Scoping Study to Review Forestry Policy Instruments in the UK

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EXECUTIVE SUMMARY

E1. As recognised in various strategy documents, forestry offers a number of non-market benefits to society. These include recreational opportunities and aesthetic landscapes plus ecosystem services such as biodiversity protection, watershed management and carbon sequestration. Others relate to market stability and social cohesion.

E2. Securing non-market benefits typically requires some form of policy intervention to correct market imperfections and failures. This may take many forms, but can be classified as providing information, offering incentives or imposing regulatory controls. Examples of each may be found in current UK forest policy, ranging from support for research and advisory services, through grants and tax breaks, to prescribed management activities and direct public management of forest resources.

E3. Whilst policy objectives have evolved to encompass sustainability principles and climate change challenges, current tax breaks largely relate to securing stable timber supplies. However, attaching conditions to eligibility for such tax breaks, to mirror those already used in many forestry and agricultural grant schemes, could be used to broaden the environmental policy relevance of tax measures. Although administrative and monitoring issues would need to be considered, such a move would be consistent with the UK government's stated intention of using taxation to promote environmental objectives.

E4. As an alternative, attempts to overcome market failures by (re)defining property rights have led to payments for environmental services (PES) being used to secure benefits such as carbon sequestration, flood management and biodiversity maintenance by rewarding land managers for the delivery of these outcomes rather than (as with traditional grant schemes) for adherence to prescribed management practices. Such an approach offers some potential advantages in terms of flexibility and efficiency, but can suffer from administrative complexity and costly monitoring unless outcomes are easily observed and agreed (as addressed in current FC work on carbon standards).

E5. Whilst different policy measures have advantages and disadvantages, following official guidance to assess them is often hampered by a lack of relevant baseline and monitoring information. Moreover, given the cluttered policy landscape of multiple arms of government and myriad interventions, most measures are used in combination rather than isolation and thus should be assessed jointly rather individually.

E6. The twin challenges of joint assessment and information gaps could be addressed by gathering primary data from forestry practitioners and administrators. Such an approach is reported in a series of papers stemming from a study in the USA, cataloguing the large number of interventions applied to forestry by different government agencies and identifying the perceived impact of measures on forestry practices and policy objectives. This provides a valuable overview of interactions, overlaps and gaps between different measures and agencies in a cluttered policy landscape and perhaps offers a useful template for similar UK work.

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I. Introduction

1. As documented in various strategy and policy documents,[1] forestry contributes to a range of desirable economic, social and environmental outcomes. Many of these take the form of non-market benefits (i.e. externalities and public goods) and, consequently, policy interventions are typically required to secure them.

2. These benefits include environmental services such as carbon sequestration and biodiversity maintenance, leisure values such as aesthetic landscapes and recreational opportunities, and social preferences such as rural employment and security of long-term supplies (see Annex A for a more detailed discussion).

3. The precise form of policy intervention used varies widely and different measures are often used in combination. Nevertheless, it is possible to crudely characterise them as being based on information provision, incentives or regulation. Hence policy makers may seek to influence forest owners and managers' actions either by raising their awareness and understanding and/or offering them rewards and/or compelling them through rules and penalties (see Annex B for a more detailed classification).

4. Examples of each class of intervention measure are evident amongst current forestry policy instruments across the UK. For instance, best practice guidance and training is available, various grant and tax relief schemes are offered, and some management options are controlled through prescriptive licenses and legal requirements (see Annex C for more examples).

5. The mix of different instruments in use reflects both that different measures offer different advantages and disadvantages (see Annex D) and also a legacy effect of a gradual accumulation of measures over time as policy objectives have evolved. In particular, the original justifications for intervention revolved primarily around issues of market imperfections jeopardising stable and secure timber supplies. Whilst this remains a policy concern, it has been supplemented by a shift to broader sustainability objectives and a different policy emphasis, especially with respect to environmental performance aspects of land use.

6. The next section of this short report reviews briefly the use of taxation in UK forestry policy, focusing on how its relevance to environmental objectives might be improved. Section III offers a brief overview of another form of incentive instrument, of payments for environmental services. Section IV scopes and suggests an approach to assessing the current mix of forestry policy instruments in terms of their individual and collective effectiveness within a somewhat cluttered policy landscape. The Annexes contain additional information and analysis.

[1] For example, see the Strategy documents for different parts of GB on the FC website: http://www.forestry.gov.uk/website/fchomepages.nsf/hp/GBIGL

II. Environmental taxation instruments in the forestry sector

7. Taxation serves three main functions. First, it acts a source of revenue, raising exchequer funds that may then be used for a variety of public purposes. Second, if applied differentially across different groups in society, it can redistribute income and wealth to address social equity issues. Third, if applied differentially across different activities, it can be used as an incentive mechanism to influence resource allocations in an attempt to correct for market imperfections and failures (James & Nobes, 2005; Lymer & Oats, 2008).

8. It is this third function that is the main focus of taxation policy within the forestry sector, with taxes being used to discourage some activities and tax-breaks being used to encourage other activities (see Annex E). However, whilst some general taxes affecting UK forestry have explicit environmental rationales (for example the aggregates and climate change levies), the main focus of forestry-specific tax measures reflects historical concerns over security of timber supplies (e.g. see Boyd & Hyde, 1989; Hibbard et al., 2001; CJC, 2003; Kilgore et al., 2007).

9. Snowdon (2003) identified the following principles underpinning this approach:

- take account of the long-term nature of forestry;
- establish a 'level playing field' for forest industry businesses; and
- be consistent and fair in comparison to agriculture and other land-uses.

10. Hence, for example, all income and profits from timber sales are free from income and corporation tax and no capital gains tax is paid on the increase in value of standing timber. Moreover, commercial woodlands attract 100% business property relief provided that they have been owned for at least 2 years prior to being transferred. All of these measures are attempts to encourage establishment and retention of an appropriate stock of forestry capital in the face of perceived market imperfections and failures, including comparability with agriculture.

11. However, environmental and social dimensions expressed in current forestry strategy documents suggest that taxation policy might also be considered as a way to reinforce other attempts to promote sustainable development principles.[2] Snowdon (2003) identified the following additional principles for expanding the role of taxation in forestry.

- promote good environmental practice in forestry industries;
- provide incentives to adopt sustainable forestry practices; and
- encourage forestry to provide benefits for rural communities.

12. This wider remit suggests various possibilities. For instance, an element of environmental cross-compliance could be introduced into eligibility for tax breaks. That is, exemption from income tax, capital gains tax and business property tax could

[2] Although environmental motivations do not exempt tax breaks from WTO scrutiny (Quick & Lau, 2003)

be made conditional on observance of best management guidelines. This would acknowledge explicitly the economic equivalence between subsidies and tax breaks.[3] It would also bring the latter in line with the use of conditionality in other land management payment mechanisms, such as some existing forestry grant schemes but also agricultural cross-compliance under Pillar I of the CAP and some environmental schemes under Pillar II. In principle, different degrees of compliance could be imposed for different sites, to reflect variability in environmental conditions and potential – although this would almost certainly increase administrative costs.

13. If voluntary adherence to sustainable forestry management practices is not currently universal, imposing conditionality on tax breaks should increase the level of adoption. However, since compliance would presumably impose some (albeit possibly modest) costs on forest managers, it might deter the take-up of some tax breaks and thus coverage might still be less than total. In addition, encouragement of adoption might require targeted provision of information and possibly capacity-building efforts too. Moreover, the practicalities of monitoring and enforcement of compliance across an increased area would need to be resourced adequately.

14. Industry stakeholders might object to the imposition of conditionality, but the strength of objections would be weakened by comparisons with the terms and conditions already applied to explicit payment schemes. Moreover, the alternative of simply imposing regulatory requirements without a corresponding compensation or reward would be even less attractive to current recipients. The use of regulatory controls would signal a significant shift in property rights, from forest owners to society, whereas the use of cross-compliance would be less extreme.

15. Equally, whilst measures applied within forestry may affect the supply-side of environmental benefits, differential taxation could also be used to affect demand-side aspects too. For example, in recognition of its lower carbon emission profile, timber and wood products used in sectors such as construction, manufacturing or energy generation could be subject to tax breaks in the form of lower rates of VAT.

16. Taxation remains a reserved matter, with responsibility resting with the UK government. Nevertheless, representations may be made to HMT to suggest change (e.g. ERM, 2002). Given that the UK government has stated its intention[4] to use taxation to encourage environmentally desirable behaviour, suggestions for improving its effectiveness could be well received. However, taxation should not be the sole focus of attention as other policy instruments may offer more potential (e.g. Brockett & Gebhard, 1999; Kluender et al., 1999; Kilgore & Blinn, 2004; Kilgore et al. 2007).

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[3] Government figures on the revenue foregone through forestry tax breaks are not available (see http://www.parliament.the-stationery-office.co.uk/pa/cm200607/cmhansrd/cm070117/text/70117w0006.htm**),** but may be estimated from the annual value of felled timber as probably lying toward the lower end of a range from £20m to £40m per year.

[4] see, for example, HM Treasury (1997) *The Statement of Intent on Environmental Taxation*, issued in July 1997 as an annex to one of the Budget press releases; HMT (2002);HMT (2008) Budget 2008 - Chapter 6 "An environmentally sustainable world" http://www.hm-treasury.gov.uk/media/4/7/bud08_chapter6.pdf

III. Payments for forestry environmental services

17. Their potential superiority to both regulatory controls and more traditionally incentive systems in terms of delivering efficient outcomes whilst possibly securing new income-generating opportunities for land managers has led to recent interest in the creation of markets for a number of ecosystem or environmental services. Hence, for example, attempts have been made to devise systems whereby land managers receive payments for carbon sequestration, hydrological management and biodiversity protection (e.g. Engel et al., 2008).

18. This has spawned a large and growing literature, describing a range of different approaches and different degrees of success across a number of varied examples relating to forestry (e.g. Landell-Mills & Porras, 2002; Pagiola et al., 2002; Valatin & Coull, 2007). Such approaches are labelled variously as "creating markets", "conservation payments" and "payment for environmental services (PES)" with the latter term being adopted here.

19. Despite the variation in terminology and form of application, some common characteristics may be identified in terms of both what constitutes a payment for environmental or ecosystem services (PES) solution and how to implement it successfully.

20. A PES approach constitutes one in which buyers and sellers participate voluntarily, sellers have partial or total control over the production outcome and buyers offer a variable payment conditional on achievement of a well defined outcome (after Wunder, 2005). This contrasts with more traditional grant schemes where payments are typically conditional on adherence to management prescriptions rather than actual outcomes.

21. Many cited PES examples fail to display all three of these characteristics, mostly through non-conditionally and prescribed management practices. This means that many are actually merely variations on conventional approaches to incentive schemes rather than being genuine PESs (Schwarz et al., forthcoming). Moreover, in terms of design and implementation, relatively few examples have been in place sufficiently long to progress beyond a pilot stage. Nevertheless, various commentators have suggested criteria conducive to achieving a successful PES (e.g. Landell-Mills & Porras, 2002; Mayrand & Paquin, 2004; Meijerink, 2007).

22. First, echoing more general guidance on policy design, there is a need for the target environmental services to be clearly defined. This may be in terms of actual outcomes, such as a certain level of biodiversity, or in terms of land management practices. A lack of clarity over objectives inevitably leads to confusion and inefficient policy design and implementation. Sellers are typically private land managers but buyers may be private individuals or firms, or public agencies acting on behalf of taxpayers.

23. Second, baselines, compliance and achievements should all be measured and monitored appropriately such that rewards (and penalties) can be applied correctly.

A failure to adequately resource monitoring activities undermines policy effectiveness. Given that some outcomes can be hard to discern and/or may not arise until sometime in the future, management practices may be more easily observed – but their association with desired outcomes has to be based on sound science.

24. Third, unfamiliarity with a PES should be countered by dialogue with stakeholders, to strengthen community capacity to engage with a novel policy instrument. This is particularly important where co-ordination across neighbouring land mangers may be needed (as with most landscape-scale outcomes) and/or explicit (re)allocation of property rights is required.

25. Fourth, in addition to having a clear role in setting and enforcing measurement standards, government typically also has a further role in designing and monitoring systems of exchange between buyers and sellers. That is, whilst private brokerage may develop, some degree of regulatory overview is usually required to police the system. For example, to preclude multiple selling of benefits.

26. Fifth, PES contracts should be open-ended, to avoid reversal problems (such as clear felling) at the end of a contract, and sufficiently flexible to be adjusted over time to reflect changing circumstances and priorities. For example, land managers may be tempted to exit from a PES if its payment rates fail to keep pace with rising commodity prices.

27. Collectively, when added to the generic criteria for any policy instrument (see next Section and Annex D) these requirements are demanding and may limit the applicability of a PES to UK forestry. However, contemporary interest in catchment management, carbon sequestration and biodiversity may offer potential applications worthy of further consideration.

28. With respect to catchment management, at least in principle, geographical proximity means that the beneficiaries of improved water quality and/or quantity and forestry and management activities can be identified and linked. Hence, if the causal link can be proven, there may thus be scope for negotiating payments from (downstream) beneficiaries to (upstream) suppliers – although securing consensus about property rights, namely whether not polluting should be rewarded or polluting should be penalised, may be difficult.

29. This suggests a need for scientific measurement of hydrological systems plus a social-economic exploration of alternative models of collective management and presumptive property rights. On-going research into community approaches to river catchment management may offer some evolving insights into how incentives and governance might be designed to deliver collective outcomes in a UK context (Waterton, 2007; Anon, 2008b; Smith, 2008).

30. Carbon sequestration represents a slightly different case since geographical proximity does not determine the beneficiaries. Rather, the benefits are nominally global through reduced pressure for further climate change and hence the

mechanism for rewarding suppliers of sequestration would be different to that used in a catchment management context.

31. In particular, the existence of carbon markets as part of both formal emission trading schemes[5] and voluntary offset schemes demonstrates the potential for a forest carbon sequestration PES. However, designing such a PES would require careful consideration of both the measurement/monitoring/verification and reversibility criteria.

32. That is, as with any market transaction, there need to be agreed and enforceable standards for measuring the quantity and durability of sequestered carbon. Media reporting of variable standards in some private sequestration initiatives suggests a clear role for government, probably with the aid of quality assurance bodies, in researching and defining such standards – possibly as an extension to existing quality assurance certification processes[6]. In addition, careful consideration would also need to be given to the system for administering trading in forest sequestration.

33. The use of a forestry PES for biodiversity is perhaps more problematic since identification and monitoring of outcomes can be difficult given their dependence on a number of factors in addition to local land management and the fact that they may take years or even decades to materialise. These problems tend to push monitoring onto management actions (assumed to lead eventually to desired outcomes) rather than outcomes per se, which weakens the market link and is effectively a reversion to more familiar, existing incentive schemes (Schwarz et al, forthcoming).

34. Indeed the complexity, indeterminacy and opaqueness of many environmental systems implies that it may be sensible to seek use a PES to maintain rather than enhance an existing level of environmental performance. That is, the baseline and target are more easily understood and land mangers will have a better idea of how to achieve the outcome (effectively no further degradation). This offers clear practical advantages, but is possibly open to criticism of achieving little additionality – of paying land managers more for little extra effort – and being an expensive alternative to simple regulatory protection through, for example, an environmental designation (Schwarz et al, forthcoming). Nevertheless, there may be merit in identifying forestry areas currently delivering desired outcomes and considering the relative appropriateness of regulatory control or a PES for securing continued benefits.

[5] Although the treatment of forest sinks under the Kyoto Protocol complicates matters slightly by focusing only on additional and permanent new aforestation.

[6] Along the lines of Defra announcement earlier this year, see: http://www.defra.gov.uk/environment/climatechange/uk/carbonoffset/codeofpractice.htm and as being addressed through current FC work on standards and good practice, see www.forestry.gov.uk/climatechange

IV. Assessing policy instruments

35. Tax breaks and payments for environmental services represent two particular examples of policy instruments. Yet current forestry policy actions encompass many other interventions (see Annex C). For example: publicity campaigns; various practice guidance notes for managers and planners; support for school and community activities; a range of grants for woodland planning, creation, restoration and management; and regulatory controls over tree felling and plant health. Each has advantages and disadvantages (see Annex D).

36. In addition, forestry is also subject to policy interventions by arms of government whose remit is not specific to forestry. Taxation is an example of this, but other notable instances include aspects of habitat/biodiversity protection and avoidance of diffuse pollution, administered through environmental agencies, and aspects of agricultural and broader rural development administered through central government. As a result, the policy landscape for forestry, or rather for land management more generally, is somewhat cluttered, leading to increasing calls for a more integrated approach to reduce fragmentation (e.g. Ellefson et al., 2003; ACCSG, 2008; RSE, 2008)

37. Various official guidance documents highlight best practice throughout the policy cycle in terms of appraising and evaluating options and actions, stressing the need for clarity of objectives and various forms of baseline and on-going monitoring (e.g. Cabinet Office, 1999; GCSR et al, 2003; HMT, 2003; ODPM, 2003). Equally, guidance is also available in relation to administrative effectiveness and design principles (e.g. OECD, 1997; Better Regulation Taskforce, 2005; Hampton, 2005; CES, 2008).

38. However, whilst individual instruments can be assessed in isolation, the fact that they tend to be used in combination perhaps suggests that they should be assessed jointly. This would potentially account better for interactions (positive or negative) between separate measures and identify overlaps and gaps between them.

39. Yet adherence to best practice in assessment is often constrained by a lack of relevant information, a problem amplified by seeking to assess multiple rather than individual instruments. Typically, the absence of information reflects prior neglect of the need to establish appropriate baselines and monitoring systems, in part due to a lack of clarity over policy objectives but also often perceived technical and cost barriers to data gathering (e.g. HMT et al., 2001; Yarron, 2006; Moxey, 2007). For the latter, the diversity of environmental systems and the time lags between cause and effect exacerbate the problem – as does the long forestry production cycle.

40. Although not necessarily able to support detailed economic analysis (e.g. Boyd & Hyde, 1989), one pragmatic approach to overcoming these twin assessment challenges of multiple instruments and information gaps is to undertake primary data collection from forestry practitioners and administrators, to provide a (subjective) picture of both the policy landscape and the effectiveness of particular measures

41. Such an approach has been used recently in an agricultural context within Scotland to explore both the effectiveness of controls on diffuse pollution (ADAS, forthcoming) and the impact of wider regulatory measures (SAC, forthcoming). In both cases, a mix of stakeholder workshops and interviews were used to identify and discuss issues, with the breadth and variety of issues readily apparent.

42. A more rigorous and specifically forestry example is reported in a series of papers documenting the experience and results of initiating such an approach in the USA (Ellefson et al., 2003; Kilgore & Blinn, 2004; Ellefson et al., 2007; Kilgore et al., 2007). In particular, the various papers report how qualitative (focus groups and interviews) and quantitative (survey) techniques were used to both catalogue the myriad measures applying to forestry and to identify how each measure related to specific aspects of forestry practices and benefits. Although the information gathered was subjective, relating to participants' perceptions, it provides a valuable overview of balance and effectiveness across different measures.

43. For example, for each of a number of separate forestry practices such as harvesting, thinning and planting, the study explored the extent to which practices were correctly applied (i.e. following best practice) and subject to intervention (e.g. regulated, and under what conditions). The effectiveness of different measures in influencing particular practices to achieve policy objectives was also scored (on a four or five-point Likert scale), with information provision generally reported as more effective than incentives. In addition, the number of different government agencies and staff involved and the extent of their involvement was recorded, along with the degree of co-ordination between them and views on how co-ordination was (or was not) achieved.

44. Although the results of the USA study may not be directly transferable, the study does perhaps provide a useful template to follow for similar work in a UK context. That is, in both countries policy objectives have evolved beyond traditional timber supply concerns to encompass broader sustainability issues, but the effectiveness of interventions has not been subject to rigorous, comprehensive assessment due to the breadth of individual measures and their sponsoring agencies plus a lack of detailed information.

45. Hence, for example, through drawing on the experience and views of those working in the industry and of those responsible for administering policy interventions, a UK study could seek to:

- Catalogue the main forestry practices that are affected by policy interventions
- Clarify the objectives and nature of each intervention
- Identify the government agencies responsible for intervention
- Report estimated effectiveness (and how performance is currently judged)
- Highlight any scope for improvement in intervention design and co-ordination

46. Without constraining the specific design of any such study, the following tables offer some suggestions as to how the findings could be structured.

Table 1. Example forestry practices

Example category	Example practices
Access	Signage; Closures; Track condition
Administration	Planning; Notification; Inspections
Chemical usage	Products; Methods & timing of applications
Harvesting	Methods & timing of felling
Hazard control	Disease, erosion & fire management
Planting	Site preparation; Species selection
Etc	Etc; etc...

Table 2. Degree to which best practice is followed

Category	Practice	Always	Mostly	Rarely	Never
Access	Signage				
	Closures				
	Tracks				
Planting	Preparation				
	Species				

Table 3. Identified instances of practices subject to intervention

Category	Practice	Information	Incentives	Regulation
Access	Signage			
	Closures			
	Tracks			
Planting	Preparation			
	Species			

Table 4. Identified instances of intervention by different government agencies

Category	Practice	Agency 1	Agency 2		Agency X
Access	Signage				
	Closures				
	Tracks				
Planting	Preparation				
	Species				

Table 5. Stakeholder awareness of and view of interventions

	Information	Incentives	Regulation
Awareness			
Appeal			

(scored e.g. 1-5 or Low – High)

Table 6. Perceived effectiveness of interventions against objectives

Policy objective	Information	Incentives	Regulation
Biodiversity enhancement			
Carbon sequestration			
Cultural heritage protection			
Education			
Employment			
Habitat protection			
Health & well being			
Landscape amenity			
Hazard management			
Rural community viability			
Security of timber supply			
Soil protection			
Water quality			
Etc.			

(e.g. negative to positive, or -5 to +5; possibly for practitioners vs. administrators)

47. The forest practices, interventions and objectives listed above are only illustrative and a more comprehensive inventory would be generated by canvassing practitioner and administrator views. Equally, the number of columns could be expanded to offer greater detail, for example with more intervention types (see Annex B) in Table 3 or specific interventions in Tables 5 and 6. Additionally, greater detail might need to be offered in supporting tables such as, for example, listing rather than tallying each agency's interventions in Table 4 or the objectives per intervention in Table 6.

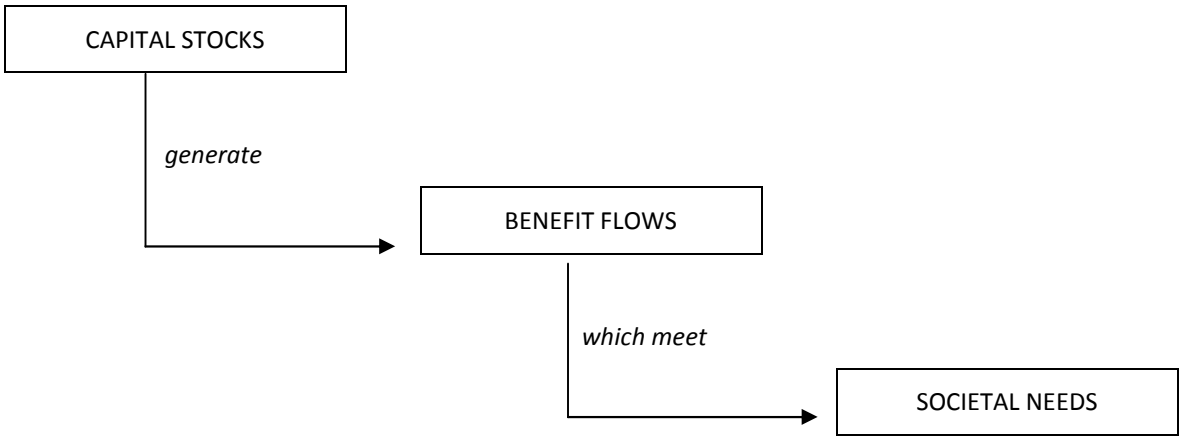
48. Populating each of the Tables would require a systematic approach to gathering information from forestry practitioners and administrators in each part of the UK, probably via a mix of interviews or workshops with selected key individuals to generate an initial list of practices and interventions, followed by a wider survey to gauge general views on effects and effectiveness.

49. In addition to providing an overview of the policy landscape, such an approach could also offer insights into the factors underpinning perceived effectiveness, such as attitudes and motivations of practitioners and administrators as well as the opportunities and constraints for new interventions and/or improved co-ordination between separate measures.

Annex A: non-market forestry benefits

50. Afforested land represents a stock of capital generating a flow of benefits for society. The value of the benefits depends jointly upon the volume and composition of goods and services comprising the flow – which is influenced by the size and management of the capital stock – but also upon the worth attached by society to those goods and services. Both components can vary over time.

Figure 1. Capital Stocks and Benefit Flows



51. Whereas traditional forest benefits are associated with tangible commodities such as timber that are traded and thus valued in markets, society increasingly attaches value to so-called non-market benefits such as recreational opportunities, aesthetic landscapes, biodiversity protection, watershed management and carbon sequestration. This increasing value is attributed to improved scientific understanding of the importance of environmental services but also to the positive effects of rising incomes on the demand for leisure enjoyment and environmental quality – both of which represent genuine economic value yet are typically not captured by markets (Willis et al., 2000; Pagiola et al., 2002; Anon, 2008a).

52. However, environmental benefits are not the only ones under-represented by market valuations. In particular, concerns over security of supply and volatility are often poorly handled by markets – particularly where production cycles are long, as in forestry - and the distribution of rewards arising from unfettered markets is sometimes socially unacceptable (Boyd & Hyde, 1989; CJC, 2003). The former was a significant driver of forestry-timber policy in the past (and may yet be again) whilst the role of forestry in contributing to sustainable economies and communities is rising up the policy agenda.

53. In practice, different goods and services offered by afforested land and its management are often "bundled" together (Landell-Mills & Porras, 2002) – a fact increasingly reflected in policy statements about sustainable development and the linking of economic, social and environmental objectives in various strategy documents (FCS, 2006; Defra, 2008; FCW, 2008).

54. Some non-market benefits, such as recreational opportunities, are derived from direct use in the form of personal recreation. Others are derived by indirect use, where the link to forest management is perhaps less apparent and the benefits are spread more thinly across a larger number of beneficiaries. For example, environmental services such as maintenance of water quantity and quality for neighbouring urban populations or carbon sequestration for mitigating further pressure for global warming. Finally, value may also derive from non-use in the sense that the option to use may be deferred into the future and/or simply from knowing that a benefit exists even if no personal gain will be made. For example, the option to exploit timber or genetic resources in the future or the "warm glow" of knowing that a forest exists for others to enjoy now or in the future.

55. Table A1 summarises the main categories of non-market benefit associated with afforested land and its management. It also suggests the dominant form of value derived and who derives it – a local, national or international population of beneficiaries - an important perspective since physical (and/or temporal) distance between providers and beneficiaries is one of several factors influencing the choice of policy instrument (Pagiola et al., 2002).

Table A1: Summary of main non-market benefits associated with forestry management

Benefit	Dominant type of values and beneficiaries
Biodiversity enhancement	Non-use, Indirect use (national, international)
Carbon sequestration & emission controls	Indirect use, Non-use (national, international)
Cultural heritage preservation	Direct use, Non-use (local, national)
Education	Indirect use (national)
Employment creation	Indirect use (local)
Habitat & species protection	Non-use, Indirect use (national, international)
Health & well-being	Indirect use (local, national)
Landscape amenity & recreation	Direct use (local, national)
Landscape maintenance	Direct use, Non-use (local, national)
Natural hazard (e.g. flood or fire) management	Indirect use, Non-use (local)
Rural community viability	Non-use, Indirect use (local)
Security of (timber) supply	Option (national)
Water quantity & quality maintenance	Direct use, Non-use (local)

Main sources: Willis et al. (2000); Landell-Mills & Porras (2002); Pagiola et al. (2002); CJC Consulting (2003);

56. The existence of non-market benefits reflects imperfections and/or failures in the operation of markets. That is, although they are often highly efficient mechanisms for allocating resources to meet society's needs, markets require certain conditions to operate effectively. In the forestry context, three main reasons for market failure

may be identified, although all reflect a divergence between private and social costs and benefits (Boyd & Hyde, 1989; Cornes & Sandler, 1996; CJC, 2003).

57. First, some problems may relate to imperfections in the markets for inputs used in forestry. For example, capital and labour markets may hinder access to finance and training opportunities. Equally, under-investment, myopic planning or other sub-optimal behaviour may simply reflect forest managers' inability to act collectively rather than individually (a "co-ordination failure") and/or lack of awareness of problems, time-horizons and remedies (an "information failure"). This can lead to missed opportunities for exploiting economies of scale and scope and to a lack of long-term planning, with implications for volatility and security of future timber supplies. In addition, other policy areas may impinge on forestry, most notably in the case of agriculture which can distort land markets to restrict forestry expansion (a "government or policy failure"; Behan et al., 2006; Winston, 2007).

58. Second, some benefits arise as externalities generated jointly as by-products of commercial activities. For example, woods and forests influence the appearance of landscapes, the level of biodiversity and hydrological functions. Although valued by society[7], the suppliers of these benefits are not rewarded for supplying them. Hence, if the commercial activity ceases, so does the externality – unless some other means of directly delivering the benefit can be found.

59. Third, in addition to being externalities, many environmental benefits are also public goods characterised to varying degrees as being "non-rival" and "non-excludable". The former means that (at least up to some level), one person's consumption does not reduce consumption opportunities for others. For example, an attractive landscape is not diminished by several people gazing upon it. Non-excludability means that it is not possible to restrict consumption to those that have paid for it (giving rise to "free-riding"). For example, it is difficult to stop people gazing at a view. This means that providers are not rewarded for delivering benefits and thus have no incentive to do so, something that has clear implications for securing delivery in the absence of underlying commercial activities generating them as externalities.

60. The nature of non-market benefits means that they will seldom be provided in sufficient volumes by markets action alone. This implies that some form of public intervention[8] is typically required to secure their delivery by seeking to influence the size and management of the forestry capital stock. The precise form of intervention will vary with the type of benefit and the type of market failure responsible for its under-provision.

[7] Some externalities, such as pollution, are negative externalities – meaning that a reduction in them would be welcomed by society.

[8] Although some can be delivered as "club" goods through collective private action, for example through land trust or some NGOs.

Annex B: A typology of policy instruments

61. The range of instruments through which policy objectives may be pursued is extremely wide and varied. However, various generic typologies have been suggested to structure discussion of options and can be applied to forestry as well as other policy areas. Perhaps the simplest is a three-way classification into incentives, regulation and information (e.g. Stiglitz, 1986) or, as Bemelans-Videc et al. (1998) characterised them "carrots, sticks and sermons". That is, policy makers may seek to encourage owners and forest managers[9] to undertake desirable activities and to refrain from undesirable activities by either offering them rewards, compelling them through rules and penalties or persuading them through raising awareness and understanding.

62. A more detailed classification offering some additional distinctions is described below and in Table B1. For example, Schneider & Ingram (1990) identify "capacity building" as a separate category between incentives and information whilst Sterner (2003) effectively splits incentives between "using markets" and "creating markets". In practice, the boundaries between different categories in any typology are blurred and individual options can overlap. Moreover, just as benefit flows from forestry are often bundled together, so too are policy instruments – many are complementary and thus used in combination. Nevertheless, the classification offered below does help to structure discussion (see also Smith, 2002; Ottitsch et al., 2002; Cubbage et al., 2007)

63. *Information provision*. Other than doing nothing, the mildest form of policy action is to provide information on the premise that markets' abilities to deliver socially desirable outcomes are being hindered by a lack of informed decision making. That is, production and consumption decisions are being based on incomplete information and this can be corrected by enhancing its availability and accessibility. Particular instruments within this category include, for example, funding research and development to improve the evidence base, running publicity campaigns or certification programmes to raise awareness, and offering advisory services. It can also include an element of moral suasion/hortatory - publicising desirable standards of behaviour and attempting to harness peer pressure as a means of reinforcing voluntary observance of such standards or norms[10].

64. The main advantage of information provision as a policy instrument is that it represents a relatively light touch form of intervention, correcting "information failures" that may hinder efficient operation of a market. By seeking to inform better decision making, whether by producers or consumers, it may be seen as attempting to make markets work better without directing individual behaviour

[9] The distinction between owners and managers may be important if they differ in responsiveness to different policy signals due to differences in personal or business motivations/objectives. If so, different instruments may be more effective on one group than another.

[10] Insights from behavioural economics (e.g. Thaler & Sunstein, 2008) have grabbed current media attention, but as noted in the Economist of July 26th 2008 (p40), much of their "nudge" prescriptions fall into the category of information provision and/or capacity building in terms of creating an appropriate "choice architecture".

explicitly. Although public R&D and communication programmes can have high headline costs, information provision is typically relatively cheap compared to other policy instruments. However, the main disadvantage is that it can also be relatively ineffective – private behaviour is influenced by a number of factors and better information alone is often insufficient to drive behavioural change, particularly in the short-term.

65. *Capacity building/learning.* The ability of producers or consumers to act on information may be constrained by their ability to interpret it, meaning that education and training may be necessary to increase levels of human and social capital. Whilst some may be provided by the private sector unaided, public funding is commonly used to supplement this. Hence the prevalence of school education but also of adult education and on-going, professional training plus the use of project/development/facilitation officers on-the-ground to help individuals and groups learn how to do things differently (the overlap with advisory services is clear). In some cases, this can encompass alternative governance arrangements such as land trusts or other voluntary membership vehicles for delivering "club" rather than public goods. In addition, capacity to act may be limited by restrictions on other forms of capital, such as machinery, buildings and infrastructure, which may be eased through access to soft loans, subsidies or tax breaks for investment purposes.

66. The market failures being addressed by capacity building may take various forms. For example, the atomistic, fragmented nature of land ownership and management means that "co-ordination failures" may preclude neighbouring individuals from co-operating to deliver collective benefits, even when it might be in their own interests to do so. Equally, a lack of access to finance or inertia and a myopic view of long-term planning may hinder investment in training and infrastructure. Hence the main advantage of capacity building is its empowerment of individuals and groups, correcting under-investment in capital (social, human or physical) to boost efficiency and productivity – which can yield multiple benefits (Ostrom, 1990; Ostrom et al., 1993; Schluter, 2007).

67. In principle, capacity building efforts could be a one-off investment. However, a common disadvantage is that, particularly for project-based cases, it can require significant public support in terms of direct funding and of facilitation and administrative services, not only up-front but also on an on-going basis, and success is not guaranteed in terms of either enhancing capacity or delivering the overall objective. Rural Development and Cohesion policies within the European Union are placing increasing emphasis on capacity building, for example through the requirement for a proportion of Pillar II expenditure under the Common Agricultural Policy to be channelled via "LEADER".

68. *Using market incentives.* For inputs and outputs traded in markets, it is possible to alter their relative prices by applying subsidies or differential taxation. For example, tax breaks or subsidies used to reduce production or consumption costs per unit may encourage greater levels of output and of input usage. Conversely, levying user charges or taxes on inputs and outputs may reduce their levels. Incentives may also be linked to management patterns rather than specific commodity inputs or outputs

per se, as with (for example) cross-compliance under Pillar I of the Common Agricultural Policy (CAP) or the use of conservation easements. The deployment of such incentives to influence current production and consumption often overlaps to some extent with encouragement for capacity-building capital investments. Equally, there is some overlap with creating markets.

69. The main advantage of incentives is that they work with market forces to influence private supply and demand behaviour in a manner familiar to producers and consumers. If designed correctly, they can deliver efficient outcomes by using price signals to guide resource allocations. In addition, they often require less information to be collected centrally than with other approaches and thus can be easier and cheaper to administer (Baumol & Oates, 1971; Zhang & Flick, 2001; HMT, 2002). However, designing incentives correctly can be difficult and their use often leads to other, unintended market distortions.

70. In addition, if used to target non-market benefits, incentives are usually deployed on observable proxies (e.g. inputs used or management action followed) rather than the benefits themselves, meaning that the link to outcomes may be weakened and/or higher monitoring costs are incurred. Moreover, the use of subsidies and tax breaks can be expensive and easily becomes entrenched: once in place, they are difficult to remove. Most existing grant and tax schemes fall into the category of market incentives.

71. *Creating markets.* Whilst externalities and public goods are examples of market failure, increasing interest is being shown in attempting to correct the failure directly by creating markets for current non-market benefits (Landell-Mills & Porras, 2002; Wunder, 2005; Engel et al., 2008). Establishing an effective market based instrument to link supply and demand invariably involves government action to define the market through assigning and/or enforcing property rights, for example through tradable quotas or permits, and/or through setting measurement standards for quantities and values. Payment for services may be by the government or directly by private producers and consumers, but is conditional on desired results being delivered.

72. The main advantage of creating markets is that, as with incentives in existing markets, they should encourage more efficient resource allocations than would be achieved by regulatory controls. That is, by allowing individual flexibility and innovation across heterogeneous land and land managers, they can deliver desirable outcomes at a lower cost than a more uniform approach may achieve (Whitten & Shelton, 2005). Moreover, the efficiency gain of targeting actual outcomes can be greater than that gained from using incentives based around proxy measures (Ferraro & Simpson, 2002).

73. However, creating markets suffers from the same potential distortionary problems of incentives plus additional difficulties in establishing standards for measurement, monitoring and verification of the quantities and values of benefits actually delivered. Problems can also be encountered in the (re)defining of property rights to establish the basis for subsequent market trading – setting the baseline and

reconciling opposing "polluter pays" and "provider gets" perspectives can be contentious (e.g. Bromley & Hodge, 1990; Colby, 2000). Nevertheless, interest in payments for environmental services using market based instruments is increasing.

74. *Classic Regulation.* The instruments suggested above all rely on voluntary responses by private individuals and businesses. By contrast, regulatory instruments constrain free choice and use rules and penalties to compel particular patterns of behaviour. This may be through simple prohibition bans of activities or listing of permissible ones and of minimum standards, either universally or within particular areas (zones) or at particular times. Equally it may be through the use of (non-tradable) quotas, licenses or concessions to control levels of activities and who can undertake them. A distinction may sometimes be drawn between regulation of activities and regulation of performance, with the latter offering a greater degree of flexibility and overlapping to some extent with creating markets.

75. The main advantage of regulation is that, if enforced, rates of compliance can exceed those of voluntary uptake and can offer greater certainty of achieving minimum standards whilst also avoiding some elements of public cost. That is, by obliging rather than attempting to entice observance of minimum standards, the need for funding transfers to the private sector can be reduced. However, public costs are still incurred through the need for monitoring and enforcement activities. Moreover, private costs are invariably raised by the imposition of regulatory constraints, particularly if flexibility to address both spatial and temporal variation in circumstances is not allowed for – making regulations unpopular with land managers (Raedeke et al., 2001). In some cases, the threat of state regulation can be used to encourage voluntary self-regulation by a sector (Ellefson et al., 1997).

76. *State control*. In contrast to all other policy instruments which seek to influence private individuals and businesses, as an extreme case, public intervention can extend to precluding private-sector activity and deploying direct state control as an alternative means of attempting to secure desired benefits. This can be, for example, through public ownership of resources such as land and/or through the use of state employees to deliver goods and services.

77. The main advantage of state control is that it avoids any reliance on private sector behaviour. In principle this ensures adherence to best management practices by appropriately trained and motivated staff and can avoid the significant costs of administration, monitoring and enforcement that often accompany the use of voluntary or regulatory measures.

78. However, bureaucratic control can itself be subject to internal variation in capacity and behaviour meaning that desired outcomes are not guaranteed. Moreover, as with regulation, costs tend to be raised and/or outcomes diminished by a general tendency to uniformity of approach rather than allowing flexibility and innovation in the face of heterogeneity (Shleifer, 1998).

Table B1: A typology of policy instruments

	Examples	Advantages	Disadvantages
Information Provision	R&D Education Publicity/labelling Advice	Least interventionist & costly, merely supporting decision making	May be insufficient to overcome market failure given other constraints
Capacity Building	Training & advice Project funding Facilitation Infrastructure funding	Improving social & human capital and infrastructure often has multiple benefits	Self-organisation or governance can be hard to improve; initial and on-going costs can be high.
Market Incentives	Soft loans Subsidies/tax breaks Taxes/User charges Easements & bonds	Works with market forces to influence behaviour and achieve efficient outcomes	Can further distort behaviour; expensive subsidies & tax breaks can become entrenched
Creating Markets	Tradable quotas/permits Measurement standards Certification	Enables market forces to influence behaviour and achieve efficient outcomes	Measurement, monitoring & verification are often difficult and costly for non-market benefits.
Classic Regulation	Prohibited activities Prescribed activities Zoning Licences/permits	More direct and avoids reliance on voluntary behaviour used in most other approaches	Can be bureaucratic; often imposes costly uniformity & monitoring across heterogeneous conditions.
State Control	Asset (e.g. land) ownership Public management Public provision	Avoids reliance on private behaviour and need for some costly monitoring & enforcement actions.	Can be bureaucratic and expensive; precludes private innovation and flexibility.

Annex C: Current UK forestry policy instruments

79. Examples[11] of existing forestry policy instruments used within the UK may be placed in each of the categories suggested by the typology above. As with all classifications, some examples might fit in more than one category and most are used in combination rather than isolation. Moreover, reflecting Devolution, there are variations across the constituent parts of the UK and some instruments are in a transitional state under new Rural Development Plans. Hence the following descriptions and the summary in Table C1 are illustrative rather than definitive or exhaustive.

80. *Information provision*. Public funding for Research & Development (RD) and Knowledge Transfer (KT) activities in the sector is channelled through Forest Research as part of the Forestry Commission, but also through various Universities and other research and teaching institutions. This helps to improve the evidence base for policy, but also to inform best practice within the industry. Information is also made available more generally through a variety of mechanisms including publicity campaigns, published guidance material (both paper and web based), advisory services and interaction with schools and communities.

81. *Capacity Building.* Beyond simple provision of information, KT activities can evolve into more structured attempts to enhance human and social capital amongst both forest managers and forest users. This is reflected in a number of initiatives and projects sponsored by the Forestry Commission (but often with co-funding from other sources) aimed at, for example, establishing community woodlands or co-ordinating management activities across multiple sites. In addition, although not specific to forestry, public funding for rural infrastructure such as roads and broadband will assist the capacity to form and/or maintain some forestry activities.

82. *Using market incentives.* A variety of incentives are deployed within the GB forest sector. For example, modest up-front grants are available to assist with the collection of information and drafting of management plans to accompany applications for more generous on-going grants to undertake actions, to regenerate, improve or create woodlands. Equally, usage of reduced-duty red diesel is permitted for forestry operations, income from timber is exempt from both income and capital gains tax and (subject to an initial two-year period) afforested land qualifies for 100% Business Property Relief on inheritance tax. In addition, increasingly and most obviously under Rural Development Plans, some more general land management grants aimed at habitat and biodiversity or amenity and recreation or watershed management are also applicable to afforested land, as are grants aimed at, for example, encouraging business diversification, increasing value-added and developing renewable energy sources.

83. *Creating markets.* Although the use of incentives in forestry is still dominated by recourse to exiting markets, interest in creating markets for environmental services

[11] See CJC (2003) and various parts of the FC website http://www.forestry.gov.uk/website/fchomepages.nsf/hp/GBIGL

is growing. For example, the importance of forests as carbon sinks has focused attention on possibilities for their inclusion in "cap&trade" systems but also more immediately in establishing agreed standards for measuring forest carbon. The earlier development (and adoption by the FC) of sustainable forestry certification schemes represents previous acknowledgement of the need to agree common monitoring, measurement and (independent) verification procedures to demonstrate environmental performance, which may then be used as a marketing tool. Equally, there is considerable interest in separation of currently bundled property rights to allow commodity production to be handled separately from other outputs, to allow direct – but conditional – payments to be instigated for environmental performance.

84. *Classic regulation*. Forestry operations are subject to a number of regulatory controls. Some, such as Health & Safety requirements, Employment legislation or pollution control apply to all businesses. Others, such as restrictions on movements of timber and wood products to protect Plant Health or the licensing of tree felling are more specific to forestry. Environmental Impact Assessments are required for some forest projects, and environmental issues are increasingly considered in, for example, the context of SSSIs, Ancient Monument and Tree Preservation Orders.

85. *State control.* In addition to administering some of the instruments listed above, the Forestry Commission – either itself and/or through Forest Enterprise – also exercises a degree of direct state control in the form of land ownership and management. Indeed the Forestry Commission is the largest land manager in Britain and employs a significant number of staff tasked with hands-on management as well as supporting other, private land managers through advice and guidance.

Table C1: Examples of current forestry policy instrument in Great Britain

	Examples
Information Provision	R&D and KT activities undertaken by Forest Research, but also Universities. Publicity campaigns and paper or web-based publications Publication and promulgation of best practice guidance Interaction with schools and communities
Capacity Building	Training & advice, funded by and/or offered via public agencies Capital investment grants Support for LEADER and other Local Action Group/Community initiatives Public funding of road and broadband networks in rural areas
Market Incentives	Grants for: gathering information & preparing management plans plus regeneration/improvement/creation/management of woodlands. Timber sales free of income and capital gains tax; 100% relief on inheritance tax; red diesel use.
Creating Markets	Measurement standards & independent certification procedures Possible use of tradable quotas/permits for abating GHG emissions Possible use of direct, but conditional, payment schemes for biodiversity or water management purposes.
Classic Regulation	Conditional Felling licences. Tree preservation orders & SSSI/Ancient Monument constraints Plant health movement constraints EIA and planning requirements
State Control	FC is largest land manager in Britain Large workforce for hands-on management

Annex D: Choosing policy instruments

86. Market imperfections and failures lead to a misallocation of resources in the economy, resulting in lower benefits to society than might otherwise be achieved. Policy interventions seek to correct this by removing, or at least reducing, the underlying distortions between private and social costs and benefits. However, interventions are themselves not costless since they incur taxpayer expenditure on public administration and (often) funding transfers, plus impose administrative and/or other compliance costs on the private sector. Moreover, the effectiveness of an intervention in correcting market distortions is not guaranteed and unintended effects may lead to further distortions.

87. Consequently the existence of a market failure is not sufficient by itself to justify policy intervention. Rather the benefits achieved by intervention need to outweigh the costs (CJC, 2003). If they do not, notwithstanding likely political pressure to "be seen to do something", the economically rational response is one of "informed inaction" (Pannell, 2008).

88. This perspective is enshrined in formal government guidance on policy appraisal and evaluation, most notably the "Treasury Green Book" (HMT, 2003). This emphasises the need for explicit consideration of costs and benefits – even though the latter can be difficult to estimate – and for consideration of different policy options, ranging from a "do nothing" (or "do minimum") approach through to more ambitious arrangements. Particular attention is urged with respect to "value-for-money" and to "additionality" - comparing the effect of the (costly) intervention with what would have happened in its absence.

89. Yet beyond emphasising the need to look at the costs and benefits of intervention and stressing the need for clarity of objective, this formal guidance is perhaps less useful in suggesting how to chose between different classes of instruments in terms of their applicability to different circumstances. To some extent, this is an empirical matter, with the costs and benefits of any given approach needing to be considered on a case-by-case basis according to the particular policy context.

90. However, drawing on the advantages and disadvantages listed in Table B1, it is possible to suggest some examples of generic criteria for guiding initial choices prior to detailed analysis. As summarised in Table D1, these attempt to tease-out the conditions under which different classes[12] of instruments might be more appropriate. Whilst economic efficiency may be the overriding concern, it depends in turn on several factors and may also be tempered by a need to consider practical and political acceptability (Howlett, 1991; Burgenmeier, 1994; Gunningham et al., 1998; Keohane et al., 1998; Weiss, 2000; HMT, 2002; Ottitsch et al., 2002; HMT, 2003; Sterner, 2003; Helm, 2006; Hepburn, 2006; Cubbage et al., 2007; Riera et al., 2007; Goulder & Parry, 2008; Pannell, 2008).

[12] In addition, there may be further distinctions within a given class. For example, the use of taxes, subsidies and quotas have some subtle economic differences. Nevertheless, consideration of criteria for selecting between instrument classes is useful as a first stage.

91. *Nature of market failure*. If the underlying market failure is demonstrably one of production (and/or consumption) decisions not being in individuals' own best interests, then the provision of information is most likely to be an appropriate policy instrument. Equally, support for capacity building is likely to be justified if market structures appear to restrict individuals' access to opportunities for self-improvement. That is, collective benefits can be derived simply by raising awareness and ability to deliver "win-win" solutions whereby individuals and wider society gain.

92. However, since most environmental market failures display externality characteristics, there is typically limited scope for "win-win" solutions. Rather, correcting the market failure entails a redistribution of costs and benefits in favour of society, with private individuals thus needing to be either rewarded for increasing social benefits or obliged to do so, suggesting recourse to either incentives/creating markets or regulation/state provision. This is not to say that information provision and capacity building should necessarily be restricted only to situations where "win-win" outcomes are possible. Indeed they clearly have a potential role in supporting other policy instruments, not least through gaining acceptance of and aiding adjustment to altered opportunities and constraints (Kligmore & Blinn, 2004). However, they are not sufficient to address most issues if used in isolation.

93. *Degree of heterogeneity* If individual firms display considerable variation in their environmental performance, either due to structural differences in their size or managerial ability or due to differences in their environmental situation, then the costs and benefits of improving their performance will also typically vary. For example, vulnerability to erosion and flooding or biodiversity and habitat value can vary significantly between different sites, making protection and improvement harder to achieve in some places relative to others. Equally, sites also vary in terms of capacity to adapt due to differences in their previous patterns of land use, the skill and experience of their current managers and the availability of other resources to aid adjustment.

94. Accounting for this variation is administratively cumbersome and expensive if handled through a regulatory approach, but imposing uniform standards to reduce public administrative cost can impose significant efficiency losses on producers. By contrast, a voluntary, market-based approach exploits the heterogeneity to find least-cost solutions and deliver a more efficient outcome and is generally preferred - providing that some continued variation in performance is acceptable.

95. *Importance of dependability, thresholds and risks.* Seeking to influence resource allocation and management through voluntary changes in behaviour offers little guarantee that desired outcomes will be achieved. That is, even with generous incentives, the adoption of different behaviour may be inhibited by, for example, a slow rate of adoption due to stakeholder wariness or cultural resistance to change. Equally, changes in circumstances such as market conditions for commodity products can lead to a reversal of behaviour. By contrast, if enforced, regulatory controls are more likely to achieve and maintain a specific degree of behavioural compliance and thus to deliver desired outcomes across a greater number of managers/sites.

96. This dependability may be important where achievement of particular outcomes is deemed necessary, for example, to protect human health or to avoid irreversible environmental damage. This is often expressed in terms of a need to respect threshold standards – as with air or water quality – beyond which risks rapidly escalate[13]. In such situations, predominately with respect to negative rather than positive externalities, regulatory controls or state provision are typically preferred over voluntary approaches as a means of ensuring greater uniformity of compliance. Hence, for example, the use of environmental designations to preserve particularly valuable (i.e. unique or scarce) habitats or to protect vulnerable water supplies and the use technology standards and management prescriptions to avoid severe pollution incidents.

97. *Ease of monitoring outcomes.* The efficiency of an instrument rests on its ability to deliver desired outcomes at least cost. Yet monitoring of outcomes can itself incur costs, and these may be sufficient to offset other advantages. That is, if environmental outcomes are difficult to observe, either because they take time to be achieved and/or because they require detailed site-inspections, monitoring becomes cumbersome and imposes additional transaction costs on both sides.

98. To avoid excessive monitoring costs, grants and subsidies or regulatory controls are often tied to more readily observed compliance with prescribed managerial actions. For example, maintenance of adequate storage facilities for harmful substances or adherence to best management practices in land operations. Equally, taxes and subsidies can be applied to, for example, chemical input purchases and commodity output sales. Whilst the causal link to desired outcomes may be less direct than if outcomes themselves were monitored, the saving on transaction costs is often sufficient to offset this. Difficulties in measuring, monitoring and verifying outcomes are a major impediment to the development of market solutions to many environmental externality problems.

99. *Stakeholder acceptance*. Whilst economic analysis may identify efficient policy options, political acceptability and perceptions of "fairness" may impinge on their implementation. In particular, land manager views of environmental problems and different solutions can carry significant weight, particularly if there is a legacy effect of past interventions in the sector and a tradition of particular forms of instrument. For examples, in most instances, the property rights associated with rural land have traditionally resided with owners and managers rather than society, meaning that policy treatment of land-based sectors has been dominated by voluntary instruments supported by public expenditure – a case of "provider gets" rather than "polluter pays".

100. More recently, this presumption has been challenged by other stakeholders (e.g. the general public, environmental NGOs and state administrators: Schaaf & Broussard, 2006) and through the introduction of regulatory measures such as the Water Framework Directive and some environmental designations. Nevertheless, voluntary approaches remain dominant and attempts to deploy regulatory controls are subject

[13] Or the Government becomes liable for penalties where standards are set by international bodies.

to on-going debates about their scientific basis, transparency, proportionality and impact on domestic and international business competitiveness.

101. *Capacity for implementation.* Whilst a particular instrument may be preferred on theoretical grounds, its practical implementation may be constrained by a lack of public resources in terms of funding and staffing levels and skills. In principle, these may be over-come in the medium to long-term by budget negotiations and recruitment/training programmes. However, these can represent a short-term restriction on instrument choice. For example, funds under Rural Development Plans are limited, as is the capacity to administer more complex schemes.

102. Equally, private sector capacity to adjust may also be important as a short-term constraint on instrument choice. For example, tighter regulatory controls may need to be phased in to allow firms time to upgrade technological and infrastructure aspects of their businesses, possibly with grant aid assistance. More radically, if private sector capacity is extremely poor, direct state provision may be merited.

103. In summary, there are a number of criteria that may be applied to the choice of class of policy instrument. In general, scientific uncertainty or the need to ensure (near) universal achievement of minimum standards can favour regulation or state control. Conversely, voluntary approaches are less overt intrusions on private behaviour and can deliver efficiency gains if environmental performance is variable. However, high costs of information gathering for monitoring and enforcement impose restrictions on the use of novel market solutions, typically forcing recourse to more familiar grant or tax-type instruments or to regulatory controls. Other considerations include the administrative capacity to implement an instrument and the acceptability of different instruments to different stakeholder groups.

104. In many cases, the criteria may not be aligned for a particular instrument and a judgement will be needed to weight their relative importance. Hence, the choice of instrument is often a political one, representing a compromise between different perspectives and typically viewing each instrument as part of a package of measures rather than in isolation (Boyd & Hyde, 1989; Cubbage, 1991; Weiss, 2000; Cubbage et al., 2007). That is, typically, just as forest benefits are delivered as a "bundle" rather than individually, policy instruments are also "bundled" together – reflecting Tinbergen's principle of multiple policy objectives requiring multiple instruments.

Table D1: Example criteria for guiding choice of class of policy instrument

Criteria	Implied instruments if yes
Do "win-win" possibilities exist?	Information provision; Capacity building
Is performance potential highly variable?	Using or creating markets; Capacity building
Are uniform, consistent standards required?	Regulatory controls; Direct state provision
Are outcomes easily observed and verified?	Creating markets; Information provision
Do legacy effects favour land managers?	Markets/Capacity building; Information provision
Is capacity to act constrained?	Capacity building; continue current instruments

Annex E: Taxation measures affecting forestry in the UK[14]

105. *Income and Corporation Tax.* The Finance Act 1988 removed forestry from Income and Corporation Tax and forestry investments can, therefore, provide a vehicle for capital growth with tax free returns. No tax is payable on income generated from a timber crop or on the sale of an entire plantation. Grants received from the Forestry Commission under Woodland Grant Schemes are also free from Income Tax. Grants received under the Farm Woodland Premium Scheme are considered to be a substitute for farming income and are taxable as such. No tax relief is available on forestry development costs (e.g. expenditure on planting, maintenance and management) or interest payments.

106. *Capital Gains Tax (CGT*). CGT can only arise on the disposal of an asset. Normally this means sale, but it could also mean gift or compensation for loss or damage to an asset. The increase in value of standing timber in commercial woodlands is not subject to CGT. Any increase in the value of the land and capital works is currently taxable (for UK residents) at 18%.

107. Capital expenditure on improvements such as new roads, fences or buildings used for business purposes, can be offset against increases in the land value. Roll-over Relief can also apply when the disposal proceeds are used to replace business assets (as forestry land but not the trees is a qualifying business asset) when the gain on the disposal of the old assets is "rolled over" into the new asset. Acquisition of the replacement asset can be up to one year before and three years after the disposal which gave rise to the gain.

108. Woodlands which are not run on a commercial basis are subject to normal CGT rules. In non-commercial woodlands, felled trees are considered to be a 'tangible moveable asset' (chattel) and are thus subject to CGT, but an individual tree would have to be sold for more than £6,000 before the possibility of CGT could arise.

109. *Inheritance Tax (IHT).* IHT applies to both the land and the trees. Inheritance Tax is charged, at death, on the net value of a person's estate (their assets less their liabilities) immediately before death, and in respect of gifts made within the prior seven years. Transfers made between 3 - 7 years before death may qualify for what is known as Taper Relief. This effectively reduces the amount of Inheritance Tax payable. For the current tax year, Inheritance Tax affects those individuals with estates worth over £312,000 (known as the nil rate band). Any value over this limit is charged at a flat rate of 40%. Certain exemptions may apply that could reduce the value of the estate. There are also certain reliefs that could reduce the tax payable.

110. Woodlands (both timber and land) managed on a commercial basis (i.e. for a gain) will be eligible for 100% Business Property Relief after two years ownership so that no tax would be payable. Any CGT liability on the asset which has been held over or rolled-over will be extinguished. If a woodland were gifted as a business property

[14] Derived from Snowdon (2003), amended with reference to Lymer & Oats (2008) and HMRC website http://www.hmrc.gov.uk/

before death, the Business Property Relief would continue provided the recipient retained the woodland in the same condition until the donor's death or for a period of seven years after the date of the gift. Amenity woodlands attract Agricultural Property Relief if they are also occupied in conjunction with agricultural property. This relief is attracted, depending on the circumstances, at 100% or 50%. Woodlands of outstanding scenic, historic or scientific interest may qualify for Heritage Relief allowing a conditional exemption from inheritance tax.

111. There is a specific relief for transfers of woodland on death, provided the deceased has been the beneficial owner of the woodlands for at least five years immediately before death or became beneficially entitled to it by gift or inheritance. However, this has become less important since the introduction of 100% relief for businesses that qualify as relevant business property. When a woodland in the United Kingdom is transferred on death, the person who would be liable for the tax can elect to have the value of the timber, that is, the trees and underwood, (but not the underlying land) excluded from the deceased's estate. Instead, tax is charged on the future net proceeds of the timber, if it is sold, given away, or disposed of before the land on which it was growing is transferred again on another death. Deduction against the proceeds can be claimed for costs of sale, and costs of replanting within three years of sale. The rate of tax chargeable on the disposal is found by treating the taxable amount as the top slice of the deceased's estate. For this purpose, the deceased's estate includes any sale proceeds or value charged to tax on previous disposals since the death. Once the timber has been transferred again on another death, tax is not chargeable on later disposals. The woodland relief is not available for (1) an outright lifetime transfer; (2) a transfer by a close company; (3) woodlands held on discretionary trust; (4) woodlands which are on agricultural property.

112. *Value Added Tax.* If turnover reaches the registerable limit (currently £67,000), a woodland owner must register for VAT purposes. VAT must then be recorded on sales, and may be reclaimed on purchases. Sales are generally subject to VAT at the standard rate. The exception is for fuel wood, which is subject to VAT at the standard rate when sold to a merchant, and at 5% when sold to the general public for domestic use. It is possible to register as an intended trader if turnover does not reach the registerable limit. In this case the VAT on business expenditure will be reclaimable but there must be a continuing intention to make taxable supplies in due course.

113. It is important to recognise that VAT is a European tax, laid down in the so-called Sixth VAT Directive (77/388/EEC) of 1977 on the harmonisation of the laws of the Member States relating to turnover taxes. The EU allows Member States to impose two VAT rates only:

- The standard rate – minimum of 15%, no maximum; and,
- The reduced rate – minimum of 5%, no maximum.

114. The UK operates a standard rate of 17.5% and a reduced rate of 5%. The reduced rate can only be applied to a limited list of 17 categories of supplies of goods and services. The zero rate used by the UK for certain goods and services is a transitional

derogation until the final EU VAT regulation comes into place. The UK cannot introduce it for other goods and services not on the original list.

115. *Aggregates levy*. The Aggregates Levy aims to address the environmental costs associated with quarrying that are not already covered by regulation, including noise, dust, visual intrusion, loss of amenity and damage to biodiversity. The levy aims to bring about environmental benefits by making the price of aggregates better reflect these costs, and by encouraging the use of alternative materials such as recycled materials and certain waste products. Revenues raised from the levy will be recycled through a 0.1% reduction in employers national insurance contributions, and a new Sustainability Fund, aimed at promoting environmentally beneficial practices. The levy is revenue-neutral to the Treasury.

116. The tax applies to any sand, gravel or crushed rock extracted in the UK, or imported into the UK. The aggregate will become liable to the tax when it is commercially exploited and is payable by persons commercially exploiting aggregates in the UK (in most instances this will be the quarry operators) and, for imported aggregate, by those making the 'first sale or use in the UK'. The levy is charged at a single flat rate of £1.95 per tonne. VAT on commercial sales is calculated inclusive of the aggregate levy, in line with VAT law.

117. The levy will not apply to other quarried or mined products. Blocks of stone ("dimension stone") used for paving, facing or repairing buildings will be outside the scope of the levy. Limestone used for the production of lime or cement will be exempt from the levy. Exports of aggregate will be relieved.

118. Both the forestry and agricultural sectors have gained partial exemption from the levy. There is an exemption from the aggregates tax when aggregate extracted from forestry land is used, in an unmixed state, on that same site, or land adjacent to it, or any other forestry land, where both the originating site and that other land are occupied by the same person. Any aggregate brought in from another source will be liable to the levy, as will any aggregate extracted from a forest which goes to a site occupied by a different person. Any aggregate which is mixed with other materials, (to produce concrete, for example) will be liable to the levy in any event. Other exemptions from the levy are for any aggregate arising from the dredging of marine navigation channels, road construction and building construction, and aggregates arising from industrial processes, offshore drill cuttings, and excavation of highways for utility work.

119. There will be provision for relief from aggregates levy on sales that customers have not paid for (bad debt relief). In these circumstances the aggregates levy will have to be shown separately on the sales invoice.

120. *Climate Change Levy (CCL)*. The climate change levy is a tax on the use of energy in industry, commerce and the public sector. The levy applies to gas (natural gas and liquified petroleum gas), coal and electricity used by business, agriculture, and the public sector for energy uses. It does not apply to fuels used by the domestic or transport sector, or fuels used for generation or non-energy purposes. The levy does

not apply to oils that are already subject to mineral oil duty. There are several further exemptions from the levy, including:

- Electricity generated from new renewable energy (e.g. solar and wind power but not large-scale hydro);
- Fuel used by good quality combined heat and power schemes;
- Fuels used jointly as a feedstock and an energy source within the same process (e.g. coke in steel-making); and,
- Electricity used in electrolysis processes, for example, the chlor-alkali process, or primary aluminium smelting.

121. The levy is intended to be revenue neutral overall, and is offset with a 0.3% cut in employers' National Insurance Contributions and additional support for energy efficiency schemes and renewable sources of energy. The levy forms a key part of the Government's overall Climate Change Programme in helping the UK to meet its targets for reducing greenhouse gas emissions. Rates of levy are 0.15p/kWh for gas, 1.17p/kg (equivalent to 0.15p/kWh) for coal, 0.96p/kg (equivalent to 0.07p/kWh) for liquefied petroleum gas (LPG), and 0.43p/kWh for electricity.

122. *Landfill Tax*. The Landfill Tax was introduced in 1996 and is levied (currently at £32/t) on the disposal of waste in landfill sites throughout the United Kingdom. It aims to:

- Ensure that the cost of landfill property reflects its environmental impact
- Help achieve government targets for more sustainable waste management

123. Some of the tax raised is used to support environmental aims by allowing a credit of landfill tax to registered operators of landfill sites who make contributions to approved bodies for spending on certain environmental projects. The Forestry is enrolled, with ENTRUST (the regulator of environmental bodies under Landfill tax Regulations 1996) as an Environmental Body (EB), for the purpose of receiving landfill tax credits. Subject to approval by ENTRUST, EB monies can be spent on projects which fall into various categories, as listed on their application form. Estates Management administers the role of EB on behalf of the Forestry Commission.

124. *Business Rates*. Businesses and other occupiers of non-domestic properties pay Business Rates (also known as Non-Domestic Rates) to directly contribute towards the costs of local authority services. The rateable value10 of non-domestic property is fixed in most cases by the Valuation Office Agency. All non-domestic property is revalued every five years. The rateable value of a property represents its annual open market rental value as at 1 April 1998. Some types of property receive full or partial exemption from Business Rates (but these exemptions do not apply specifically to forestry businesses). For example:

- agricultural land and buildings are fully exempt;

- there is a mandatory 50% rate relief (discretionary to 100%) for new, non-agricultural businesses on previously agricultural land or buildings if the rateable value is below £7,000; and;
- there is a mandatory 50% rate relief (discretionary to 100%) for certain businesses with rateable values of less than £7000 which are in rural villages with a population under 3000.

125. In addition local authorities have a discretionary power to give relief of up to 100% to a rural business with a rateable value of less than £12,000 if, in the local authority's opinion, the business is of benefit to the area and in the interests of its council tax payers. A three month 'rate free' period is given on unoccupied property. After this, unoccupied property rate is charged at 50% of the full bill or, if applicable, the bill after transitional relief has been granted. Factories, warehouses, stores and properties with a rateable value of less than £2,200 are exempt from empty property rates.

126. *Fuel Tax and Vehicle Excise Duty*. Machinery and vehicles used in forestry may in certain cases qualify for the use of "red diesel", which is eligible for a rebated rate of excise duty. The effective duty rate for red diesel is currently 9.69p per litre, compared with the generally applied diesel rate of 56.69p per litre.

127. The exemptions related to red diesel are very detailed. However, the general principle is that vehicles and machinery that are designed and used only for purposes specifically relating to agriculture, forestry, or horticultural work, (e.g. agricultural tractors, light agricultural vehicles, works vehicles) are exempted. With few exceptions, the use of red diesel is not permitted for road vehicles using public or private roads or for vehicles eligible for red diesel using public roads.

128. Some vehicles used in forestry and agriculture are exempt from Vehicle Excise duty. Tractors used for hauling articles for a farm or forestry estate, or hauling within 15 miles of a farm or a forestry estate occupied by the keeper, are exempted. These are required to license annually and to display a (NIL) VED disc.

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