

Support for Forestry in the Rural Development Programme

1. Objective.

1. To facilitate the adaptation, sustainable management and expansion of the woodlands of England to maintain and, where possible, enhance the wide range of ecosystem services they provide. The majority of these services are subject to market failure being unpriced public goods.

2. Fit with Defra / Government priorities.

2. Forestry provides a wide range of public goods and as such increasing forestry resilience through increased levels of forestry management and cover contributes to a number of government priorities.
3. Defra's Structural Reform Priorities include enhancement of the environment and biodiversity to improve quality of life and support for a strong and sustainable green economy, resilient to climate change. English woodlands and forests contribute to these priorities through a range of ecosystem services as indicated in Table 1.
4. The UK Government is committed to action to both mitigate and adapt to climate change¹ and the Climate Change Act 2008² gives a legally binding long-term framework to cut carbon emissions, as well as setting a framework for building the nation's adaptive capacity. Woodlands have a significant role to play in these actions.
5. The Natural Environment White Paper³ includes an ambition for a major increase in the area of woodland in England, better management of existing woodlands and a renewed commitment to conserving and restoring ancient woodlands, and that forests and woodlands should play a full part in achieving a resilient and coherent ecological network across England.
6. The EU Water Framework Directive requires that all water bodies achieve good status. Woodland creation has a role in helping to tackle diffuse pollution and may have a function in addressing flood risk.
7. Biodiversity 2020⁴ includes a commitment to increase the area of woodland that is managed and expand the total area of England's woodlands.

¹ <http://www.defra.gov.uk/environment/climate/government/>

² <http://www.legislation.gov.uk/ukpga/2008/27/contents>

³ <http://www.official-documents.gov.uk/document/cm80/8082/8082.pdf>

⁴ Defra (2011) *Biodiversity 2020: A strategy for England's wildlife and ecosystem services*

Table 1 Ecosystem service provided by woodlands⁵

Ecosystem service provided by woodlands	Examples of goods and benefits in the UK	Key references
Provisioning services		
Crops, livestock and fisheries	Little tradition of agro-forestry other than grazing particularly as part of wood-pasture systems; non-timber forest products (NTFPs) for commercial and domestic use, e.g. meat (including from culled deer), berries, honey, fungi, medicinal derivatives and drugs.	Martin <i>et al.</i> (2006); Emery <i>et al.</i> (2006); Kirby <i>et al.</i> (1995)
Trees for timber	Provision of raw timber materials for use in commercial and domestic enterprises; provision of wood chips for boards and pulp for paper. Use of timber as an alternative for other building materials such as steel and concrete in order to reduce use of fossil fuels and enhance building standards.	Forestry Commission (2003a) Suttie <i>et al.</i> (2009)
Trees for bio/woodfuel	Timber products (e.g. harvesting residues, stumps and roots, recycled wood) as fuel for heat and power plants, as domestic firewood, for biochar and as raw material for processed hydrocarbon fuels.	Chapter 14 Ireland <i>et al.</i> (2004)
Woodlands and water supply	Wooded catchments especially in the uplands provide important water supplies for major urban areas (e.g. Thirlmere and Manchester).	Ritvo (2009)
Regulating services		
Climate	Avoidance of climate stress. Tree cover can help dampen the climatic effects experienced in the open, thus protecting soils, animals and humans from extremes of temperature, strong winds and UV light.	Mason <i>et al.</i> (2009)
	Carbon sequestration. Woodlands and their soils are important reserves of terrestrial carbon, and timber products can also be considered.	Morison <i>et al.</i> (2009); Lorenz & Lal (2010)
Hazard	Soil protection. Tree cover can offer protection from soil erosion and slope failure. Forest management will reduce exposure to chemicals and pesticides and likelihood of soil compaction compared to agriculture.	Moffat (1991); Nisbet <i>et al.</i> (2008)
	Flood and water protection. Woodlands moderate rainfall events and river and stream hydrographs, delaying and reducing flood events.	Nisbet <i>et al.</i> (in press)
Disease and pests	Woodland dwelling organisms can help in regulating the incidence and spread of insect pests of crops and pathogens of importance to humans, livestock, crops and ecosystems.	Chapter 14
Detoxification and Purification	Water quality. Because of minimal use of pesticides and fertilisers, woodlands managed under sustainable principles also offer benefits of water quality.	Nisbet <i>et al.</i> (in press)
	Soil quality. Woodland cover can stabilise contaminated brownfield land and hinder the pathways between source and receptors.	Moffat & Hutchings (2007)
	Air quality. Capture of atmospheric pollutants in tree canopies can lead to consequent reduced exposure for humans, crops, buildings etc.	NEGTAP (2001)
	Noise reduction. Belts of trees between residences and transport routes can absorb sound.	Huddart (1990)
Pollination	Woodlands likely provide habitat for diverse wild pollinator communities of importance to trees, crops and other plants.	Devoto <i>et al.</i> (2011)
Cultural services		
Wild species diversity	Biodiversity. UK forests, including plantations, provide habitat for a wide range of fauna and flora but a limited genetic resource (e.g. compared to tropical forests).	Humphrey <i>et al.</i> (2003)
Environmental settings	Trees and woodlands are valuable for personal enlightenment and as places or catalysts for social activity and cohesion.	O'Brien (2006); Lawrence <i>et al.</i> (2009)
	Forests are increasingly acknowledged for their educational value.	O'Brien & Murray (2007)
	Trees have been perpetual motifs in fine art, and influenced many other art forms.	Phythian (1907); Hohl (1998)
	Many forests are open to the public for the enjoyment of outdoor pursuits and recreational activities. Their access facilitates exercise and benefits human health and longevity.	Woodland Trust (2004); O'Brien & Morris (2009)
	Trees and woodlands increase the diversity of landscape character; their existence provides a link with the past when man's existence was more closely linked to woodlands and their products; woodlands reduce the rate of, or eliminate the need for, cultivation, a significant cause of archaeological destruction.	Rackham (1976); Smout (2002); Crow (2004)
Supporting services		
Soil formation, nutrient cycling, water cycling, oxygen production	Forests facilitate soil formation and other biogeochemical processes essential to life.	Fisher & Binkley (2000)
Biodiversity	Little in way of unique species (endemism) at least amongst the well-know groups, but locally adapted provenances and distinctive assemblages associated with some species being at the edge of their range in Britain; a distinctive maritime climate; and historical differences. These include 'Atlantic' elements such as the abundance of bluebells, rich bryophyte communities in western oak woods, ash-hazel dominated woods (beyond range of beech), abundance of veteran trees with associated lichen and saproxylic associated species.	Rodwell (1991); Peterken (1996); Kirby <i>et al.</i> (2005)

⁵ National Ecosystem Assessment (2011) *Chapter 8: Woodlands*, page 263.

8. The 'Lawton Report' *Making Space for Nature*⁶ highlights the role of habitat, including woodland, fragmentation and isolation in the serious decline of many species groups.
9. The natural environment underpins economic prosperity, health and wellbeing and provides support in ways which may not always be visible but have very real values. Research projects such as The Economics of Ecosystems and Biodiversity (TEEB⁷) and the UK National Ecosystem Assessment (NEA⁸) have used available evidence to quantify the benefits from forestry at a GB level (**Error! Not a valid bookmark self-reference.**).

Table 2 Annual and capitalised social and environmental benefits of forests in GB (at 2010 prices)⁹

Environmental benefit	Annual value (£ millions)	Capitalised value (£ millions)
Recreation	484	13,825
Landscape	185	5,290
Biodiversity	476	13,592
Carbon sequestration*	115	2,676
Air pollution absorption*	0.5	14
Total	1,261	36,019

* An approximation, since carbon sequestration, and probability of death and illness due to air pollution, varies over time. More carbon is sequestered in early rotations than in later rotations, resulting in an annuity stream that is inconsistent over multiple rotations. Similarly for air pollution, that results in an individual's life being shortened by a few days or weeks at the end of the individual's life at some point in the future. More recent work puts a much higher value on the carbon sequestration benefits (Read *et al.* 2009).

3. Background evidence.

3.1. Strengths

10. The woodlands of England have a significant value; primarily as areas of high biodiversity, settings for recreational activity, components of high quality landscapes and repositories of carbon¹⁰.
11. Some of these ecosystem services, especially biodiversity and landscape, are improving as forests are maturing, particularly the conifer plantations of the 1950s to 1980s^{11,12}.

⁶ Lawton, J.H., Brotherton, P.N.M., Brown, V.K., Elphick, C., Fitter, A.H., Forshaw, J., Haddow, R.W., Hilborne, S., Leafe, R.N., Mace, G.M., Southgate, M.P., Sutherland, W.J., Tew, T.E., Varley, J., & Wynne, G.R. (2010) *Making Space for Nature: a review of England's wildlife sites and ecological network*. Report to Defra.

⁷ www.teebweb.org

⁸ uknea.unep-wcmc.org

⁹ National Ecosystem Assessment (2011) Chapter 8: Woodlands, page 270

¹⁰ National Ecosystem Assessment (2011) Chapter 8: Woodlands, page 270

12. Woodland delivers many ecosystem services simultaneously; for example the mere presence of a wood will result in carbon sequestration and biodiversity benefits and depending on the location may provide water or recreational benefits.
13. Sustainability, which is expressed at the UK level in the UK Forestry Standard (UKFS)¹³, is accepted throughout Europe as the basis for forest management.
14. Temperate forests are naturally highly dynamic ecosystems and therefore inherently adaptable¹⁴ and should therefore respond to management interventions in response to climate change.
15. Over 25% (340K ha) of England's woodlands are 'Ancient'¹⁵ of which 206K ha are semi-natural¹⁶. A further 210K ha of recent woodland is also semi-natural¹⁷.
16. Over 95% of woodland SSSIs are in 'favourable' or 'favourable recovering' condition¹⁸.
17. Surveys of the public opinion of forestry¹⁹ show that about 68% of respondents have used woodland for recreation in the recent past.
18. About 38% of the population of England live within 500m of a woodland of more than 2ha and 84% within 4km of a woodland larger than 20 ha²⁰; further 63% of the population live within 4 km of an accessible woodland larger than 20 ha²¹.
19. Prices for both coniferous²² and low grade hardwoods have increased in the last few years, the latter in response to a growing demand for woodfuel.
20. Woodlands which have been created by centuries of human activities require ongoing management to retain their nature-conservation and social interest.

3.2. Weaknesses

21. Woodland cover in England is low at only 10%²³.

¹¹ Humphrey, J W; Ferris, F & Quine, C P eds. (2003). *Biodiversity in Britain's Planted Forests*. Forestry Commission, Edinburgh.

¹² National Ecosystem Assessment (2011) Chapter 8: Woodlands, page 280

¹³ [http://www.forestry.gov.uk/pdf/FCFC001.pdf/\\$FILE/FCFC001.pdf](http://www.forestry.gov.uk/pdf/FCFC001.pdf/$FILE/FCFC001.pdf)

¹⁴ Frelich, L (2002) *Forest Dynamics and Disturbance Regimes*, Cambridge Studies in Ecology

¹⁵ Ancient woodland is woodland that has been in continuous existence since 1600

¹⁶ Forestry Commission (2011). *Forestry Statistics 2011*

¹⁷ Total area of semi-natural woodland is almost the same as the area of semi-natural grassland and heathland combined.

¹⁸ Forestry Commission (2011). *The FC SSSI Recovery Programme 2003 to 2010. A summary of achievements and costs*.

¹⁹ Forestry Commission (2011) *Public Opinion of Forestry 2011, UK and England*
[http://www.forestry.gov.uk/pdf/POF_ENG_UK2011.pdf/\\$file/POF_ENG_UK2011.pdf](http://www.forestry.gov.uk/pdf/POF_ENG_UK2011.pdf/$file/POF_ENG_UK2011.pdf)

²⁰ Woodland Trust (2010). *Space for People: Targeting action for woodland access*

²¹ Woodland Trust (2010). *Space for People: Targeting action for woodland access*

²² Timber Prices Indices (2011). Forestry Commission
[http://www.forestry.gov.uk/pdf/tpi201109.pdf/\\$file/tpi201109.pdf](http://www.forestry.gov.uk/pdf/tpi201109.pdf/$file/tpi201109.pdf)

22. English forest areas are neither natural nor extensive, (indeed they are particularly fragmented) having been subject to human influence for millennia²⁴ and therefore do not benefit from the natural robustness and resilience associated with temperate forests²⁵. Intervention is therefore required if woodlands are to adapt to climate change, to ensure that the valuable ecosystem services currently provided are maintained and enhanced.
23. As the effects of climate change are so uncertain any adaptation actions have a significant level of risk associated with the most appropriate changes in species or woodland structure that may be required²⁶, woodland owners may be reluctant to implement changes due to that risk.
24. It is estimated that only about 47% of the non public forest estate is under any currently recognised form of management²⁷ this makes it more susceptible to degradation in quality and less able to respond to climate change.
25. Although forests are naturally subject to a wide range of 'pests' and 'diseases' they are generally well adapted to endemic species. Increasingly exotic pest and disease species are being introduced which can have very significant impacts.
26. Whilst it is known that woodland owners in England form a diverse group^{28,29} with widely differing attitudes to owning and managing their woods³⁰, there is a need to have improved knowledge of their differing aspirations and in particular how they may respond to policy instruments to improve the effectiveness and efficiency of interventions. A research project is being developed that will help to fill this knowledge gap.
27. Only 14.5% of the population of England live with 500m of an accessible woodland larger than 2 ha³¹. Providing access to existing or creation of new accessible woodland would increase recreational potential.
28. Although a full understanding of the reasons why woodland owners do and, conversely, do not currently manage their woodlands is lacking, a key issue is known to be the low

²³ Forestry Commission (2011) *Forestry Statistics 2011*,

<http://www.forestry.gov.uk/website/forstats2011.nsf/LUContentsTop?openview&RestrictToCategory=1>

²⁴ Kirby, K J & Watkins, C (ed.) (1998) *The Ecological History of European Forests*, CAB International

²⁵ Frelich, L (2002) *Forest Dynamics and Disturbance Regimes*, Cambridge Studies in Ecology

²⁶ Moffat, A J; Morison, J I L; Nicoll, B & Bain, V (2012) *Climate Change Risk Assessment for the Forestry Sector*

²⁷ Within either a grant scheme or subject to legislative control.

²⁸ Render, M (2002). Woodland Management: The Owners' Views. *Quarterly Journal of Forestry* **96** 143-148

²⁹ Urquhart, J & Courtney, P (2011). Seeing the owner behind the trees: A typology of small-scale private woodland owners in England, *Forest Policy and Economics* **13** 535-544

³⁰ Nicholls, D & Young, M (2006) *The Estate Owner's Perspective on Forest Policy*. Proceedings of ROOTS rural research conference Wadham College, Oxford

³¹ Woodland Trust (2010). *Space for People: Targeting action for woodland access*

value of wood and timber and the relatively high cost of management activity³².

Improving the economic viability is likely to lead to increased woodland management.

29. Most of the above weaknesses could be addressed by increased and improved management of existing woodland and through appropriate woodland expansion.

3.3. Opportunities

30. There is extensive evidence that the contribution of woodlands to the delivery of a wide range of ecosystem services could be significantly improved, particularly through improved management and woodland expansion^{33,34}.
31. The resilience and quality of existing forests of England could be enhanced through appropriate management^{35,36,37} and appropriate expansion, particularly to reduce fragmentation.
32. Woodland management can be used to limit or address the impact of both endemic and exotic pests and diseases.
33. Whilst the greatest impacts of climate change may not appear for some decades there is a need to commence adaptation strategies now and the most appropriate time to introduce changes, particularly to species or provenance, is at the time of regeneration³⁸. The replacement rate of forests is very low (currently less than 0.5% of England's woodlands are thinned or felled each year) and therefore, whilst there is a constant opportunity to influence planting to ensure climate adaptation, it will take many decades to implement these changes. However much of the stock that was planted in the 1940s to 1980s is approaching maturity so the next 10 years will provide an opportunity for increased regeneration which will be key to influencing the adaptation agenda.
34. The experience of recreational visits can be improved through woodland management that creates diversity of structure and age together with the sense of space and light³⁹.

³² Nicholls, D & Young, M (2006) *The Estate Owner's Perspective on Forest Policy*. Proceedings of ROOTS rural research conference Wadham College, Oxford

³³ Spiecker, H (2003). *Silvicultural management in maintaining biodiversity and resistance of forests in Europe - Temperate zone*. Journal of Environmental Management **67**, 55-65

³⁴ CJC Consulting, Pearce D, & Willis, K (2003) Economic Analysis of Forestry Policy in England

³⁵ Gamborg, C & Larsen J B (2003) 'Back to Nature' – a sustainable future for forestry? *Forest ecology and Management* **179** 559-571.

³⁶ BOKU, EFI, IAFS, INRA (2008): *Impacts of climate change on European forests and options for adaptation*

³⁷ Stokes, V & Kerr G (2009). *The evidence supporting the use of CCF in adapting Scotland's forests to the risks of climate change*.

³⁸ Moffat, A J; Morison, J I L; Nicoll, B & Bain, V (2012) *Climate Change Risk Assessment for the Forestry Sector*

³⁹ Lee, T R (2001) *Perceptions, attitudes and preferences in forests and woodlands*. Forestry Commission Technical Paper 18.

35. There is a consensus that a continued increase in woodland area is desirable in England^{40,41,42,43}, with the consistent proviso that it is the 'right tree in the right place', increased creation can achieve a number of government objectives for example increased habitat resilience for biodiversity (as highlighted in the Lawton review) and for carbon sequestration. The UK Carbon Plan⁴⁴ includes woodland creation as one of the means by which emissions from land use will be reduced. The Natural Environment White Paper⁴⁵ includes an ambition for a major increase in the area of woodland in England, and the Government has asked the Independent Panel on Forestry to provide advice on an appropriate level of ambition for woodland creation⁴⁶.
36. Woodland creation in appropriate locations can achieve water management and water quality objectives⁴⁷, this includes tackling diffuse pollution through both barrier and interception functions. This is a high priority issue given the need for all water bodies to be in good status by 2027 set against the current figure of 28%⁴⁸. However more work and evidence is needed on cost effectiveness compared to other interventions.
37. Riparian and floodplain woodland can protect river morphology and moderate stream temperatures, while a good case can also be made for mitigating downstream flooding⁴⁹.
38. Afforestation of soils susceptible to erosion can help reduce sedimentation⁵⁰.
39. Afforestation could be an effective means of climate change mitigation^{51,52}. The Read report suggested that an increase in forest area, at the UK level, of 23,000 ha per year for the next 40 years could, by 2050, be delivering emissions abatement equivalent to 10% of total GHG emissions at that time. As well as carbon storage in growing biomass,

⁴⁰ Forestry Commission (2011) *Public Opinion of Forestry 2011, UK and England*

[http://www.forestry.gov.uk/pdf/POF_ENG_UK2011.pdf/\\$file/POF_ENG_UK2011.pdf](http://www.forestry.gov.uk/pdf/POF_ENG_UK2011.pdf/$file/POF_ENG_UK2011.pdf)

⁴¹ Defra (2010) *English National Parks and the Broads: UK Government Vision and Circular*.

<http://archive.defra.gov.uk/rural/documents/national-parks/vision-circular2010.pdf>

⁴² Defra (2011) *Uplands Policy Review*. <http://archive.defra.gov.uk/rural/documents/interim2/upland-policy-review2011.pdf>

⁴³ Woodland Trust (2011) *The State of the UK's Forests, Woods and Trees: Perspectives from the sector*. Woodland Trust, Grantham, Lincolnshire.

⁴⁴ HM Government (2011). *The Carbon Plan: Delivering our low carbon future*.

⁴⁵ HM Government (2011). *The Natural Choice: securing the value of nature*.

⁴⁶ <http://archive.defra.gov.uk/rural/forestry/documents/forestry-panel-tor2.pdf>

⁴⁷ Forestry Commission & Environment Agency (2011). *Woodland for Water: Woodland measures for meeting Water Framework Directive objectives*

⁴⁸ <http://www.environment-agency.gov.uk/static/documents/Research/>

2011_WFD_classification_update_surface_waters.ppt

⁴⁹ Nisbet, T R; Marrington, S; Thomas, H; Broadmeadow, S & Valatin, G (2011) *Slowing the flow at Pickering: Final report*. Defra.

[http://www.forestry.gov.uk/pdf/stfap_final_report_Apr2011.pdf/\\$FILE/stfap_final_report_Apr2011.pdf](http://www.forestry.gov.uk/pdf/stfap_final_report_Apr2011.pdf/$FILE/stfap_final_report_Apr2011.pdf)

⁵⁰ Nesbit, T R; Orr, H & Broadmeadow, S (2004). *A guide to using woodland for sediment control*.

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⁵¹ EU (2010). *Green Paper On Forest Protection and Information in the EU: Preparing forests for climate change* COM(2010)66

⁵² EU Standing Forestry Committee (2010). *Climate Change and Forestry*

this level of abatement included a very significant contribution from harvested wood continuing to store carbon and also reducing fossil fuel emissions either directly in energy production or indirectly by replacing materials with high energy/carbon emissions associated with their production.

40. Woodland extension and defragmentation would improve resilience to climate change⁵³, and would probably have significant biodiversity benefits⁵⁴, particularly if semi-natural woodland is involved.
41. The creation of an extensive network of even small areas of woodland in landscapes otherwise devoid of existing woodland cover can be a significant benefit to many species of invertebrates and vertebrates⁵⁵.
42. The inclusion of woodland planting within regeneration programmes, particularly those associated with Community Forests and National Forest, can provide very significant benefits to quality of place, recreation, tourism, and health and wellbeing^{56,57}.
43. Whilst there is limited, if any, justification for government intervention in woodland creation purely for timber production, as highlighted earlier the lack of economic markets in recent decades has been one of the reasons for a reduction in woodland management. Any significant woodland creation must therefore consider the potential for wood production as an economic driver for subsequent management.
44. At present only about 40% of the annual increment of England's woodland is harvested⁵⁸ and that from broadleaved woodlands is considerably lower, there is therefore the potential to significantly increase wood and timber production if markets are developed.
45. Although currently the only major market available to woodland owners is that for wood and timber, markets for wider 'ecosystem services' are being developed; such as that for carbon underpinned by the Woodland Carbon Code⁵⁹ and some water companies supporting land management activity to improve water quality.

⁵³ Spiecker, H (2003). *Silvicultural management in maintaining biodiversity and resistance of forests in Europe - Temperate zone*. Journal of Environmental Management **67**, 55-65

⁵⁴ Defra (2011). *Biodiversity 2020: A strategy for England's wildlife and ecosystem services*

⁵⁵ Boughey, K L; Lake, I R; Haysom, K A & Dolman, P M (2011) Effects of landscape-scale broadleaved woodland configuration and extent on roost location for six bat species across the UK. *Biological Conservation* **144** (9) 2300-2310

⁵⁶ Forest Research (2010). *Benefits of green infrastructure*. Report by Forest Research.

⁵⁷ Regeneris Consulting (2011). *The Economic Contribution of the Mersey Forest's Objective One-Funded Investments*.

⁵⁸ Forestry Commission (2007) *A Woodfuel Strategy for England*

⁵⁹ The Woodland Carbon Code is a voluntary standard for woodland creation projects in the UK which make claims about the carbon dioxide they sequester. Independent certification to this standard provides assurance and clarity about the carbon savings of these sustainably managed woodlands.

46. The development of a market for venison will enhance the viability of deer management, however there is likely to be a continued need to support co-ordinated activity at the landscape scale.

3.4. Threats

47. **Climate change** is the most significant threat to the ability of woodlands to continue to deliver ecosystem services. Forests have developed together with the naturally changing climate over the millennia. As climate shifted slowly, and the natural environment presented few barriers, species and communities could adapt and evolve more easily, however the rapid rate of human-induced climate change is now overcoming the natural ability of ecosystems to adapt⁶⁰. The rate of temperature increase is unprecedented and there are also likely to be significant changes in rainfall patterns. Combined, these will alter the suitability for certain forest types, forcing a shift in species distribution and leading to changes in growth of existing stands^{61,62}. It will also alter the distribution of individual species as their 'climatic envelope' moves. A fragmented landscape, often simplified forest composition and structure and pressures such as pests, storms and droughts make autonomous forest adaptation much more difficult.

48. In addition extreme events (storms, forest fires, droughts and heat-waves) are expected to become much more common and/or severe⁶³.

Changing climate is also likely to:

- increase the levels of damage caused by existing forest pathogens and pests;
- bring new exotic infestations, whether introduced by man or migrating naturally; and
- lead to changes in population dynamics of pathogens and pest.⁶⁴

49. Adaptive management⁶⁵ and woodland expansion will be needed to address these issues and make England's woodlands and more resilient ensuring the provision of valuable ecosystem services into the future.

⁶⁰ Frelich, L (2002) *Forest Dynamics and Disturbance Regimes*

⁶¹ Moffat, A J; Morison, J I L; Nicoll, B & Bain, V (2012) *Climate Change Risk Assessment for the Forestry Sector*

⁶² Forestry Commission (2012). *Climate Change Risk Assessment Forestry Commission : England Invited Report under the terms of the Reporting Powers of the Climate Change Act (2008)*
<http://archive.defra.gov.uk/environment/climate/documents/adapt-reports/11public-bodies/pbs-forestry-comm.pdf>

⁶³ Allen, C D (2009) Climate-induced forest dieback: an escalating global phenomenon? *Unasylva* **60** (1-2) 43-49

⁶⁴ BOKU, EFI, IAFS, INRA (2008): *Impacts of climate change on European forests and options for adaptation*

50. **Increased prevalence of pests and diseases.** Whilst both ‘pests’ and ‘diseases’ are a natural part of forest ecosystems, in recent years their number and severity of impact on individual trees and forest areas appears to be increasing. Those causing most concern in England being various species of *Phytophthora*⁶⁶, Acute Oak Decline⁶⁷, *Dothistroma* needle blight⁶⁸ all of which result in deaths of significant numbers of trees. Also of particular worry is the introduction of a number of insect pests such as the Oak processionary moth (*Thaumetopoea processionea*)⁶⁹, which is of particular concern from a public health perspective, and the Asian longhorn beetle (*Anoplophora glabripennis*) recently recorded in Kent⁷⁰.
51. Any existing threats should be addressed through implementation of the Tree Health and Biosecurity Action Plan⁷¹, there is a need for effective monitoring and private sector woodland owners and managers should be encouraged to instigate such programmes involving ‘citizen science’⁷² as well as government agencies; an action supported by the UK Forestry Standard (UKFS) and the Forestry Regulation Task Force⁷³ but currently with no co-ordination.
52. In some cases of preventative measures may need to be undertaken to reduce the likelihood of spread of pests and disease, such as the removal of host species for some pathogens e.g. rhododendron in areas where *Phytophthora* is present.
53. Whilst a well targeted approach to pest and disease control may sometimes be effective, for example controlling grey squirrels where they are a threat to remaining red squirrel populations⁷⁴, in general widespread control is rarely possible or viable.
54. **Excessive grazing or browsing by ungulates, both domestic and wild.** Although low levels of grazing/browsing are probably beneficial and assist initial woodland regeneration through the removal of competing vegetation⁷⁵, at higher levels such regeneration, whether by planting or from seed or coppice regrowth, tends to be

⁶⁵ Lawrence, A. & Gillett, S. (2011). *Human dimensions of adaptive forest management and climate change: A review of international experience*. Forestry Commission Research Report

⁶⁶ <http://www.forestry.gov.uk/forestry/WCAS-4Z5JLL>

⁶⁷ <http://www.forestry.gov.uk/forestry/INFD-868CUH>

⁶⁸ <http://www.forestry.gov.uk/forestry/infid-74jjfk>

⁶⁹ <http://www.forestry.gov.uk/fr/INFD-6URJCF>

⁷⁰ <http://www.forestry.gov.uk/forestry/HCOU-4U4J45>

⁷¹ [http://www.forestry.gov.uk/pdf/Action-Plan-Tree-health-and-plant-biosecurity.pdf/\\$FILE/Action-Plan-Tree-health-and-plant-biosecurity.pdf](http://www.forestry.gov.uk/pdf/Action-Plan-Tree-health-and-plant-biosecurity.pdf/$FILE/Action-Plan-Tree-health-and-plant-biosecurity.pdf)

⁷² Scientific research conducted, in whole or in part, by amateur or nonprofessional scientists.

⁷³ *Challenging Assumptions, Changing Perceptions*

⁷⁴ Forestry Commission/Defra (2006) *Grey Squirrels and England's Woodlands: Policy and Action*

⁷⁵ Hester, A J; Mitchell, F J G & Kirby, K J (1996) Effects of season and intensity of sheep grazing on tree regeneration in a British upland woodland, *Forest Ecology and Management*, **88**, 99-106

unsuccessful^{76,77}, thus leading to a gradual decline and eventual woodland deterioration. In lowland Britain deer densities above 14 per km² are likely to be too high to allow effective regeneration and yet in a study of 15 sites⁷⁸ in all but five (one being the Isle of Wight where deer are absent) this figure was exceeded, with a maximum of 44.5 per km².

55. Intensified deer browsing, in combination with increased canopy shading as a result of reduced management, is thought to be driving reductions in woodland understorey structures in many parts of the lowland England^{79,80,81}.
56. Domestic livestock can quite easily be excluded from grazed woodland during the regeneration phase to ensure effective establishment.
57. It may be possible to keep wild deer out of sensitive sites by means of fencing, but as stated above low levels of browsing and grazing are deemed to be positive in many cases. At the landscape scale the only effective means by which browsing damage can be reduced to a level which will allow successful regeneration is through management of deer populations by culling. It has been found possible to implement large-scale deer management resulting in a reduction in browsing damage to facilitate unfenced forest regeneration⁸². There is, however, evidence that some silvicultural systems can accommodate higher deer populations than others: e.g. 'close to nature' management may cope with higher densities than can systems based on clear felling or coppicing⁸³.
58. **Decline in management activity:** There has been concern for a number of years that long-term habitat and structural changes are taking place in British woodlands that are leading to changes in some key aspects of biodiversity interest^{84,85,86,87,88,89,90}.

⁷⁶ Gill, R M A (1992) A review of damage by mammals in north temperate forests: 3. Impacts on trees and forests, *Forestry* **65** (4) 363-388

⁷⁷ Palmer, S & Truscott, A M (2003) Browsing by deer on naturally regenerating Scots pine (*Pinus sylvestris* L) and its effect on sapling growth, *Forest ecology and Management* **182** (1-3) 31-47

⁷⁸ Gill R M A & Morgan G (2010) The effects of varying deer density on natural regeneration in woodlands in lowland Britain *Forestry* **83** (1) 53-63.

⁷⁹ Fuller, R J & Gill, R M A (2001) Ecological impacts of deer in British woodland. *Forestry* **74** 193–299.

⁸⁰ Côté, S D; Rooney, T P; Tremblay J-P; Dussault, C; & Waller, D M (2004) Ecological impact of deer overabundance *Annual Review of Ecology, Evolution and Systematics* **35** (1) 113-147

⁸¹ Dolman P; Fuller, R; Gill, R; Hooton D & Tabor, R. (2010) Escalating ecological impacts of deer in lowland woodland. *British Wildlife* **21** 242–254

⁸² Hothorn, T & Müller, J (2010) Large-scale reduction of ungulate browsing by managed sport hunting. *Forest Ecology and Management* **260**, 1416-1432.

⁸³ Reimoser, F & Gossow, H (1996) Impact of ungulates on forest vegetation and its dependence on the silvicultural system. *Forest Ecology and Management* **88** 107-119.

⁸⁴ Hopkins, J J & Kirby, K J (2007) Ecological change in British broadleaved woodland since 1947. *Ibis*. **149** (s2) 29-40.

⁸⁵ Kirby, P (1992) *Habitat Management for Invertebrates: A Practical Handbook*. RSPB, Sandy.

59. A comparison of ecological surveys of 103 woodlands in 1971 with comparable data collected from the same sites between 2000 and 2003, found an overall decrease in the species richness of ground flora, however shade and semi-shade tolerant plants had increased⁹¹. There were increases in soil pH, perhaps reflecting recovery from earlier airborne pollution. Most tree and shrub species remained stable although there had been a loss of small diameter tree stems from some stands and there was an overall increase in stand density leading to increased shading. A more recent study⁹² has shown that changes in structural attributes of broadleaved woodland, such as the foliage cover in different height intervals, which are likely to be important for invertebrate and vertebrate biodiversity, were significant although not uniform throughout Britain.

4. The rationale for RDPE funding.

60. The underlying principle of the Coalition Government for any intervention is to ensure that 'Government only does what only Government can do'. With regard to forestry, any intervention must seek to maximise the non-market ecosystem services that woodlands provide.

61. An analysis of forestry policy undertaken in 2003⁹³ cites three main reasons, which are still valid, why Government may intervene in forestry:

- The dominant rationale for intervention in the forest sector is market failure⁹⁴, specifically around the provision of public goods. However, the identification of market failure alone is insufficient to justify intervention. The benefits of intervention must exceed its costs in order that society makes a net gain.
- International and EU obligations that require intervention; and

⁸⁶ Plantlife (2011) *Forestry Re-commissioned: Bringing England's woodlands back to life*. Plantlife, Salisbury

⁸⁷ Asher, J; Warren, M; Fox, R; Harding, P; Jeffcoate, G & Jeffcoate, S (2001) *The Millennium Atlas of Butterflies in Britain and Ireland*. Oxford University Press, Oxford.

⁸⁸ Fuller, R J; Noble, D G; Smith, K W & Vanhinsbergh, D (2005) Recent declines in populations of woodland birds in Britain: a review of possible causes. *British Birds* **98** 116–143.

⁸⁹ Amar, A; Hewson, C M; Thewlis, R M; Smith, K W; Fuller, R J & Lindsell, J A (2006) *What's happening to our woodland birds? Long-term changes in the populations of woodland birds*. RSPB Research Report No. 19 and BTO Research Report No. 169. Sandy and Thetford.

⁹⁰ Fuller, R J; Smith, K W; Grice, P V; Currie, F A & Quine, C P (2007) Habitat change and woodland birds in Britain: implications for management and future research. *Ibis*. **149** (Suppl. 2) 261–268.

⁹¹ Kirby, K J; Smart, S M; Black, H I J; Bunce, R G H; Corney, P M & Smithers, R J (2005) *Long Term Ecological Change in British Woodland (1971-2001)*. English Nature Research Report No. 653. English Nature, Peterborough.

⁹² Amar, A; Smith K W; Butler S; Lindsell, J A; Hewson, C M; Fuller R J & Charman, E C (2010) Recent patterns of change in vegetation structure and tree composition of British broadleaved woodland: Evidence from large-scale surveys. *Forestry* **83** (4) 345-356.

⁹³ CJC Consulting, Pearce D, & Willis, K (2003) Economic Analysis of Forestry Policy in England

⁹⁴ Market failure refers to the inability of freely functioning markets to account for all the benefits (services, functions) that may be provided.

- Requirements 'derived' from other government agendas, for example Biodiversity 2020⁹⁵.

62. Government intervention is needed in woodland to achieve three objectives

- to ensure the continued provision of the ecosystem services that are currently provided by woodlands
- To improve the benefits provided by current woodlands
- To increase the level of woodland cover to increase the resilience of the current woodland stock, and enhance the wide range of services provided.

63. Woodland delivers many ecosystem services simultaneously; for example the mere presence of a wood will result in carbon sequestration and biodiversity benefits and depending on the location may provide water benefits. Currently the only major market available to woodland owners is that for wood and timber; at present this does not provide a sufficient incentive to bring woodlands into management. Whilst there is a fully functioning and mature market and supply-chain for coniferous timber and high-grade hardwoods the same cannot be said for low-grade hardwoods, which comprises most of England's growing stock. With the rising cost of fossil fuel, particularly oil, and the growing interest in the use of woodfuel, the value of this low-grade material is now increasing so that the production of woodfuel is now becoming economically viable. However the establishment of supply-chains and improved access to woodland to facilitate harvesting and extraction of wood are likely to require some support in the short-term until markets and supply are sufficiently robust.

64. Where markets do exist for woodland goods and services (which require management for their production) many of the non-market benefits can be provided alongside at zero marginal cost, however frequently, due to the nature of woodlands in England woodland management and creation do not provide a financial return. The majority of the services, other than provisioning, highlighted in **Error! Reference source not found.** are subject to market failure. Although the existence of markets may help to drive woodland management there may be situations when alternative management practises than those driven by the market would be more beneficial (for example in a key biodiversity area) and therefore government intervention is required to maximise public benefits. Also there is very limited economic rationale for woodland creation and support is likely to be required for woodland establishment where clear ecosystem services can be provided,

⁹⁵ <http://www.defra.gov.uk/publications/files/pb13583-biodiversity-strategy-2020-111111.pdf>

e.g. WFD commitments, biodiversity enhancements and increased recreational provision.

65. The Rural Development Programme is the only government source of funding available to support the public goods provided by forestry management and creation at the national level. Within the National Forest the Changing Landscape Scheme, purely exchequer funded, provides support to deliver similar objectives and some local authorities operate small scale tree planting programmes. The Big Tree Plant has been developed so that it supports small scale tree planting (particularly in urban areas) to which the RDPE would not be applicable.
66. If the market for carbon develops this may provide an alternative funding source for woodland creation, current examples still rely on RDPE as part of the funding mix.
67. At present the market for timber is not sufficient to incentivise the management and creation of woodlands and therefore the delivery of non-market ecosystem services will probably require support in the form of grants (effectively a payment from government for the provision of an ecosystem service). A research project is currently out to tender to develop the evidence base around the most efficient and effective way to do this.
68. The potential for the use of loans or repayable grants should be investigated for the development of marketable products and supply chains.
69. As woodlands are an integral part of landscapes and inter-relate with adjoining land uses, operating at the landscape or catchment scale is likely to be required to achieve or maximise multiple benefits, or to address various threats (particularly pests and diseases). Therefore support under RDPE should also be considered at the landscape scale rather than being split between land-uses.

5. Fit with the draft regulations.

5.1. *Response to SWOT analysis*

70. From the above SWOT analysis it is apparent that to build on the strengths, address the weaknesses, take advantage of the opportunities and tackle the threats action falls into three main areas:

- Improvement of the quality and an increase in the area of woodland being managed;
- An increase in the total area by planting of appropriate woodland types in appropriate locations; and
- Development of markets and supply chains for forest products to improve the economic viability of woodlands.

71. The draft Rural Development Regulation 2014-20 provides for quite wide support to the forestry sector which would include all the above.
72. **Woodland management.** Articles 18, 25, 26, 31, & 35 between them would allow support for a very wide range of management activity to address:
- Prevention and restoration of damage caused by natural disasters, pests and diseases;
 - Improving resilience and adaptive capacity;
 - Enhancing environmental, biodiversity conservation and public amenity value (with particular emphasis on Natura 2000 sites under Articles 18 & 31); and
 - Improving access to woodland areas for management purposes.
73. **Woodland creation.** Articles 23 & 24 provide support for afforestation of agricultural and non-agricultural land and agro-forestry. Also Article 31 may support land-use change from agriculture to woodland for the requirements of the Water Framework Directive by providing income foregone payments.
74. **Market development.** Article 26 would allow support to be provided to enhance forest potential and investments in the processing, marketing and adding value to forest products. Article 28 would support the establishment of producer groups and Article 36 the development of new products and co-operation within supply chains.
75. There will also be a need for increased and improved knowledge transfer and skills training (Article 15) together with the provision of advice, particularly if the area of woodland being managed is to be increased (Article 16).
76. As the delivery of many of the benefits of woodland management and expansion would be enhanced by operating at the landscape or catchment scale, it is likely that co-operative action (Article 31) between landowners and other bodies will be beneficial.

6. What works/evidence of success?

77. The nature of forestry is such that the impact of any intervention can take decades⁹⁶ to become apparent; there is therefore a paucity of such evidence. There is however a very sound logic chain that improvement of management will provide positive results; as highlighted in the Mid Term Evaluation of the RDPE.
78. Management of over 190,000 ha of mature woodland (not including woodland planted in the last 15 years) has been funded through the English Woodland Grant Scheme. It must

⁹⁶ Tanentzap, A J; Kirby K J & Goldberg, E (2012) *Forest Ecology and Management* **264** 159-166.

be stressed however that, due primarily to budgetary constraints, not all woodland has been eligible with support limited to areas of high biodiversity or recreational value.

79. The recent programme to address the management of woodland SSSIs in unfavourable condition was successful in that between 2004 and 2010 the percentage in favourable or favourable recovering condition increased from 71% to 96%⁹⁷. It will be essential that the management that has commenced is fully implemented and sustained if favourable condition is to be achieved and maintained.
80. There is rarely good baseline data available at forest level against which to assess impact, however with the introduction of the Woodland Bird WIG in the East Midlands in recent years the collection of baseline bird populations has been instigated⁹⁸. Likewise a study has just commenced to evaluate the impact of deer management grants in East England, this will include analysis of ecological damage assessments together with cull records and collation of deer population figures which will facilitate re-survey in future years. As part of a project to conserve red squirrels in northern England a monitoring programme of populations of red and grey squirrels will commence in spring 2012 with initial results to be published in July 2012⁹⁹.
81. It is often easier to demonstrate outputs rather than outcomes for example it is possible to show that both woodland regeneration grants aimed at the removal of non-native, primarily coniferous, species from Plantations on Ancient Woodland Sites and restocking with native species has resulted in the conversion of about 3,500 ha.
82. The Mid Term Evaluation of the RDPE noted the relatively high levels of 'dead weight', i.e. beneficiaries would have done the work anyway, particularly associated with the Woodland Management Grant. This should not be unexpected as it is unusual for financial incentives to dramatically alter the attitudes of forest owners although they may amend management practices¹⁰⁰. However anecdotal evidence from Forestry Commission Woodland Officers, who deal with applications for grant assistance under RDPE, shows that whilst the overall intent and interest of the applicant may not be changed the process of agreeing management prescriptions frequently results in improved programmes of work to deliver significantly enhanced outcomes. In addition the research currently out to tender is aimed at developing the evidence base around motivations so that these can be utilised to maximise value for money.

⁹⁷ *The FC SSSI Recovery Programme 2003 to 2010. A summary of achievements and costs.*

⁹⁸ Charman, E (2011) *Monitoring of the bird and habitat response to Woodland Improvement Grant 80 in the East Midlands region: Interim report.* RSPB, Sandy, Beds (unpublished)

⁹⁹ http://www.rsne.org.uk/sites/default/files/RSNE%20Squirrel%20Surveying%20Methodologies_0.pdf

¹⁰⁰ Serbruyns, I & Luyssaert, S (2006) Acceptance of *sticks, carrots and sermons* as policy instruments for directing private forest management. *Forest Policy and Economics* **9** 285-296.

83. The majority of woodland established in England is supported through RDPE payments, primarily under EWGS but also small areas under HLS; a small percentage is funded by local authorities and the Changing Landscapes Scheme within the National Forest. Even such schemes as the Jubilee Woods Project promoted by the Woodland Trust¹⁰¹ are heavily dependent on EWGS funding. Some small-scale woodland planting is undertaken without any public sector grants and a small number of larger scale projects are in development, although these still require public sector involvement through the provision of advice or because of regulation.
84. Since 2007 almost 8,400 ha of woodland has been created through EWGS, although this is significantly below the target for the 15,400 for the programme period as highlighted in the Mid-term Evaluation of the RDPE. One reason is likely to be the relatively low grant rates currently available; the basic woodland creation grant of £1,800/ha (for broadleaves) only covers around 20% of establishment costs which is increased to only about 50% with the maximum additional contributions of £2,000 per ha available in certain areas. Partly in response to a recommendation in the Mid-term Evaluation of the RDPE, increased levels of support are about to be introduced that will provide levels of grant equivalent to up to 70% of costs. It should also be stressed that in the early part of the programme woodland creation was not a high priority due to the policy focus at the time.
85. A recent analysis of woodland connectivity as part of the UK Government's assessment of biodiversity indicators¹⁰² revealed a decrease (not statistically significant) in England between 1990 and 2000¹⁰³, even though there had been an increase in woodland area during the same period. This is believed to be linked to a reduction in the mean woodland size and an increase in the number of small, isolated woodlands. However between 2000 and 2007 connectivity increased (again not statistically significant); the reason for this is currently being explored further but it may be linked to more targeted woodland restoration and creation.
86. Once such example of targeted woodland creation in England is the JIGSAW scheme on the Isle of Wight¹⁰⁴, this provided increased financial incentives for woodland creation if the proposal extended or joined existing native woodlands. This scheme was compared with a more traditional scheme with grant available to all-comers and the analysis

¹⁰¹ <http://www.woodlandtrust.org.uk/en/jubilee-woods/Pages/home.aspx>

¹⁰² *UK Biodiversity Indicators in Your Pocket (BIYP)* <http://jncc.defra.gov.uk/page-4229>

¹⁰³ BIYP - 14. Habitat connectivity <http://jncc.defra.gov.uk/page-4249>

¹⁰⁴ Quine, C P & Watts, K (2009). Successful de-fragmentation of woodland by planting in an agricultural landscape? An assessment based on landscape indicators. *Journal of Environmental Management* 90 (1), 251-259.

confirmed the targeted scheme produced improved connectivity. The Isle of Wight scheme increased the mean woodland size and decreased the number of discrete woodlands as the new woodlands either extended or joined existing ones. Untargeted grants created more, smaller, isolated woodlands which decreased mean woodland size. Similar schemes are also being developed and implemented across England to target action in similar manner to improve connectivity e.g. Exmoor National Park. This more targeted intervention will be a key consideration in developing the next phase of the woodland grant schemes..

87. The Mid-term evaluation of the RDPE pointed out that the contribution of woodland creation to the delivery of the objectives of the Water Framework Directive (WFD) have not been fully realised. Until recently addressing water quality has not been a target for woodland creation and there was therefore very limited promotion of the benefits. Additionally forestry was not identified as a pressure in the first cycle of River Basin Management Plans; as a result, it was not considered as a solution. With the publication of the joint FC/EA report 'Woodland for Water'¹⁰⁵, there is now increasing emphasis being placed on woodland planting to address diffuse pollution, reduced sedimentation and flood mitigation, indeed the increased rates of support referred to above will be available for woodland creation schemes specifically aimed at addressing WFD issues.
88. As well as supporting environmental and limited social activity the RDR can and does provide support for training, advice and economic aspects of forestry. However as the EU does not have competency to address forestry competitiveness the extent to which purely economic activity can be supported is limited.
89. Within the RDPE the activities available to the forestry sector are:
90. **Vocational training and skills.** No forestry specific skills packages have been introduced, however a number of training courses (for example the 'Ignite'¹⁰⁶), including support for apprentices, of relevance to the sector have been provided.
91. **Provision of advice.** Although support for the use of advisory services by both the agriculture and forestry sectors is included within the RDR, in the England Programme it is limited to the forestry sector. The former East England, North East England and the West Midlands regions have utilised this measure to provide subsidised advisory services to woodland owners and an evaluation of their effectiveness will be included in the research referred to above.

¹⁰⁵ Forestry Commission & Environment Agency (2011). *Woodland for Water: Woodland measures for meeting Water Framework Directive objectives*

¹⁰⁶ <http://www.ruraldevelopment.org.uk/ignite>

92. **Improving the economic value of forests.** This is targeted at woodland owners and can include a wide range of support including forest management activity and investments in machinery. This measure has been used in many parts of England and is included in the Farming and Forestry Improvement and Rural Economy Grant Schemes administered by Defra. It is also utilised by the FC in the Woodfuel WIG component of the EWGS to support the increased production of wood from under-utilised woodland.
93. **Improving and developing forest infrastructure.** The Woodfuel WIG also draws on this measure to support investments to improve access to woodland to facilitate the harvesting and extraction of wood. The first applications under the Woodfuel WIG have only recently been approved so it is too early to make any assessment of its effectiveness but a monitoring process of uptake, wood production and area of woodland brought into management has been instigated.
94. **Adding value to forestry products.** The beneficiaries of this measure must be forestry micro-businesses. This measure is also used by FFIS and REG has been quite widely used to support investment in forestry and primary processing machinery, particularly that related to the production of woodfuel.
95. Whilst there has been no evaluation of the various aspects of support available, and the mid-term evaluation did not deal with them in any detail, there is strong anecdotal evidence that investments to improve the harvesting and conversion of wood, particularly into woodfuel, has led to a significant increase in the quantity and quality of material being brought to market.