing wonderful views and aesthetic pleasures; capturing carbon and mitigating the effects of climate change; safeguarding ecosystems and biodiversity; preventing and alleviating flooding; and creating jobs in commercial forestry and tourism. However, despite their being much-loved by so many of the UK's people, there has been a tendency to undervalue our trees and woodland, which has resulted in national policy approaches that fail to adequately reflect their importance to the national good.

Happily, this is beginning to change. The public clearly value trees and woodland, and have become more engaged in safeguarding them. Moreover, the forthcoming Natural Environment White Paper (the first since 1990) will foster a broader, inter-departmental consideration of all the issues relating to trees and woodland that will, in turn, produce more integrated, effective policy making. The recent establishment of an Independent Panel on Forestry Policy in England will also make a detailed examination of the benefits afforded us by trees and woodland and how these can be optimised.

The right policies can help us protect our existing trees and woodland, extend their coverage and maximise the societal benefits they deliver. The 'Big Society' can contribute to this by seeking to build a sustainable environment through involving local communities in the management of their green spaces and harnessing the enthusiasm of millions of people for looking after and enjoying their woodland.

Phillip Blond

Director, ResPublica

June 2011

Foreword

The Woodland Trust warmly welcomes this report from ResPublica as an important contribution to understanding of why trees and woodland should matter to decision makers right across government.

As the report shows, there is a rapidly growing evidence base demonstrating the wide range of benefits provided by trees and woodland. The passion people feel for them has also become increasingly apparent. The production of the first Natural Environment White Paper for twenty years and the establishment of the Independent Panel on Forestry Policy in England provide a crucial opportunity both to act on scientific research and also to harness public enthusiasm.

The evidence makes a compelling case to protect, restore and expand our native tree cover, recognising that this is not simply a matter for Defra alone because it matters in terms of national wellbeing.

It also means not delaying action, including where Government has already signalled intention to act. This country has an especially low level of woodland cover (less than 12% land cover for the UK and only 8.6% for England). There is a convincing and ever growing consensus that a significant expansion is required. The setting up of the Independent Panel is an important opportunity to explore how we can secure ongoing expansion but the publication of the White Paper should be the trigger for a newly energised drive to realise the benefits of trees and woods and extend these benefits to all in society. At a time of enormous pressure on the public purse, cost effective instruments like tree planting which can deliver on multiple agendas have never been more valuable.

Dr J Nicola Nicholls

Chair, Woodland Trust

June 2011

Introduction

More than sixty years since the creation of the National Parks, and nearly forty years since the poet Philip Larkin railed against the concreting over of England, it has become an article of national faith that our natural environment must be protected. However, halting its degradation has proved difficult.

The benefits provided by our land, seas, rivers and forests in sustaining human life have long been recognised in political rhetoric and to an extent in law, notably in the planning system. There is an increasing understanding that these benefits underpin economic prosperity, health and well-being.

The inevitability of climate change has intensified public awareness of the fragility of the planet. In 2010 and 2011, extreme flooding in Australia, Brazil and China, and rising food prices worldwide have, in combination, made these concerns more pressing than ever. Public debate overwhelmingly assumes that development will tend to damage the natural environment – despite improvements in air quality, cleanliness of rivers and protection of wildlife sites in recent decades.

Furthermore, the increasing membership of environmental charities – together vastly greater than the membership of political parties – suggests that the values for which these organisations stand are capable of appealing at a fundamental level to millions of people. More than half a million people signed petitions expressing concerns about the sale of woodland.

People feel particularly strongly about woodland...

Much of the debate around the future of the Public Forest Estate, which accounts for nearly half of England's accessible woodland, explicitly stated that these sites matter not only because of their environmental benefits but also because they are powerful symbols of national identity. The Royal Oak is one of the commonest pub names: "Heart of Oak," referring to shipbuilding timber in the age of sail, is the Royal Navy's official march. Trees often outlive individuals, so they stand for continuity, tradition and the ties between past, present and future generations.

The UK has 2.8m hectares (6.9 million acres) of woodland. However, as was highlighted in recent debate, this makes it one of the least forested countries in Europe, at less than 12% of its area (8.6% for England¹) compared to a 44% European average. Since the 1930s, over half of England's ancient woodland (defined as existing since before the start of the seventeenth century) has been lost or converted to non-native plantations. Only 4% of the UK is covered by native woodland (defined as species that have grown here naturally since the last Ice Age).

Britain, then, lacks woodland². This reality, however, is accompanied by a readiness to value that which we do have. A 2005 survey found that two out of five adults had visited woodland in the previous year.³ A study covered in Chapter Four showed that nearly 20% of the 1.5 million people living in the area around the Community Forest in the Mersey area visited it at least once a week.

The attractions of woodland motivate volunteers. Organisations like the Woodland Trust, the National Trust and the British Trust for Conservation Volunteers (formerly the Conservation Corps), were inspiring volunteers to help care for the natural environment long before the concept of the "Big Society" was launched. The Milton Keynes Parks Trust and Manchester's Green Streets initiatives provide

good examples of how both woodland and street trees can create social capital.

The Government's publication of a White Paper on the Natural Environment, the first since 1990, and the creation of the Independent Panel on Forestry Policy in England together represent a welcome opportunity to extend the benefits of an inheritance which the public demonstrably values.

Executive Summary

The aim of this document is to review some recent developments in valuing the benefits derived from ecosystems, and to present them in an accessible form that will clarify how the aspirations of the Natural Environment White Paper and of the Forestry Panel might be realised.

While there may be a moral case, based on intrinsic value, for protecting nature, embedding nature in public policy decisions is easier to justify if an economic value for ecosystem assets and services can be set out. The value arises from the many benefits woodland provides. Woodland captures greenhouse gases. It provides space for recreation. It creates havens for wildlife. It helps prevent flooding. It increases the amenity value of property, because views of trees are valued; and, by providing windbreaks and shade, it can help limit the impact of climate change.

Much work on calculating these economic values has already been done, under the umbrella of the United Nations Environmental Programme and its initiative on The Economics of Ecosystems and Biodiversity.⁴ One valuation⁵ put the value of the UK's woodland for recreation purposes alone at nearly £450m a year. Another put its total value at more than £1 billion annually⁶. Using a more up-to-date price for carbon, the total value would be more than £2 billion a year. There is further value, which cannot easily be captured in economic terms, arising from woodland's ability to inspire volunteering and to create social capital.

This introductory review of how these values can be established for woodland in the UK is the basis for recommendations with particular relevance for the Forestry Panel, for the agencies and authorities concerned with climate change adaptation, and for all those involved in Big Society efforts to devolve power and responsibility to local communities.

These recommendations are:

- In the planning system, the protection for ancient woodland in Planning Policy Statement 9 should not be reduced in the new **National Planning Policy Framework**, because it is the only specific top level planning policy protecting ancient woodland and ancient trees.
- The **Independent Panel on Forestry Policy in England** should consider how woodland cover can be increased, and how to enhance public benefits from all woodland, including: public access; biodiversity, wildlife protection and ecological resilience; climate change mitigation and adaptation; economic development; and engagement and participation of civil society. This opportunity to make the most of what woodland can do for us must not be missed.
- Preventing degradation of existing trees and woodland and creating, maintaining and making use of new ones should be a cross-cutting policy priority reflected in all relevant government departments.

- Ahead of the Water White Paper, and the implementation of the Water Framework Directive and the Floods Directive in the UK, departments, agencies and local authorities should recognise fully the role of woodland in **flood prevention and alleviation**, including for Catchment Flood Management plans, and in local authorities' flood risk assessments and local Surface Water Management plans. Tree canopy cover could be a performance indicator in Local Authority Local Area Agreements.
- The **Climate Change Risk Assessment**, due to be published in January 2012, should take particular account of the value of trees and woodland in prevention and alleviation of these risks.
- As part of the new **National Policy Statements**, the role of woodland in alleviating the effects of **flooding** and improving water quality should be taken into account. The potential for investment in woodland to mitigate climate change effects should be considered.
- DEFRA's **Big Tree Plant** initiative, the first central government tree planting campaign since the 1970s,⁷ should ensure it complements other woodland initiatives such as **MoreTreesMoreGood**.
- Not only government but **business, charities and other civil society organisations** too should be encouraged to take account of the value of woodland. Environment charities should engage with the Panel to show what they can do to help woodland deliver on the Natural Environment objectives, for example by using economic values as the basis for an Environment Bank, in which debits incurred as a result of degradation at one site can be offset by credits at other locations.
- The **National Wellbeing Project**, which is looking at ways to measure societal wellbeing outside traditional metrics, should take account of the benefits created by trees, woodland and other ecosystems, particularly the ways they can create **social capital**.

CHAPTER 1

Why carry out economic valuation of woodland?

Despite public awareness of the fragility of the planet, making the case for protecting nature requires convincing evidence of the benefits of doing so.

It is possible to describe nature in terms of its intrinsic value. On that foundation an ethical case for conservation and extension of ecosystems can be built. However, for policymakers it is much easier to justify decisions, and defend them as rational, in terms of economic value. This is particularly true in an age of austerity. Establishing economic value does not exclude intrinsic value or imply undue reliance on market forces as opposed to government action. It simply puts the value of nature into the same currency as some other policy priorities.

We are becoming able to value what nature provides in a way that makes it clear how much we lose if we destroy it. Rather than simply describing forests, lakes and other natural features as priceless, policy makers can and must price them: for “we lose nature if we do not price it in to what we do”⁸. Natural resources are part of a country’s economic assets, even if they do not enter the marketplace. If those who make policy are to protect and invest in these assets, they need to be priced – and they can be.

One way of looking at nature is to see it in terms of ecosystems. Defined as communities of organisms which are linked to each other and the physical environment, these can be seen as assets which give rise to services, such as carbon storage, regulation of air and water quality, and the provision of space for recreation. In economic terms, these services are often treated as ‘free goods’, because there is usually no market for them. That view has led to the catastrophic over-exploitation of the natural environment.

Valuing nature in economic terms, on the other hand, allows it to be set against the wealth created by construction, quarrying or other development, using the same currency. For forestry assets in the UK, which enjoy multiple privileges in relation to inheritance, capital gains, income and corporation tax, this may be particularly important.

Putting a cash value on what nature does for us forces us to take it seriously.

Providing a value for ecosystem services can help to develop public policy. If there are measurable returns to investing in ecosystem assets, doing so will look more attractive and justifiable in terms of public investment. It may even attract private donations. Other useful consequences follow from putting cash values on nature. For example, compensation can be calculated and paid to owners if the assets which provide these goods are destroyed (see Box 1 page 16 on forest compensation in India).

Alternatively, fines can be imposed on those responsible for destruction of ecosystem assets, using the “polluter pays” principle. Environment banking can develop, whereby debits for destruction are offset by credits for creating new ecosystem assets and services. In a world in which consumers and taxpayers are used to thinking in terms of monetary values, ascribing this kind of value to ecosystems encourages greater public awareness of their significance.

“We... need to better account for the value of our natural assets in policy and decision-making, not only to conserve and enhance our natural environment, but to support economic and social development.” That was the view of DEFRA in 2007, when it published a guide to valuing ecosystem services.⁹ This cost-benefit analysis approach does not rule out the use of others which government has developed, such as the Environmental Impact Assessment or risk analysis¹⁰. However, the main focus of this report is on how the cost-benefit approach has been developed to apply to nature.

Much work on economic valuation of nature has already been done, here and abroad – particularly on woodland.

Significant government effort has already gone into the valuation of the UK’s ecosystem assets and services. DEFRA took an important step towards this goal in 2007 with the publication of its “valuing ecosystems” guide, referred to above. This was intended to ensure that the values of ecosystem services and natural capital, and the costs of environmental impacts, were embedded in policy appraisal. Looking ahead, planned DEFRA research includes a plan to produce “An assessment of the economic value of England’s terrestrial ecosystem services.”¹¹

Woodland has already received particular attention. A major study of all aspects of the social and economic contribution of woodland was carried out for the Forestry Commission for publication in 2003 and is referred to throughout this document.¹² In addition, as part of the previous government’s public consultation on the Public Forest Estate (the state’s largest land holding, accounting for 827,000 hectares of the UK’s total 2.8m hectares of woodland), a detailed study was conducted in 2009 in order to estimate the value of the services the estate generated.

This study, “The Economic Contribution of the Public Forest Estate in England”¹³, put the value of benefits from the state forest in the range of £428m to £642m a year. That was the equivalent of between £1,600 and £2,500 a hectare.

A separate study for the Woodland Trust looked at the benefits woodland offers in terms of flood alleviation and prevention.¹⁴ Although precise estimates were impossible, woodland’s ability to intercept rain and allow penetration into the soil clearly matters at a time when one in six homes in England are estimated to be at risk of flooding. Important work has also been done on other roles played by trees in adapting cities to climate change. For example, a study focusing on Greater Manchester stated that mature trees help by providing shade as well as intercepting rainfall.¹⁵ On this basis, trees and woodland can be valued in terms of how much it would cost to provide alternative man-made defences against the effects of climate change.

In short, ways to value woodland in economic terms already exist.

CHAPTER 2

So “you cannot manage what you do not measure” – but how do you measure ecosystems’ value?

A fast-growing body of research in ecology, environmental economics, accounting methodologies for sustainability, as well as the underlying disciplines of forestry and health sciences, has produced new insights into how these benefits can be quantified.

The Millennium Ecosystem Assessment framework developed by the United Nations Environment Programme has shaped thinking around the world. The framework has been developed further by the programme’s initiative on The Economics of Ecosystems and Biodiversity (TEEB), which was supported by the European Commission and DEFRA, together with government ministries in Germany, Japan, the Netherlands and elsewhere. In the UK, a National Ecosystem Assessment is under way.

Working on the principle that “if it can’t be measured, it can’t be managed”, the TEEB research, which brings together natural scientists and economists from around the globe, aims to define and quantify ecosystem services and their value.

The Secretary of State attended the Convention on Biological Diversity’s 10th Conference of Parties in October 2010, in Nagoya, Japan, at which the TEEB report on “Mainstreaming the economics of nature” was presented. The rather muted media response suggests that there is little public awareness of the progress that has been made. Yet, as HRH the Prince of Wales pointed out recently to the European Parliament, the fragility of the planet’s ecosystems shows that learning how to incorporate the value of nature into decision-making has never been more important.¹⁶

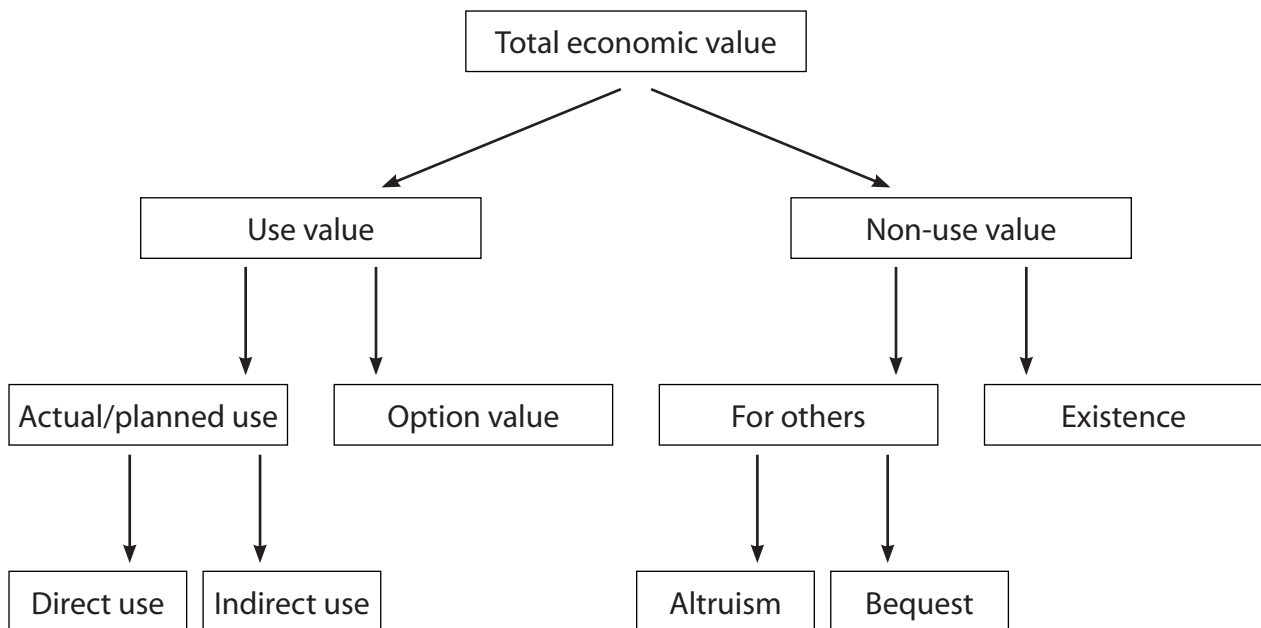
The aim of this section is to show how much progress has been made in recent years towards placing an economic value on nature in a form that is intellectually robust and defensible. The Millennium Ecosystem Assessment framework developed by the UN Environment Programme is widely accepted as a way of categorising these activities.

Broadly, ecosystem services fall into the categories of provisioning: e.g. food, fibre, fuel, water; regulating: e.g. climate, water, air quality, erosion regulation; cultural: e.g. ritual or aesthetic value; and supporting: e.g. soil formation and photosynthesis. This is admittedly an anthropocentric approach, ascribing value only where there is value to humans. No realistic alternative, however, is available.

The supporting services – and some of the regulating services – are ‘intermediate’, i.e. they underpin the value of ‘final’ services such as the provision of water. There is a risk of double-counting if we attempt to value both the final and the intermediate services. However, the National Ecosystem Assessment currently being undertaken in the UK takes the approach of assuming that the value of the supporting services is captured in that of final services. It therefore avoids this double counting risk.

Flows of ecosystem services can be seen as the dividend that society receives from natural capital. Maintaining stocks of natural capital pays future dividends that promote human well-being over the long term.

The Total Economic Value Framework for valuing ecosystem services



The total value of ecosystem services can be divided up as shown in the diagram. The “direct use” value that appears at the bottom left refers to food and timber, for example, which are consumed when used. In addition, there is value from “indirect use.” This refers to value which arises without the ecosystem resources being used up – such as recreation and the provision of views and amenity. Both these direct and indirect uses relate to actual or planned activities. There is, in addition, an “option value” to the asset. This captures the ability to use a resource in future (e.g. by visiting for recreation) even though the population or generation in question has no present plans to do so.

The fashion designer Vivienne Westwood justified her support for the campaign against sales of Forestry Commission land in exactly these terms: “I’m too busy to go walking in the woods. I hardly ever do it. But I certainly want to know it’s there.”¹⁷

On the right hand side of the diagram, there is an attempt to capture the value we place on forests or other ecosystems even when we do not use them. We may, for example, value the existence of whales – as demonstrated by our readiness to give money to Save the Whale even though most givers will never actually see one. Similarly, we may confer “altruistic value” on an environmental asset because we believe it has value to our contemporaries, if not to ourselves personally, and “bequest value” if we believe the asset has value to future generations.

Of course, many of these categories of value do not involve traded goods. So it is not immediately possible to assign a price to them. However, methods that try to measure the price do exist. Surveys, for example, can ask how much people would be prepared to pay for a non-traded good, if they had to do so in order to secure it. This Willingness to Pay, or stated preference method, has the disadvantage of relying upon a hypothetical situation, so may not be reliable. In addition, those asked may not fully understand what is at stake. For example, they may consider ancient trees dangerous rather than important for biodiversity. Nonetheless the approach is widely used.

Alternatively, so-called “revealed preference” techniques can be employed. For example, the amounts people are prepared to pay in travel costs to visit a “free” recreational site can be taken as a guide to what they might be willing to pay for admission.

A rather different approach to the Total Economic Value framework is the cost-based technique. This is discussed in Chapter Six as a way to assess the value of woodland in flood protection and alleviation in terms of what it would cost to build man-made flood defences. Further alternatives would be group deliberative discussions, citizens’ juries or similar approaches but these are not considered here for reasons of space.

The TEEB report provides two examples of how valuations of ecosystem services can be used in public policy:

Box 1

In 2006, the Indian Supreme Court drew up a scale of compensation payments for converting different types of forested land to other uses. These payments were based on estimated values for, among other things, timber, fuel wood, ecotourism, flood prevention and soil erosion mitigation, carbon sequestration and biodiversity, as well as values attached to conserving charismatic species such as the Royal Bengal Tiger and Asian Lion. Payments for the permits to convert forest lands go into a public fund to improve India’s forest cover. In 2009, the Supreme Court directed Rs. 10 billion (£135 million) to be released every year for afforestation, wildlife conservation and the creation of rural jobs.

Box 2

A study undertaken for the David Suzuki Foundation of Canada sought to value the natural capital contained within Ontario’s ‘Greenbelt’ which adjoins the Greater Toronto area. The most valuable services identified by the study were habitat, flood control, climate regulation, pollination, waste treatment and control of water runoff. The study estimated the total annual value of the region’s measurable non-market ecosystem services at CA \$2.6 billion (£1.6 billion).

Valuing ecosystem services shows these assets provide public services

The valuation approach shows how ecosystems can be considered as assets which provide, in turn, benefits that can be seen as public services. In many ways, this fits in with what we already know: of course woodland stores carbon, reduces soil erosion and provides opportunities for much-valued recreation.

At least some of the services concerned are public goods, in the sense that they are non-rival and non-excludable: they can be enjoyed by many people at once and no-one can be excluded from the benefit. Carbon sequestration is a benefit to everyone in the UK (and beyond). If provided to one citizen, it is effectively provided to all. Recreation is more complicated, since the benefit provided by a particular publicly accessible woodland is not in practice enjoyed by everyone in Britain. Biodiversity is more obviously a public good, perhaps even a global one.

This matters because public goods – the classic example being national defence – are generally thought to require public funding. That is because they cannot be charged for (because they are non-excludable) and therefore will not be provided by the market. To put it another way, spending to support these services amounts to an investment on which a return in terms of public benefit can be expected. However, the fact that carbon sequestration and biodiversity etc are public goods does not necessarily imply public provision of the services, even if they are publicly funded. Provision could be made contestable. How the public benefits deriving from all woodland can best be provided, and whether the provision of these benefits should be opened up to more providers, is among the tasks of the Independent Panel on Forestry Policy.

Postscript: Limitations of the economic approach

The TEEB report noted that, because many ecosystem services are location and context-specific, valuation should rely on firm ecological data. This is clearly the case for recreation, where distance from population centres matters, but also for air pollution benefits, which tend to diminish as distance from the source of the pollutants increases.

There are some further caveats when calculating the value of ecosystem benefits. Valuation work such as that of CJC and Regeneris (see Chapter Four below) both rely quite heavily on the Forestry Commission-funded Social and Environmental Benefits survey of 2003. Another valuation difficulty, as DEFRA points out, arises in situations in which for example, a rare species (perhaps a bird such as the osprey) may have significant existence or altruistic values attached to it across a wide population, whereas a less unique species may only be valued by a local population. Similarly, there are timing problems. A view of mature trees takes years to grow. As mentioned above, it is important to avoid double counting some of the benefits. And the values for woodland typically are not calculated net of the benefits that would accrue if the land was put to another use. There is also difficulty in accounting for the fact that some losses, biodiversity for example, may be irreversible.

There are, moreover, gaps in the underlying science. For example, Natural England proposed a review of the evidence on the effectiveness of tree planting in urban areas in terms of reducing human exposure to heat, ultraviolet radiation and ozone. In response, a study by the Centre for Evidence Based Conservation at the School of the Environment and Natural Resources at Bangor University asked “How effective is ‘greening’ of urban areas in reducing human exposure to ground level ozone concentrations, UV exposure and the ‘urban heat island’ effect?”¹⁸

The study concluded that while it may be possible to deploy “greening” interventions as a climate change adaptation strategy, the matter requires further research. There were numerous studies of the effect of greening on temperature, which mostly suggested that a green site could be cooler than a non-green site. But relatively small numbers of sites, rather than an urban greening programme as such, were covered by the existing research. This is just one demonstration of real gaps in the science required to underpin certain interventions. More work may be necessary before policy decisions follow.

CHAPTER 3

The total value of ecosystem services provided by forestry in the UK

Reference to the valuation conducted as part of the Forestry Commission's Social and Environmental Benefits of Forestry in Britain research in 2003 has been made above. The study estimated the **total value of forestry's annual benefits to people in Britain at around £1 billion in 2003**.

The Forestry Commission 2003 study: a valuation of ecosystem services

Box 2.2

Ecosystem services provided by forestry

Well managed forests and woodlands deliver a range of social and environmental goods and services. Research for the Forestry Commission *The Social and Environmental Benefits of Forestry in Britain*,²⁴ published in 2003 showed that these benefits include:

- providing opportunities for open access outdoor recreation
- supporting and enhancing biodiversity
- contributing to the visual quality of the landscape
- carbon sequestration

The report estimated the total value of annual benefits to people in Britain to be around £1 billion. This was based on both existing evidence and commissioned new surveys on public preferences for forestry. The table below shows the contribution from these social and environmental benefits.

Benefit	Annual value (£ million)
Recreation	£393
Biodiversity	£386
Landscape	£150
Carbon sequestration	£94
Total	£1023

All of these benefits could be categorised as ecosystems services, i.e. the services that are provided, in this case, by forestry and woodland in Britain. What is interesting is that, increasingly, attention is being drawn to other social and environmental benefits of forestry, such as improving air quality and regulating water supply and water quality. These can be described under the ecosystem services category of 'regulating services'. For example, under improving air quality, forests and woodlands 'clean' the air as trees trap harmful dust particles and absorb gases such as sulphur dioxide and ozone. Scientific evidence has shown that this absorption by trees can be considerable. The beneficial contribution of trees to improved air quality can be valued through the resulting improvements to human health. In addition, forests and woodlands can reduce soil erosion, stabilise riverbanks and reduce pollution in run-off. Fuller understanding, however, may be required before they can be quantified or valued.

In 2003 terms, Britain's publicly and privately owned forests contributed services worth a total of £1023 million a year. Updated using a price of £92 per tonne of carbon, often cited as the shadow price of carbon (as opposed to the price of £6.70 used in 2003), the total value of carbon sequestration services alone would be not £94m but nearly £1,300m.¹⁹ At today's prices, the total would be **over £2 billion a year**.

A more recent study, *The Value of Benefits Arising from Trees and Woodland in the UK*, commissioned by the Woodland Trust from CJC Consulting in 2009, essentially updates the 2003 study. A separate study commissioned by the Trust during 2008, unlike the others reviewed so far, brings in a consideration of the benefits of woodland for water management. It is referred to later in this chapter.

The CJC study found that the benefits from public **access** to woodland alone were £447m a year in 2007/08 prices, when updated from the £393m figure from the Forestry Commission's 2003 study above. In respect of air quality improvements, there was evidence from the West Midlands and Glasgow that increasing tree cover reduced pollution by particulates, but the benefit estimated was negligible compared to the other values in this section.

Using the Forestry Commission's 2003 finding that local trees can add between 4% and 7% to house prices, the CJC study found the aggregate UK benefit estimated for **landscape and visual amenity** to be worth £177m a year in 2007/8 prices.

Greenhouse gas mitigation benefits are very substantial. CJC used a commonly accepted shadow price of carbon in 2007 of £25 per tonne of CO₂ emitted, equal to a £92 per tonne of carbon, amounting to a UK-wide value for the contribution from woodland of nearly £1.3 billion a year. It is this value which doubles the 2003 total of £1 billion total, highlighted above, to **more than £2 billion**.

The study suggested there may be other benefits from woodland, such as the enhancement of community identity and attachment, use as an educational resource for school trips and preservation of cultural history in areas such as the Caledonian Forest and New Forest.²⁰ However, quantitative data in these areas was limited. The report was also hesitant about estimates of the value of biodiversity. Nonetheless, the study suggests a value of over £620 million a year from UK woodlands for recreation and amenity benefits alone, with £1.3 billion from greenhouse gas mitigation taking the total over £2 billion a year.

A separate 2008 study for the Woodland Trust by Newcastle University's Centre for Land Use and Water Resources Research looked at the benefits woodland offers in terms of flood alleviation and prevention.²¹ Not enough research has yet been done to permit precise estimates. However, the orders of magnitude involved are clearly high.

The 2007 floods in the UK cost insurers around £3 billion. One in six homes in England is said by the Environment Agency to be at risk of flooding. The November 2009 floods in Cocker mouth cost £100m.²² Heavy rainfall is forecast to increase as a result of climate change. The Environment Agency estimates annual damage to homes from flooding at £1 billion, with further damage to business and infrastructure taking the total to £2.5 billion. Contributory factors include changing agricultural practices, which have tended to expose soils. Rainfall runs quickly from field to drains and rivers, leading to surges in river levels. In towns the increase in hard surfaces, particularly the paving over of front gardens identified in the Pitt Review,²³ often mean drains are overwhelmed. Water quickly collects on the surface, rushing down streets.

By contrast, trees and woodland can reduce the rate at which rainfall reaches the ground and runs off into streams, rivers and drains. They also slow the downstream passage of flood flows. Trees intercept rain, slowing its fall and allowing some of it to evaporate. And the "sponge effect" of leaves and dead

matter under trees enables water to penetrate the soil. In both urban and rural areas, this allows more time for the natural and man-made drainage system to take the water away.

The Pitt Review emphasised the need for managing water on the surface, rather than relying on expensive and lengthy upgrades of the sewer system. Mature and ancient trees, with large crowns which can intercept rain well, are more valuable in this regard than some of the smaller trees of recent planting.²⁴

Clearly, a cost-based approach to valuation would ascribe a benefit to woodland for these reasons. DEFRA's Valuing Ecosystem Services gives the following example of how wetlands could be valued in terms of the cost of building artificial flood defences: "Wetlands, which perform flood protection, may be valued on the basis of the cost of building man-made flood defences of equal effectiveness. Given that flood protection is one of many wetland services, the value of the wetland is at least as much as the cost of the man-made protection that would be required in the absence of the wetland." There seems no reason why the same approach could not be applied to woodland.

It is worth noting that individual street trees are also important in helping cities adapt to climate change. For example, a study of green infrastructure in Greater Manchester stated that mature trees would be very important for the roles they play in providing shade and intercepting rainfall. It added that, in times of drought, trees may provide a cooling function for longer than grass, which will dry out faster.²⁵ The i-trees initiative, supported by Manchester City Council, the University of Manchester, Manchester Metropolitan University, Red Rose Forest and other local institutions, with EU funding, uses tree planting, green roofing and green walls alongside monitoring equipment to test climate change adaptation methods. This work on street trees and small green spaces may give us a better understanding of the contribution of larger woodland areas.

In conclusion, the floods of 2007 and 2009 have made it clear that the costs of flood damage are extremely high. Because woodland can play a role in preventing and alleviating flooding, it can be valued in terms of what it would cost to provide man-made alternative defences. In the context of wider problems of climate change alleviation, the sheltering and cooling effects of trees may also have a value. **It seems, therefore, that the estimate of total benefits from the UK's woodland at over £2 billion a year could be significantly higher if flood and other climate change mitigation values were taken into account. The estimate discussed in the postscript below, of between £428 million and £642 million a year from England's public forest estate alone, would support the figure of over £2 billion for total benefits. If anything, that may be an underestimate.**

Postscript: Assessing the economic contribution of England's Public Forest Estate – 18% of the UK total

This study²⁶ by the EFTEC consultancy, of which DEFRA is a client, looked at England's public forest estate as a whole, in addition to taking the Mersey Forest as a case study. A broadly similar exercise, covering social and economic benefits, was conducted by Forestry Commission Scotland, where the proportion of woodland owned by the commission is much higher.²⁷

EFTEC used techniques similar to those used for the Mersey Forest study to assess values. It also developed a series of different scenarios for management of the state forest out to 2070. These included a "timber focused" scenario, in which timber revenues were maximised; a "recreation focused

scenario”, in which urban community woodland is doubled; a scenario based on the Habitat Action Plan, with emphasis on open habitats creation; a scenario focused on the restoration of Plantations on Ancient Woodland Sites; a “future” case based on the current set of Forest Design Plans; a “recent past” case and a status quo base case of maintaining the public forest estate as it is.

Interestingly, in all the scenarios, the costs of managing the public forest estate are an order of magnitude less than the benefits. The costs relate to land management, access provision, conservation and heritage, including the protection of biodiversity, and community engagement; but they are small relative to the benefits.

The report is emphatic: “Overall, benefits are an order of magnitude greater than costs, in all scenarios.” It describes this as “a substantial subsidy to the nation”.

The study is a cost benefit analysis based on annual flows, and does not include any one-off costs such as land purchase or restoration costs for new urban community woodland. Benefits for water supply quantity and quality, flood alleviation, and air pollution were not included. The study notes that the total value of air pollution regulation by forests is very low compared to other services. Other health effects were also excluded, though these would be partly reflected in the value for recreation.

“Overall the analysis illustrates the huge non-timber benefits provided by the public forest estate, and in particular by recreational access and facilities within it, by carbon sequestration, and by the natural beauty of wooded areas,” the study states. **The “subsidy” the state forest effectively provides to the nation is far greater than what it costs to manage.**

It is estimated that in 2070, under most of the above-noted scenarios, the value deriving from every hectare of the public forest estate in England would be around £2,000, rising as high as £2,500 under the recreation scenario. Together, **the value flows are worth between £428 million under the recent past approach and £642 million in the recreation focused scenario. Since England’s public forest estate amounts to less than a fifth of the UK’s total woodlands, these figures broadly support this chapter’s estimate of over £2 billion for the total economic contribution of the UK’s woodland.**

CHAPTER 4

UK examples – the Mersey Forest

This study is presented in order to give a sense of how a real UK woodland, including small urban wooded spaces and larger forests, can be valued in economic terms. The Mersey Forest is a network of woodland and open habitat spaces covering 465 square miles or 92,500 hectares of Merseyside and Cheshire. It is the largest of Britain's twelve Community Forests, which include the Red Rose Forest, Thames Chase and the Forest of Mercia. It is supported by a partnership between Natural England, the Forestry Commission and seven local authorities.



The Area Covered by The Mersey Forest Network

Over eight million trees have been planted since 1994. Nearly 20% of the 1.5 million people living in the area visit the forest at least once a week.²⁸ The aim is to create, over 30 years, a total of 8,000 hectares of new community woodland, along with other sustainable landscape improvements.

The Mersey Forest received over £7m from the EU's Merseyside Objective One Programme to fund new tree planting, land reclamation, management and improved access. Contributions have also been received from DEFRA. An economic assessment of these interventions was undertaken by Regeneris Consulting for The Mersey Forest in 2009.²⁹ It concluded that the **net benefits were £2m a year and the net present value of the interventions was £71m.**

The figures are set out in the table below. Under the heading of climate change mitigation and adaptation, the carbon sequestration effect is relatively straightforward to calculate, using the marginal

social cost of carbon set out in the Stern Review.³⁰ The mitigation effect is based on US Department of Energy statement on the air-conditioning effect of trees, along with guidance from the Town and Country Planning Association and the Building Services Research and Information Association. This produces a value for reduced heating costs, through the “shelterbelt effect” of trees planted to block wind.

In terms of flood alleviation and water management, the Mersey Forest Study found no method of quantifying the benefits – though this could be done using the approach described in Chapter Six below. As for “quality of place”, the study used existing literature and anecdotal evidence, such as that from the Commission for Architecture and the Built Environment, suggesting that the presence of trees enhances house prices by 4-7%. This figure relies on the Forestry Commission 2003 study, which used the stated preference approach to ask over 400 people what they would pay per year for a view of woodland from a home on the urban fringe, and what they would pay to view forested landscapes while driving.³¹

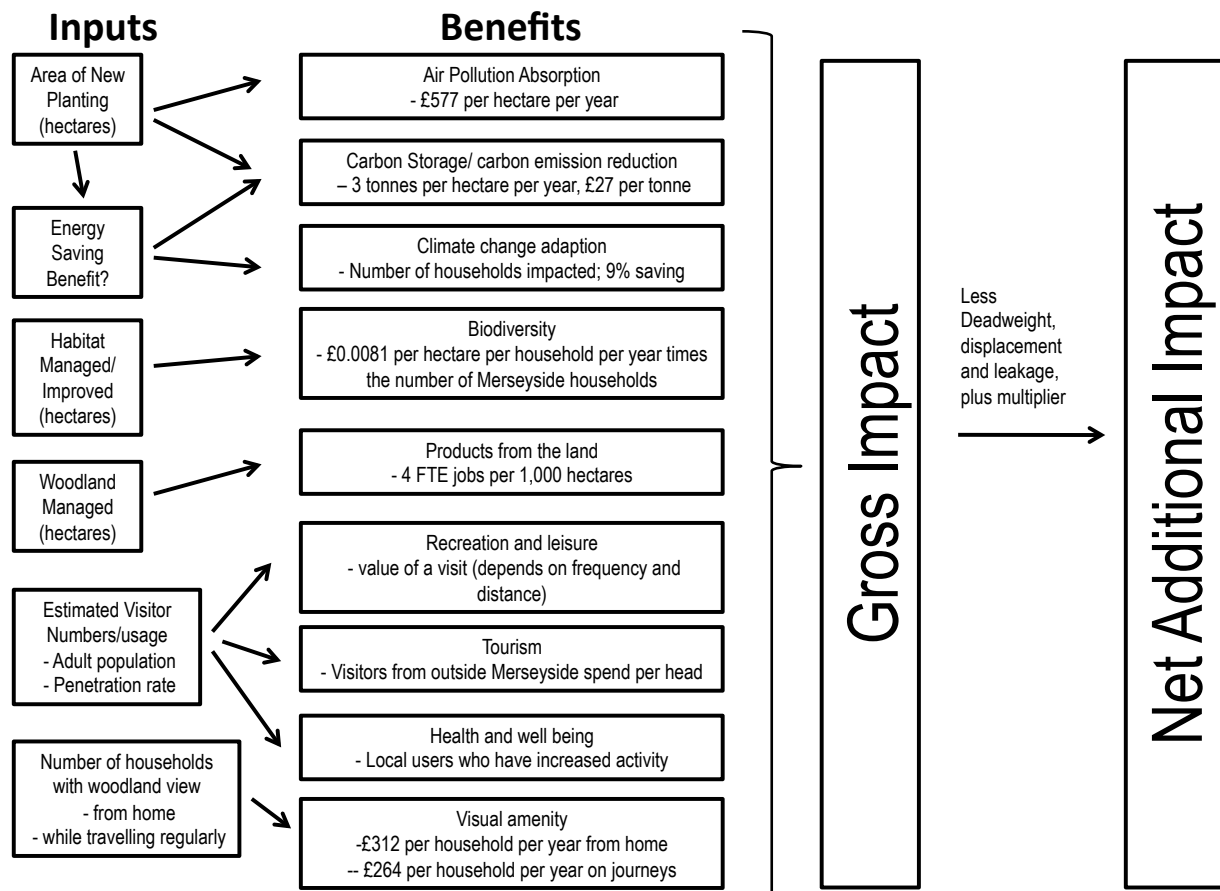
These ‘willingness to pay’ statistics were applied to the number of homes in the Mersey Forest areas that currently have woodland views, and to the number of households with a view of forest on their regular journeys. This calculation produced values of £412,000 for views from home and £527,000 for views while travelling. Together, these values constitute a significant part of the £2m total assigned as net benefits of the intervention.

For recreation and leisure, greenspace was valued in terms of direct, or actual, use and in terms of its option value – the ability to use it in future if required. The study relied on a contingent valuation study conducted as part of the Forestry Commission 2003 study. The average value placed on a day visit was £1.66 or £1.95 in 2009 prices. For tourism benefits, using the 2005 England Leisure Visits Survey, the average spend per tourist visit was £28, worth £31.04 in 2009 prices. This was multiplied by the number of visitors and the gross value added per pound spent.

Other health benefits were identified using Department of Health statistics on the cost to the economy of poor health due to lack of exercise, and a previous study by Regeneris of the impact on physical activity of improving rights of way. Although the Forestry Commission 2003 study concluded the value of trees in absorbing air pollution – such as particulates, sulphur dioxide, nitrogen dioxide and carbon monoxide – was negligible, a US study gives a value equivalent to £577 per hectare for the price society is willing to pay to control these pollutants.³² A low value reflecting this approach was therefore also added.

The restorative benefits of nature and their impact on mental health have been widely identified, for example in relation to Attention Deficit Disorder in children. However, this survey chose not to include any value for these. A small element for the non-use value per hectare of biodiversity was factored in. Another possible category, increased land and property values, was taken as being reflected in the values for views from homes. The Mersey Forest’s effects on economic growth, investment and labour productivity and the value of products from the land involved were not clear-cut enough to merit inclusion.

Structure of the Model



Total Monetised Benefit of The Mersey Forest's Objective One Funded Investments, by Source of Benefit (£000s)

Source of Benefit	Gross	Gross	Net Additional	Net Additional
	Annual	NPV	Annual	NPV
Carbon Sequestration	16	1,388	16	1,388
Energy Saving – direct cost saving	0	10	0	10
Energy Saving – carbon cost saved	0	5	0	5
Biodiversity	38	1,375	38	1,375
Products from the land	164	5,964	164	5,964
Quality of Place – landscape (from home)	412	15,001	412	15,001
Quality of Place – landscape (from travelling)	527	19,193	527	19,193
Recreation	1,547	56,361	405	14,754
Tourism	2,552	92,974	253	9,199
Health and Well-being: exercise (GCA)	74	2,686	20	722
Health and Well-being: exercise (cost saving)	48	1,763	13	474
Health: Air pollution absorption	116	2,717	116	2,717
Total Monetised Benefit	5,495	199,436	1,963	70,800
Source: Regeneris Consulting calculations. Note: Benefits are assumed to apply at the point of maturity of the site. NPV is calculated over 50 years.				

The modelling concluded that the net annual benefit was £2 million, equivalent to a net present value of £71m. On a net basis, which strips out the displacement of benefits elsewhere on Merseyside, the largest elements accrue from quality of place and from recreation and tourism. The majority are non-market wellbeing benefits, over a fifth is gross value added, while the remainder are accounted for by savings in social costs. The health and carbon sequestration impact is quite small, though clearly much depends on the price of carbon used.

The net present value was calculated over a period of 50 years. On that basis, the report concluded that every £1 spent generated £10 in NPV terms. By any standards, this represents good value for money.

CHAPTER 5

Building Social Capital

This review has focused so far on the measurable economic contribution of woodland. However, there is good reason to believe woodland can also create less easily measured “social capital”: the goodwill, shared norms and social networks created by co-operation. Organisations like the Woodland Trust, the National Trust and the British Trust for Conservation Volunteers, formerly the Conservation Corps, were inspiring volunteers to help care for the natural environment long before the concept of the “Big Society” was developed. Urban as well as rural sites can attract volunteers: the Heritage Lottery-funded Capital Woodlands Project has mobilised volunteers to improve urban woodland in areas like Merton, Lambeth and Croydon. The Woodland Trust has long experience of schemes which involve local youth in tree planting and woodland management schemes, in the expectation of reducing vandalism.

The Milton Keynes Parks Trust provides one example of how volunteering contributes further to what is already recognised as a successful social enterprise. Since 1992, the Trust has owned the 4,500 acres of parks, meadows, woodland and roadside woodland corridors which comprise a fifth of this “forest city”. The Trust has an endowment of £20m to fund maintenance costs. The intention was to protect the much valued green features of the city from the competing financial pressures that come into play when parkland is owned by a local authority.

Nearly all the acreage owned by the Trust, including three ancient woodlands, have been made accessible to the public. On a typical day, around 100 new plants and shrubs are planted. Newly created woodland and green spaces can then be transferred into the Trust, provided they are endowed with enough capital to generate sufficient income to fund maintenance costs in perpetuity.

The Trust has around 150 volunteers. The work they do in patrolling parks, litter-picking, helping with school and summer holiday events and with practical conservation not only helps the Trust manage its woodland and parks to a higher standard than would otherwise be possible, it also helps build social capital through volunteering.

Volunteers featured on the trust’s website speak of how taking part has helped them get to know their way around the area, meet new people, and “do something which makes a difference.” People of many different backgrounds and ages are involved. As the volunteer co-ordinator Martin Kincaid puts it: “We particularly find people new to the area like to volunteer because it gives them the opportunity to learn their way around Milton Keynes and familiarise themselves with the parks”. This is a very clear example of how the ability of woodland to inspire volunteering not only delivers a measurable contribution but also helps to increase social capital.

Street trees, as opposed to woodlands, can also prompt volunteer involvement and thereby build the sense of local pride and community responsibility which are important elements of social capital. One example from Greater Manchester’s Green Streets project, supported by the Red Rose Community Forest, local councils, the North West Development Agency and United Utilities, is that of Walter Street in Old Trafford.

The area was blighted by vandalism and other crime, especially in the “blind spots” created by thick pyracantha bushes on the street. With the support of residents and the police, workers from the local New Deal for Communities team removed these shrubs. Following the clearance, a group comprising local primary school children, residents, councillors and business owners planted silver birch trees and bulbs, and installed “standing stone” art works³³.

There is some evidence that the role of woodland in building social capital goes beyond its ability to inspire participation by volunteers. Landmark research such as Frances E Kuo’s “The Role of Arboriculture in a Healthy Social Ecology”³⁴ supported the view that the presence of trees and grass could transform “no-man’s lands” into well-used spaces which encouraged stronger ties among residents.

This study built on a quarter century of research indicating that urban outdoor areas with trees were preferred to those without. Some of those working in the field had doubted whether this perception would be found in low-income Afro-American neighbourhoods. However, Kuo found evidence in these environments that individuals living in greener settings reported more social activities and more visitors, knew more of their neighbours, reported their neighbours were more concerned with helping and supporting one another, and had stronger feelings of belonging. In other words, greenspace increased social capital even in challenging environments.

Another famous study, “Growing up in the Inner City: Green Spaces as Places to Grow”, from a linked University of Illinois team, funded by the National Urban and Community Forestry Advisory Council³⁵, showed that children played more creatively and had more access to adults in relatively green spaces than in barren ones. However, the work relied heavily on work conducted in Ida B Wells, one of the ten poorest neighbourhoods in the entire US, with a 93 % unemployment rate.

As Forest Research points out below in its inventory of social evidence and practical programmes, the findings of these landmark studies may not translate easily into the much more varied communities of the UK as a whole.

For the UK, there are clearly gaps in evidence for the value of forests and woodland in building social capital. The Forestry Commission’s Review of Current Evidence on the public forest estate cited some examples of how projects in woodlands had brought people together. In one case, volunteers described the importance of meeting others and this was particularly the case for those who were retired, lived alone or were bereaved.

The Cydcoed project in Wales, led by the Forestry Commission Wales, funded community groups who wanted to plant new woods or manage existing ones in their area. Evaluation of the project suggested that half those questioned felt involvement in Cydcoed projects had improved their overall well-being.³⁶

However, Forest Research’s inventory found that while there was evidence that trees can improve perceptions of place, there are concerns about safety and crime, particularly among women and ethnic minorities, which can deter these groups from visiting woodland. The Capital Woodlands Project, launched in 2006 and involving the Forestry Commission, British Trust for Conservation Volunteers and Trees for Cities, has shed light on some of the barriers to use of urban woodland – such as concerns about gang territoriality – and how they might be addressed.

Forest Research concluded that there needed to be more research on how these problems could be tackled in the UK. There is also a gap in evidence as to whether woodland differs from other green space, such as open parkland, in its ability to generate social capital.

On the assumption that Forest Research, as the research agency of the Forest Commission, is well placed to track down relevant evidence in the literature, its disclosure that there are gaps is important. So conclusions about the ability of forests to create social capital must be tentative. That said, the examples of the Milton Keynes Parks Trust, i-Trees and the Capital Woodlands Project cannot be ignored.

CHAPTER 6

Conclusions and recommendations

Increasing understanding of the ways in which ecosystem services can be valued confirms what we have always known intuitively about woodland. Trees' release of oxygen through photosynthesis, their provision of shelter from sun and wind, their purifying effect on water and, above all, the mental and physical benefits of time spent enjoying the peace and calm of forests; all these things are now being measured in economic terms. Their value in preventing and alleviating the effects of climate change is also likely to be considerable. Plainly, the value of nature has to be taken seriously. So what does this mean for policy?

This new and clearer view of the value of nature and, in particular, of woodlands comes at a time when the policy framework affecting the natural environment is under review. Policy makers now have to hand new evidence of how the potential of woodland can be harnessed to achieve their goals. This is particularly important in relation to the Natural Environment White Paper. It also represents a great opportunity for the Independent Panel on Forestry Policy in England to realise the White Paper's aspirations.

The aim of this review has been to show that we now know a great deal about how to value the benefits that existing woodland creates, in terms of carbon storage, recreation, amenity value, biodiversity, limiting flood risk and much else besides. Ministers and officials alike now have a practical framework for justifying investment in woodland in financial terms.

The next task is to look at how new woodland could help tackle the costs to our economy and quality of life arising from a degraded natural environment. Whether it is in preventing or adapting to climate change, tackling pollution, or addressing challenges in public health, such as too little physical activity, woodland has a role to play.

What is more, in the context of the Government's Big Society objectives of devolving previously centralised powers to individuals and communities, it must be recognised that institutions like Community Forests and the Milton Keynes Parks Trust, along with initiatives like the Capital Woodlands Project, have a track record of achievement. They have a history of dealing in a hands-on way with difficult problems like fly-tipping and motor vehicle damage. They have some experience of how to communicate in ways which can overcome a reluctance among some demographic groups to participate in the benefits woodlands provide. And they clearly know how to use volunteering to build social capital.

Our recommendations:

- In the planning system, the protection for ancient woodland in Planning Policy Statement 9 should not be reduced in the new **National Planning Policy Framework**, because it is the only specific top level planning policy protecting ancient woodland and ancient trees.
- The **Independent Panel on Forestry Policy in England** should consider how woodland cover can be increased, and how to enhance public benefits from all woodland, including public access; biodiversity, wildlife protection and ecological resilience; climate change mitigation and adaptation; economic development; and engagement and participation of civil society. This

opportunity to make the most of what woodland can do for us must not be missed.

- Preventing degradation of existing trees and woodland and creating, maintaining and making use of new ones should be a cross-cutting policy priority reflected in all relevant government departments.
- Ahead of the Water White Paper, and the implementation of the Water Framework Directive and the Floods Directive in the UK, departments, agencies and local authorities should recognise fully the role of woodland in **flood prevention and alleviation**, including for Catchment Flood Management plans, and in local authorities' flood risk assessments and local Surface Water Management plans. Tree canopy cover could be a performance indicator in Local Authority Local Area Agreements.
- The **Climate Change Risk Assessment**, due to be published in January 2012, should take particular account of the value of trees and woodland in prevention and alleviation of these risks.
- As part of the new **National Policy Statements**, the role of woodland in alleviating the effects of **flooding** and improving water quality should be taken into account. The potential for investment in woodland to mitigate climate change effects should be considered.
- DEFRA's **Big Tree Plant** initiative, the first central government tree planting campaign since the 1970s,³⁷ should ensure it complements other woodland initiatives such as **MoreTreesMoreGood**.
- Not only government but **business, charities and other civil society organisations** too should be encouraged to take account of the value of woodland. Environment charities should engage with the Panel to show what they can do to help woodland deliver on the Natural Environment objectives, for example by using economic values as the basis for an Environment Bank in which debits incurred as a result of degradation at one site can be offset by credits at other locations.
- The **National Wellbeing Project**, which is looking at ways to measure societal wellbeing outside traditional metrics, should take account of the benefits created by trees, woodland and other ecosystems, particularly the ways they can create **social capital**.

APPENDIX

Timber Production and Employment

The Independent Panel includes among its terms of reference consideration of options for enhancing public benefit from economic development, particularly to support a sustainable timber industry and a wide range of small and medium sized enterprises, including social enterprises.

Forest-related activities include planting and harvesting, leisure shooting, and indirect activities such as haulage, wood processing and pulp and paper production. Information on these activities is readily available elsewhere and is not included in this review. As an indication of scale, however, the Annual Business Survey's data on economic activity in forestry as measured in Gross Value Added terms, and on employment in the sector, are included here. Under the codes for forestry and logging, silviculture and other forestry activities, employment amounted to 24,000, compared to total UK employment of around 30 million. Gross value added for these categories amounted to £931 million in 2008, compared to a total for the UK economy of £915 billion.

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with assistance from Alison Meldrum at ResPublica

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