Policy Options for Sustainable Management of UK Peatlands

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Summary

Sustainable management is essential to maintain the wide range of benefits or "ecosystem services" that peatlands provide for society.

UK peatlands provide society with a wide range of "ecosystem services": in good condition, they help regulate our climate, provide clean water, reduce downstream flood risk, support wildlife and provide us all with wild, open landscapes in which to roam and escape. However, many peatlands have been damaged by human activities such as drainage, over-grazing and infrastructure development. With changes to EU policy influencing the management of these landscapes and climate change adding additional pressures, now is a crucial time to examine how best to secure the ecosystem services provided by peatlands.

Using existing literature and inputs from members of the policy, practitioner and research community, this technical review assesses some of the most important biophysical, socio-economic and market drivers of change in UK peatlands and considers a variety of policy options to facilitate sustainable peatland management.

Policy objectives are needed that will ensure delivery of priority ecosystem services.

It may not always be possible to maintain all ecosystem services in all peatlands, given costs, varying priorities of land owners, managers and members of the public, and the fact that some ecosystem services are mutually exclusive in the same location. UK policy objectives may therefore need to focus on identifying priorities for delivery of ecosystem services and recognising that the priorities may not be the same in different areas. This review suggests that it may be possible to deliver the following five priority ecosystem services sustainably, concurrently and efficiently from UK peatlands: biodiversity, fire risk mitigation; climate regulation; freshwater provision; flood risk mitigation/ flood storage; landscape and wildness.

Numerous biophysical, socio-economic, market and policy changes affect the long-term sustainability of UK peatlands.

Important drivers of change in UK peatlands are numerous and present both challenges and opportunities for UK policy regarding peat habitats.

Rural communities are struggling to survive economically and build sustainable futures, with many farm businesses in peatlands dependent upon agricultural payments to avoid making an annual loss.

Drainage, burning, grazing, peat extraction, infrastructure development and afforestation have affected and continue to affect the ecology and hydrology of UK peatlands. In addition, climate change is causing more rapid deterioration of already damaged bogs through increased decomposition and erosion, increasing loss of carbon and biodiversity and some lowland peatlands may be threatened by sea level rise.

Current international policy does protect peatlands to a certain degree and there are potential opportunities for improved support. Under the Kyoto Protocol, Greenhouse Gas emissions from peat degradation and the benefits or rewetting are recognised and could be included in national Greenhouse gas reporting. Additionally, peatlands are areas of high biodiversity value with their component species and habitats identified as priorities under the EU Birds Directive and

Habitats and Species legislation. Biodiversity targets proposed for 2020 under the Convention on Biological Diversity offer an opportunity to protect and restore important peatland habits and ecosystem services.

At the European Union level, CAP reform post-2013 is currently under discussion, at several levels. At all levels payments are potentially vulnerable to budget restrictions due to public spending crises which have already impacted on a number of countries with significant areas of peat. At the same time, the European Landscape Convention came into force in the UK in 2007 and may facilitate a more citizen-led approach to peatland management in future. The EU legislation on water quality and flood management also supports greater recognition of the management of natural habitats and ecosystems to deliver improved water management. At the same time, the European Landscape Convention came into force in the UK in 2007 and may facilitate a more citizen-led approach to peatland management in future.

There are a number of national environmental strategies and other legislation relating to peatlands; those peatlands currently covered by statutory designations should be protected from most future forms of intensive management. Some lowland peats that have not already been cultivated may come under pressure from possible moves towards increasing the area of food production in the UK. Current forestry strategies across the UK signal woodland expansion but also give strong protection for peatlands alongside recognising the benefits of restoring peatland habitat from formerly planted areas.

Greater flexibility will be needed in the management of peatlands in response to climate change, including providing improved species and habitat management and large scale restoration. . Spatial Planning might be able to help facilitate this by extending the concept of “green infrastructure” to connect current protected areas to non designated peatlands within new larger landscape scale units where peatland ecosystem services are prioritised. Investment in the restoration of degraded peatlands could help meet conservation targets whilst increasing their resilience to climate change and mitigating further climate change.

There are a range of policy instruments and options that could sustain the future provision of important peatland ecosystem services in a rapidly changing world.

Government has a wide range of policy instruments to choose from to influence peatland management. This document reviews some of the advantages and disadvantages of six different policy instruments: information provision; capacity building; classic regulation (e.g. prohibition and permits); direct state control (i.e. state owned land); financial instruments (e.g. taxes and, subsidies); and the creation of new markets (e.g. for water or carbon). It then considers how each type of policy instrument might contribute towards future sustainable management of UK peatlands. This analysis leads to a number of specific considerations for future UK peatland policy:

- **National co-ordination of peatland knowledge for policy, research and practice**

A national research, policy and practice network or partnership could help exchange knowledge and create a shared agenda for understanding and sustaining peatland ecosystems, human communities and the ecosystem services they provide under current and future land use and climate. Effective communication to the public about the importance of peat habitats could also raise public awareness of these vital habitats, and help to achieve more sustainable management through altered consumption patterns (in particular peat products).

- A range of options should be pursued to **restore peatlands damaged by inappropriate management** (such as drainage), based on the latest available research

This may include: ensuring land managers have access to and capacity to use the latest restoration techniques; exchanging knowledge about new techniques and the relative performance of existing techniques; continuing to finance peatland restoration through existing schemes; and facilitating private funding of peatland restoration for carbon and other benefits

- **Accessing private finance for peatland restoration via carbon markets**

Private financing of peatland restoration for carbon and other benefits by companies who wish to become carbon neutral, but are unable to further reduce greenhouse gas emissions at source, could supplement the cost of existing agri-environmental schemes (by at least 20%). However to facilitate this, significant policy changes would be necessary at an international and national level to generate tradeable credits for voluntary or compliance carbon markets.

- **Improving links between agricultural payments and provision of ecosystem services**

The efficiency with which agricultural payments deliver ecosystem services could be enhanced by linking the two more effectively in a spatially targeted scheme that incentivises cross-boundary collaboration for the provision of defined ecosystem services. This review suggests a framework for such a scheme, which could be piloted in a peatland National Park.

- **Encouraging cross-boundary collaboration between peatland stakeholders**

A shift in the focus of agri-environmental schemes from contractual agreements with individuals to awarding collective payments could facilitate the management of ecosystem services across property boundaries and support self-governance of groups consisting of land owners and managers working alongside other peatland stakeholders.

- **Improving the planning system to benefit peatlands**

Many development plans play a crucial role in supporting sustainable peatland management At present there is a failure to join up planning policy with the ecosystem services provided. Planners urgently require a greater understanding of syuch matters which are not currently taught in planning programmes. Peatland communities also have a key role in planning decisions, for example as part of the coalition Government's Big Society initiative, prioritising the kind of sustainable developments necessary to enable these remote communities to thrive using a range of betterment and compensation tools e.g. visitor payback to help create a shared understanding of the environmental and economic benefits of peatlands. As planning policy evolves it may be possible to raise additional funds for sustainable peatland management from developments via mechanisms like the Community Infrastructure Levy 2010 and the emerging provisions of the new Localism Bill. It may also be worth re-considering a levy on extractive uses of peat. It may be possible to significantly reduce administrative costs of incorporating peat levy into the existing Aggregates Levy or the Community Infrastructure Levy to discourage extraction via the planning system. It may also be possible to divert peat extracted during infrastructure development (e.g. for wind turbines) to be used in the horticulture industry.

Glossary of Acronyms

ASSI	Area of Special Scientific Interest
BAP	Biodiversity Action Plan
CAP	Common Agricultural Policy
COP	Conference of the Parties
DECC	Department of Energy and Climate Change
DEFRA	Department for Environment, Food & Rural Affairs
ELS	Entry Level Scheme
GHG	Greenhouse Gas
HNV	High Nature Value
JNCC	Joint Nature Conservation Council
LFA	Less Favoured Area
MEP	Member of European Parliament
LULUCF	Land Use, Land Use Change and Forestry
NGO	Non-Governmental Organisation
PES	Payment for Ecosystem Services
RDP	Rural Development Programmes
SAC	Special Area of Conservation (and Scottish Agricultural College)
SPA	Special Protection Area
SRDP	Scottish Rural Development Plan
SSSI	Site of Special Scientific Interest
UELS	Upland Entry Level Scheme
UKCIP	UK Climate Impacts Programme
UNFCCC	UN Framework Convention on Climate Change
UNCBD	UN Convention on Biological Diversity
WTO	World Trade Organisation

1. Introduction

Peatlands provide a multitude of benefits to society. To the (often remote) communities living in these areas, peatlands offer a livelihood: for example directly from the sheep and sporting enterprises that rely on these areas, or indirectly from the tourists who come to enjoy the internationally rare habitats they support. For the rest of us, peatlands are slowly making a journey through public consciousness from desolate wastelands to a crucial part of nature's life-support system (Figure 1.1). They provide us with climate regulation and clean water, reduce downstream flood risk, support wildlife and provide us all with wild, open spaces in which to roam and escape (Bonn *et al.*, 2009; Hubacek *et al*., 2009; Reed *et al.*, 2010).

Sustainable management is essential to sustain the wide range of benefits or "ecosystem services" that peatlands provide for society. Drainage, grazing, fires and atmospheric deposition of pollutants have significantly altered the ecology and hydrology in many areas (see Reviews 3, 5 and 6). Peat habitats face many challenges, both now and in the future, which may threaten their ability to continue providing society with the benefits we have come to depend upon (SAC, 2008; Reed *et al.*, 2010; Commission for Rural Communities, 2010). A loss of some ecosystem services (e.g. a reduction in the rate at which peat soils sequester and retain carbon) may further compound climate change. Climate change itself may compound the loss of other ecosystem services, for example speeding up the rate at which particular species and habitats are lost from peatlands (see Review 2).

We need to understand what these changes might mean for UK peatlands, and consider what policy options might enable us to manage our peatlands more sustainably, so they can continue providing the services that society needs most. We need to consider how policy can facilitate the repair of damaged peatlands and bring them into a functioning state with their full complement of biodiversity, making them robust and resilient to future change, so they can continue delivering ecosystem services and preserving heritage long into the future. At a time of Government spending cuts, it is particularly important that we consider how to target and get the most out of existing funding, and that we consider options for stimulating investment in sustainable peatland management. This review therefore:

Figure 1 *Peatland stakeholders identifying drivers of change and discussing how they might affect the Dark Peak*

- Considers policy challenges and opportunities arising from some of the most important biophysical, socio-economic and market drivers of change in UK peatlands, and considers implications for the development of future policy to facilitate sustainable peatland management (Chapter 2)
- Considers a variety of policy options to facilitate sustainable peatland management (Chapter 3)

The review draws together and critically evaluates existing literature alongside inputs from stakeholders we have consulted during the review process (Figure 1.2). For definitions and distribution of UK peatlands, see JNCC report 445 (JNCC 2011).

1.1 What is sustainable peatland management?

Achieving sustainable peatland management is fraught with difficulties – not least determining what "sustainable" might mean in different contexts, and to different people. For the purposes of this review, we consider the sustainable development three concentric and overlapping circles, with economics as a sub-system of the social system, which in turn is a sub-system within the environment. In defining the sustainable *management* of UK bogs and fens to provide ecosystem services, we argue that environmental sustainability must take priority over the other two, given the long timescale of peat accretion/loss, which in turn provides the basis for all peatland ecosystem services. As such, it cannot be sustainable to continue damaging these rare and threatened habitats and sustainable management must seek ways to recover past habitat loss. For the purposes of this review, we define sustainable management of peatland (after Brundtland, 1987) as:

"Land use and proactive management that protects the peatland resource and meets the needs of current society for priority peatland ecosystem services without compromising the ability of future generations to meet their own needs."

The potential range of ecosystem services provided by peatlands is very broad. Some services have a market value, while others have the characteristics of 'public goods' which are not (currently) rewarded by the market. It may not always be possible to maintain all ecosystem services in all peatlands, given costs, varying priorities of land owners, managers and members of the public, and the fact that some ecosystem services are mutually exclusive in the same location (section 1.2). Before considering policy options therefore, it may be necessary to consider what might be priority peatland ecosystem services.

1.2 Broad policy context

Few countries have specific peatland policies or strategies (Peat-Portal, 2010). In terms of land use and management of UK peatlands, the most relevant government policy areas (biodiversity, forestry, water, spatial planning, soils, climate mitigation and adaptation) are almost entirely devolved to the four UK administrations: England, Scotland, Wales and Northern Ireland. Although there are many similarities in the policy tools used, and some overarching policy targets at UK (and/or EU) level (e.g. UK Biodiversity Action Plans for peatlands, Natura 2000, GHG emissions, water quality), there is no single authority responsible for peatland policy at UK level. Although the Joint Nature Conservation Council (JNCC) are able to provide a strategic overview nationally, the relevant departments of the four separate administrations determine the strategic priorities, how funding is allocated and detailed polices for peatland.

Just as important as the policy context is the distribution of property rights, determining who has control of the land use and management of individual areas of peatland, and the extent of this control (see section 2.10). This complex patchwork quilt of property rights in peatlands plays host to perhaps the most wide-ranging set of economic "externalities" found in any land use context in the UK. Externalities are consequences of economic activities that are experienced by an unrelated third party; in such cases, the third party does not have a choice and their interests are not taken into account. In relation to peatlands, externalities may arise in two ways: there may be indirect effects away from peatlands, for example when land use exacerbates flooding in adjacent areas; or, there may be direct impact within peatlands when a decision in one sector (e.g. farming) affects another sector (e.g. conservation). This results in many landowners and managers being unrewarded for positive environmental externalities and unaccountable for any negative externalities that they create. In many ways, the peatlands can

be seen as a repository of largely unpriced public goods of major national importance (Hubacek *et al*., 2009).

In this context, the case for some form of policy intervention to address the many market imperfections and failures associated with peatlands appears clear. However the choice of policy instruments with which any such intervention might be implemented is perhaps less clear given the seemingly wide range available. Drawing on the literature, Moxey *et al.* (2009) suggest six broad categories of instrument to choose from, each containing a variety of specific instruments and each with advantages and disadvantages (Table 2). These will be discussed further in Chapter 3. First, the next chapter will review the biophysical, socio-economic and policy context in which these options must be considered.

Table 1 *Six categories of policy instrument*

Category	**Examples**
Direct State Control	Public ownership of land, management by public employees
Classic Regulation	Prohibited activities, licences/permits, planning zones, delivery of conservation objectives
Financial Instruments	Grants, subsidies, tax breaks, user fees, taxes
Capacity Building	Skills training, capital grants, infrastructure funding
Information Provision	Leaflets, websites, research and advisory services
Creating New Markets	Payments for ecosystem services; voluntary schemes.

2. Peatland Policy: Current Approaches and Future Challenges in a Changing World

This chapter considers how a range of biophysical, socio-economic, market and policy changes may affect the long-term sustainability of UK peatlands. It reviews current policy relating to peatland management and identifies future challenges and possible trajectories for peatland policy. Important drivers of change in peatlands include the following:

- Many peatlands have been dramatically altered by drainage in response to Government subsidies post-WW2
- Although only recommended for heathland habitats in the Heather & Grass Burning Code and Muirburn Code, managed burning of blanket bogs (as defined in section 1.1) and accidental fires have been widespread (Holden et al., 2007; Worrall et al 2011)
- Significant afforestation of many peatlands, due to tax breaks, in the 1980s still have negative implications today for biodiversity and carbon loss
- Infrastructure development, particularly for wind turbines

- Grazing mainly by sheep and red deer in Scotland (with some goats), and mainly by sheep (with some cattle, ponies and red deer) in England, Wales and Northern Ireland has historically led to significant declines in peatland habitat condition, transforming species assemblages typically associated with bogs and fens into grasslands in many areas (National Ecosystem Assessment, 2011)

- Peat forming vegetation is particularly sensitive to atmospheric deposition of sulphur and nitrogen from the burning of fossil fuels and intensive agriculture, and upland peats have experienced particularly high levels of atmospheric deposition over the last two centuries (National Ecosystem Assessment, 2011)

- The UK Climate Impacts Programme identifies upland peat bogs as particularly sensitive to changes in temperature and precipitation regimes, while many fen bogs (for example in East Anglia) may be threatened by sea level rise (UKCIP, 2009)

- On upland peats, hill farmers have experienced steadily declining incomes, with most farm businesses dependent upon agricultural payments to avoid making an annual loss

- An increasing number of peatland residents commute to work elsewhere and many communities have seen an influx of retirees and second homes, contributing towards increasing house prices, and threatening the fabric of many remote communities

- There is a long history of peat extraction: the current primary use of extracted peat is in the horticulture industry as a growing medium; and it is used to a lesser extent as a fuel. Horticultural extraction has predominantly been in lowland raised bogs and of an original 70,000 ha in the UK around 61,000 ha have been lost and over half of what remains is designated as degraded (Alexander *et al.* 2008). Peat extraction for fuel has seen significant declines since WW2 as demand shifted, firstly towards coal and then latterly to oil and gas

2.1 International policy drivers

The UNFCCC was extended via the Kyoto Protocol (which entered into force in 2005) to include mandatory limits on greenhouse gas (GHG) emissions. From 2008-2012, developed countries and countries with economies in transition are required to reduce their collective emissions of GHGs by 5.2% compared with 1990 levels, and up to 3% of this reduction may be offset by land use, land use change and forestry (LULUCF). The drainage of peatlands constitutes a land use change and emissions from this are covered. The UK GHG Inventory accounts for historic drainage of lowland peat for agriculture but does not currently account for the impact of drainage on upland peats. Peat use in horticulture is also captured in the LULUCF component of the UK GHG Inventory. The method currently only accounts for the extracted peat, but there is IPCC guidance on how to account for emissions from *in situ* oxidation of the bare peat surface. New rules being proposed under LULUCF would allow the carbon gains from rewetting peatlands to be included in national greenhouse gas reporting from 2012 (IMCG, 2010).

Peatlands are areas of high biodiversity value and biodiversity targets set for 2020 under the CBD offer an opportunity to protect important peatland habitats and ecosystems. Some international NGOs have demanded that biodiversity specifically in forests and peatlands should be safeguarded and restored (Global witness, 2010), while within the UK, NGOs have suggested that in addressing the major threats to biodiversity, it is important to prevent the loss of carbon sequestering habitats (Wildlife and Countryside Link, 2009).

2.2 EU policy drivers

At the highest level, the "Europe 2020" strategy (European Commission, 2010), is likely to dominate political thinking in Brussels, both in the short-to-medium term, and for the next programming (policy) period 2014-2020/21. In this strategy, economic concerns, such as competitiveness and energy security, predominate (European Council, 2010c). Environmental concerns are largely confined to climate change. However, the 25/26 March European Council (2010b) was "committed to the long term biodiversity 2050 vision and the 2020 target set out in the [Environment] Council's conclusions of 15 March 2010", which included "a headline target of halting the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible".

The recent CAP "Health Check" has encouraged further (but still not complete) "decoupling" of the CAP's Pillar 1 payments (75% of the CAP total) from farm production levels, and therefore potentially from farming activity. There are also calls for these payments to be made "fairer" between Member States and between farmers etc., and perhaps to be further "greened" after 2013 via stronger cross-compliance or other environmental requirements.

The future and funding of the CAP's Pillar 2 and its current Axes – agricultural and forestry competitiveness, environmental land management, and rural diversification and quality of life, pursued via regional/national Rural Development Programmes (RDPs) – also remain uncertain. As part of overall CAP reform, reform of the long-standing Less Favoured Area (LFA) regime (an Axis 2 measure) is under consideration, as are payments for "High Nature Value" (HNV) farming systems that deliver public goods (which might be one means of supporting peatland management). However, as all Member States, including the UK, are required to co-finance Pillar 2 payments to a considerable degree, these payments are potentially vulnerable to public spending crises which have already impacted on a number of countries (e.g. Eire) with a significant area of peat.

CAP reform for 2014 and thereafter is currently under intensive discussion, at several levels. The European Parliament's Agriculture Committee (2010) has recently endorsed a report by George Lyon MEP (from Scotland) that stresses farming's role in climate change policy: "A reformed and renewed CAP will treat farmers as part of the solution to climate change, not part of the problem. This includes...creating opportunities to produce carbon sinks from peat bogs" (Lyon, 2010). NGOs, such as BirdLife International, are calling for greater emphasis on 'public payments for public goods' through the CAP (BirdLife International, EEB, IFNCP, IFOAM and WWF, 2009).

CAP reform could have a number of implications for EU peatlands including:

- Further extensification (lower stocking rates) and some further abandonment of upland farming areas;
- A slow shift to environmental land management (e.g. wetland restoration) in the lowlands unless agri-environmental payments are increased;
- New 'public good' payments for peatland farmers and landowners willing to undertake carbon sequestration measures

The 2000 Water Framework Directive is only now (2010-2013) coming into full effect, and its provisions may strongly affect future peatland management, and associated developments such as hydropower schemes pursued as part of the EU's energy policy. Fens are considered Groundwater Dependent Terrestrial Ecosystems under the directive, but it is less clear how rain-fed blanket bog or raised bogs are included in within the UK.

The Commission's proposed Soils Directive has so far been blocked in the Council, for a variety of reasons including issues of EU/national competence and concerns over data-gathering and administrative cost. However, there may be agreed common action over peatland developments, including wind farm installations (which can degrade peat during construction and post-construction phases), extraction for horticultural purposes, and in some Member States peat-fuelled power stations (which may come under the EU's carbon trading scheme).

The EU Habitats Directive identifies several peatland types as priorities and requires Member States to ensure they are maintained or restored to a favourable conservation status. Although primarily in A/SSSIs in the UK, this extends beyond just designated sites. Infringement can bring costly fines for member states who fail to comply.

The European Landscape Convention (a Council of Europe, not European Union, responsibility) came into force in the UK in 2007, but seems unlikely to exert significant legislative or administrative pressures. However, it does, impose an obligation upon policy makers to actively involve publics in the development and management of all landscapes. Given the iconic status of much landscape in the UK through the designation hierarchy, we see this as a potential bridge to shape a more citizen-led approach to peatlands and their collaborative management.

2.3 Statutory designations in peatlands

Peatlands protected under EU designations include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) through the European Union's Birds and Habitats Directives respectively, and the Natura 2000 network. National designations include Sites of Special Scientific Interest (SSSIs – ASSIs in Northern Ireland), Local Landscape Designations and National Parks, which use a combination of habitat conservation and species conservation measures to attain the goal of "favourable condition" (Cliquet *et al.*, 2009). Most existing and candidate Natura 2000 sites are designated as SSSIs/ASSIs, and it is SSSI legislation and policies that are largely being used to achieve the Natura 2000 requirements. SSSI legislation protects peatland by prohibiting damage, by restricting property rights through a process of notification/consent for changes in management, and by special requirements when planning consent is sought for a change of land use. The legislation also provides for positive support to help deliver management objectives through positive management agreements, grants and advice. In 2004 the UK Government, with support from the devolved administrations, set targets for 95% of designated land (A/SSSIs, SACs and SPAs) to be in 'favourable' or 'recovering' condition. The 95% target is defined separately for each of the UK countries, either by area or by number of features. Latest reports on this indicator suggest that this target is proving difficult to achieve - in 2009 only 67% of SACs, 82% of SPAs and 82% of A/SSSIs in the UK were in favourable or recovering condition (JNCC, 2010). Having said this, as the UK Peat Compendium[1] showed, the Public Service Agreement target for SSSIs has been a key driver for levering funding for peatland restoration in the UK.

Despite the emphasis in both EU and domestic policies on the conservation status of peatland and other important habitats, the only dedicated EU environment budget is LIFE+, which supports Natura 2000 management through the dissemination of best practice techniques, know-how or technologies, awareness-raising, information and communication – but does not provide funds for day-to-day or year-to year management. In practice, the UK Government relies on the CAP budget to co-fund the maintenance of terrestrial A/SSSIs, SPAs and SACs

[1] http://www.peat-portal.net/

through agri-environment payments under the four UK Rural Development Programmes (see next section).

National Park designation provides some protection for some peatlands outside A/SSSIs, in that consent is required for agriculture or forestry development work (e.g. roads, buildings) on areas of the National Park mapped as 'moor or heath', which in practice include bog habitats. A significant proportion of English and Welsh peatlands are already in National Parks (approaching half of all peatlands), but only a relatively small proportion are in National Parks in Scotland (there are no National Parks in Northern Ireland).

A number of peatland Local Landscape Designations sit beneath the national tier of designations and involve relatively simple procedures for designation covering a range of landscape types and functions (Bishop *et al.*, 1995; Scottish Natural Heritage and Historic Scotland, 2005) that are "of at least county importance for reasons of their rarity, representativeness or variety" (Cobham Resource Consultants, 1993: 3.14). What limited evidence there is tends to suggest that such designations are failing to deliver substantive conservation benefits due to lack of public awareness, incentives and structures for effective management (Scott, 2001; Scott and Bullen, 2004; Tickle and Clark, 2000; OECD, 2004).

2.4 Agri-environmental schemes for peatlands

Agri-environment schemes offer farmers and other land managers contracts with annual payments for 5 -10 years in return for prescribed management to conserve habitats, species and landscapes, protect soil and water resources, and combat climate change. There are separate schemes in each of the four countries, but typically they consist of an entry level payment (often applying across the whole farm) and higher level payments for a wide range of more demanding habitat-specific management, available only to applicants meeting strict entry criteria. Most higher-level agri-environment contracts are prepared with input from specialist advisers, and in assessing applications priority is given to Natura 2000 habitats and species, A/SSSIs and BAP habitats. Payments are co-financed by the EU rural development budget and payment rates must be justified in detail on the basis of income foregone and additional costs incurred.

There is a range of agri-environment management payments available for upland and lowland bogs, fens and reedbeds, covering management, restoration and creation (where appropriate), supplemented by one-off capital payments - for example of ditch blocking to restore blanket bogs. Grip blocking is now covered under the Upland Entry Level Scheme (UELS) and Scottish Rural Development Plan (SRDP). Expenditure on peat-related management under Pillar II of the CAP is not always reported routinely or in a form that facilitates identification of specific actions such as drain blocking. Nevertheless, as an example, Rural Priorities funding under the SRDP has approved just over £70K for dams in fens and lowland raised bogs, and almost £90K for dams in upland peat sites since 2008[2]. More broadly, the SRDP has awarded £2.17m for "Management of Wetland", £0.39m for "Create, Restore and Manage Wetland", £0.26m for "Management/Restoration of Lowland Raised Bogs", £3.72m for "Water Margins and Enhanced Riparian Buffer Areas", £0.14m for "Management of Flood Plains" and £0.39m for "Buffer Areas for Fens and Lowland Raised Bogs" since 2008.

[2] Data provided by the Scottish Government Rural Payments and Inspections Directorate, 30 July 2010

2.5 Climate change legislation, guidelines and carbon markets

Climate change risks causing more rapid deterioration of already damaged bogs, increasing loss of carbon and biodiversity (CCRA, 2010[3]). The UK's Climate Change Act, introduced in November 2008, sets the world's first legally binding target for reduction of greenhouse gas emissions: to 80 per cent of levels recorded in 1990 in the UK by 2050. A more immediate target is to reduce emissions to at least 34 per cent of the 1990 level by 2020. The Act also establishes a system of successive five-year carbon budgets, specifying the total amount of greenhouse gases that can be emitted over each budgetary period (DEFRA, 2008, 2009). Scotland's Climate Change Act is stronger and requires a sustainable approach across all activity. It includes annual targets and regular reports on policies, programmes and adaptation plans. Greenhouse gas reductions across the devolved administrations also then feed collectively into the UK's commitments under the Kyoto Protocol (see below).

Investment in the restoration of degraded peatlands may represent a win-win scenario that can help meet conservation targets whilst increasing their resilience to climate change and mitigating further climate change by reducing greenhouse gas emissions. Recent research has illustrated the potential for peatlands to contribute significantly to reduced greenhouse gas emissions (Lindsay, 2010; Moxey 2011, Worrall et al 2011). Peatland restoration, as targeted in the UK Habitat Action Plan, could match the carbon currently contained in all the conifer plantations on deep peat. The intention to include such carbon emissions reduction from peatland restoration in meeting national climate change targets has been announced by the Scottish Government. At COP15 of UNFCCC in Copenhagen, draft rules were agreed, which could come into force from 2012, that specifically include rewetting of drained peatlands within national reporting (UNFCCC, 2010). This would give extra impetus and priority towards delivering peatland restoration both from within EU and UK policy.

The Kyoto Protocol established a number of "flexibility mechanisms" that could in theory enable peatland restoration to be financed via international carbon markets. However to generate carbon credits that could be traded on international markets, all peatlands would need to be included in the UK's Greenhouse Gas Inventory, and changes would be necessary to UK legislation and the EU's Emissions Trading Scheme (if peatland restoration were to become part of a compliance programme where credits were generated and counted under the Kyoto Protocol) and to DECC's Greenhouse Gas Accounting Guidelines (to enable carbon credits from restoration to be traded on voluntary carbon markets).

Alternatively, the Government may consider establishing its own scheme (co-ordinated with existing peatland schemes e.g. under UELS and SRDP), to recognise peatland restoration activities that meet certain standards under DECC's Greenhouse Gas Reporting Guidelines. These guidelines were introduced in 2009 as a precursor to mandatory carbon reporting which will be required for all UK corporations by 2012, but they do not currently allow companies to use peatland restoration to offset their emissions. These standards would need to be set out in a new UK Peatland Carbon Code as part of DECC's Reporting Guidelines. UK companies who have done everything possible to reduce their emissions at source and who want to offset their remaining emissions to become carbon neutral would then be able to invest in peatland restoration, facilitating private investment in this important work. Initial market research shows that there is significant demand for UK-based schemes that deliver multiple benefits from major UK corporations (Rabinowitz and d'Este-Hoare, 2009).

[3] http://www.defra.gov.uk/environment/climate/adaptation/ccra/index.htm

Peatland restoration projects would need to be analysed on a case-by-case basis to determine the emission reductions and carbon mitigation values that can be achieved relative to implementation costs (Moxey 2011). Financial analysis by Settelmyer and Eaton (2010) with a range of assumptions has been used to generate net present values that can be compared to average implementation costs across various restoration techniques in both upland and lowland peat scenarios. This analysis indicates that in many circumstances, carbon mitigation values can contribute to a significant portion of implementation costs (>20%).

International and national climate change obligations also require adaptation action with plans and proposals for action. Restoring peatlands has been recognised in a number of UK adaptation plans as a measure that will contribute to helping maintain biodiversity in a changing climate but will also help people in adapting to the impacts of other climatic changes such as increased heavy rainfall and flood events and the increase in moorland fires with hotter drier weather.

2.6 National environmental strategies and other legislation relating to peatlands

2.6.1 Cross-cutting

The UK Biodiversity Action Plan was established under the UNCBD and identifies priority habitats and species and focuses resources to protect these both within and outside designated areas. These include a number of important peatland habitats and species. Action plan objectives in turn help steer central government funding and local authority work. Duties on public bodies to deliver biodiversity objectives are included within wildlife legislation giving these plans a high level of policy commitment. Progress in delivering the action plan objectives has however been slow and as yet the targets for restoration have not been met (JNCC, 2009).

The Climate Change (Scotland) Act 2009 requires the Government to bring forward a Land Use Strategy covering all land – rural and urban – in Scotland. This must set out objectives in relation to sustainable land use (and its contribution to meeting targets for reductions in GHG emissions) and the policies and proposals required to meet those objectives. The Strategy, which must be reviewed every five years, is expected to have significant implications for how land is used and managed and should help to reduce land use conflicts.

If Food 2030 is retained as a policy, this could have important implications for national peatlands, especially those in lowland areas that are highly prized for horticulture with its contributions to a diet based more on UK-produced fruit and vegetables. This may be at odds with the UK Sustainable Development Strategy, which seeks to address challenges of sustainable consumption and production, natural resource protection and environmental enhancement, sustainable communities and issues of climate change and energy[4]. To be sustainable, moves towards agricultural intensification should strive to identify other ecosystems in which intensification could take place and lead to fewer and less detrimental sustainability impacts. Those peatlands currently covered by statutory designations are likely to be protected from most future forms of intensive management[5], but undesignated lowland peatlands that have not already been cultivated may increasingly come under pressure from a move towards self-sufficiency in food.

[4] It is unclear if/how this strategy will be followed in the wake of the abolishment of the Sustainable Development Commission

[5] The range of statutory designations currently in place in UK peatlands and some of the challenges that they face are reviewed in the previous chapter

2.6.2 Forestry

Current forestry strategies across the UK signal woodland expansion but also give strong protection for peatlands alongside recognising the benefits of restoring peatland habitat from formerly planted areas. Wales aims to increase its woodland cover (Welsh Assembly Government, 2009) but recognises the need to protect semi-natural habitats and carbon-rich soils. A doubling of forest area by 2056 is the target for Northern Ireland (Forest Service, 2006). This is to be achieved mainly by converting agricultural land with government forestry agencies guiding the location of new woodland sympathetic to the natural environment. Scotland aspires to increase woodland area to 25% (Scottish Executive, 2006) but the strategy guiding this expansion (Forestry Commission Scotland, 2009) recognises the carbon sink value of peatland and indicates that expansion is likely to be focused away from the deeper peat and on lower quality agricultural land offering net carbon sequestration potential. In all three countries deep peat areas and peatland habitats in good condition should be safe but there is still likely to be pressure for afforestation of shallow peat and peaty mineral soils, particularly where habitats are degraded or of less valued types. In each of the four UK countries, policies are in place allowing woodland removal for purposes including restoring peatland habitats, but restoration has a cost and funding difficulties continue to constrain the scale of activity. Government exert influence over private forestry in a range of ways, most notably via grants. In Scotland there are forestry options in SRDP's Rural Development Contracts - Rural Priorities integrated programme that reflect various regional priorities. The Forestry Commission administer the English Woodland Grant Scheme and will be launching new woodland creation grants in Wales in autumn 2010. The Northern Ireland Forest Service fund forestry through seven separate schemes targeted at different woodland types and locations.

2.6.3 Peat extraction

There have been significant shifts in thinking and policy surrounding peat extraction for horticulture. Since 1990 the Peatlands Campaign Consortium has pushed for a ban on peat extraction which, although this created conflict with the horticulture industry, eventually led to voluntary agreements to stop peat extraction in some areas. It also led to the development of government policy, first through the Minerals Planning Guidance on Peat (MPG13, 1995) and then through the UK Biodiversity Action Plan (1999), to cap new peat extraction and to set targets to reduce extraction and develop alternatives (for a detailed discussion see Alexander *et al.* 2008). However, the Minerals Planning Policy Guidance document MPG13 was produced in 1995 and is in need of review. It does not adequately cover the impact on carbon emissions of peat extraction and is weak in its guidance on new planning applications for peat extraction. To date the development and uptake of alternatives to peat in growing media have been variable and it is argued that there will be a continued need for peat for this purpose in the future (Schmilewski, 2008).

2.7 Spatial planning policy

Spatial planning focuses on new forms of governance and partnership with planning as a positive enabler and agent of societal, economic and environmental change set within multi-scalar perspectives (Tewdwr-Jones, 2004; Harris and Hooper, 2004: Vigar, 2009). Moving from a more reactive and sectoral approach, which was restricted to land use considerations alone, the 'new' spatial planning agenda moves across traditional sectoral boundaries to incorporate a wider set of societal objectives. This fundamentally changes the culture and practice of planning; at least in theory (Tewdwr-Jones et al, 2010; Keating and Stevenson, 2006).

2.7.1 Current planning policy and peatlands

Spatial planning is conceived and operationalised separately through the devolved administrations (England: Regional Spatial Strategy and Local Development Framework; Scotland: Strategic Development Plans and Local Development Plans; Wales: Local development plan; Northern Ireland: Regional Development Strategy and Development Plans). The principal differences lie in the way England had developed a statutory regional tier of planning to drive local development frameworks and that Wales, Scotland and Northern Ireland have their own plans/strategies to help articulate a framework for local planning authorities

At the heart of spatial planning lies the development plan, which provides the statutory framework within which development takes place through development management protocols. This plan-led system prevents an ad-hoc approach to planning and provides consistency and clarity in decision making processes. The plan itself is subjected to public scrutiny and Strategic Environmental Assessment procedures ensuring, in theory, that the plan has taken proper account of any environment impacts (Cullingworth and Nadin, 2007). This is important as planning decisions can override any designation (including A/SSSIs) if it is deemed to be in the national/public interest. However, a complex system of multi-scalar planning governance has ensued, raising concerns about the lack of transparency, accountability and the social and environmental justice of planning processes as they play out through central targets, public inquiries and appeal procedures (Phelps and Tewdwr-Jones, 2008; Scott, 2003; Scott, 2010).

European legislation acts as a key driver through Natura 2000 and SACs, which have been translated by UK government through national policy guidance notes (Planning Policy Statements in England and Northern Ireland; Scottish Planning Policy; Planning Policy Wales; at a regional level into Regional Spatial Strategies (now deleted subject to ministerial order by the new government) and by Local Authorities into their local development frameworks/plans. Although there is a general presumption against developments that affect the nature and landscape value and integrity of protected peatlands, policies can vary significantly from authority to authority in terms of strength and conviction, and according to economic and social needs (Scott and Shannon, 2007;Curry, 1992)

Under the terms of the Habitat Directive and Natura 2000, an appropriate assessment must be made for any development plan where development proposals might have an adverse effect on the integrity of a peatland SAC or SSSI. This requires a more strategic approach to be taken to proposals in and around a protected peatland. For example the Thames Basin Heath Joint Strategic Partnership Board worked successfully across 13 local authority areas (Thames Basin Heath Joint Strategic Partnership Board, 2009). The key issue of ‘appropriate assessment’ led to the establishment of a 12 mile zone of influence which was to be influential also in the proposal for Cannock Chase SAC This meant that any competent authority had to make appropriate assessments on proposed developments within their emerging plans and propose suitable mitigation/compensation or alternative spaces where the resource affected is interchangeable.

2.7.2 Tools for spatial planning to promote sustainable peatland management

This section examines the potential of spatial planning tools to support sustiable peatland management through a direct connection with ecosystem services. At the level of the individual planning application, planning ‘Agreements’ and ‘Unilateral Undertakings’ are types of Planning Obligations (England and Wales) authorized by Section 106 of the Town and Country Planning Act 1990 in England and Wales, Section 75 of the Town & Country Planning (Scotland) Act 1997 in Scotland and Article 40 of the Planning (Northern Ireland) Order 1991 (updated (Amendment) (Northern Ireland) Order 2003). They allow the applicant to enter into

legally binding agreements with the planning authority and provide a vital tool to secure certain works, infrastructure, management or financial support to offset adverse environmental effects where there is no other clear planning mechanism. Their use in environmental matters has been largely ad-hoc and limited, but they have been used in a wide range of countryside management projects (Marshall and Smith, 1999). In theory they could be used to finance sustainable peatland management or restoration where large scale developments take place adjoining or within peatlands (e.g. major road improvements or development; high speed rail links; wind farms). Section 75 agreements have been used in Scotland to secure peatland restoration where a development was to cause damage to a peatland (e.g. Denny Substation near Falkirk – part of the Beauly-Denny electricity line).

However, it is the Community Infrastructure Levy (2010), which offers the greatest potential as in theory it gives communities and neighbourhoods the ability to use monies from development projects to benefit their areas. If the ecosystem services that peatlands provide are recognised by the communities that adjoin them, these resources might prosper from monies to improve their status and condition. With a peatland designation or BAP priority species in close proximity to a major development, monies from Community Infrastructure Levy developments could legitimately be used to fund management activities.

Similarly, habitat banking (Latimer and Hill, 2007; Briggs et al, 2009) builds on ideas of visitor payback promulgated by Scott et al, (2003) where visitors support businesses and conservation agencies to deliver environmental benefits for a range of projects. For example “Our Man at the Top” secures £50k per year for such work by adding a £2 surcharge to every week booked by tourists in the lake district (Atkinson, 2010). Habitat banking involves brokering arrangements between developers, landowners and planning authorities in appropriate locations where it is possible to assimilate large funds for the creation and management of habitats at a large landscape scale. This allows people to work collectively to engineer conservation benefits from developments that go beyond the immediate boundary of a proposed development, potentially offering more leeway than traditional planning agreements or obligations (Benmayor et al, 2010).

Green infrastructure as a concept has an important but, as yet unrealised potential from its current urban fixation (Kambites and Owen, 2006). Not all peatlands are designated and can be fragmented and vulnerable habitats with significant development pressures, particularly given planning policy protection for grade 1 and 2 agricultural land. The linking of habitats through a wider extension of green infrastructure at a landscape scale to the rural context may be able to connect peatlands within national, regional and local networks and provide a more joined up approach to conservation management (Natural England, 2009).

2.8 Property rights in peatlands

Peatlands are multi-resource systems that are important for the range of services that they provide. Because of this, there are multiple stakeholders who want a say in how they are managed. However, private property regimes still dominate in peatlands, particularly in uplands, and as such, few stakeholders beyond land owners are able to influence management decisions (Quinn *et al.*, 2010). Instead the UK government has restricted property rights through legislation (Condliffe, 2008; Tovey, 2006) or assumed some property rights in order to represent the interests of other stakeholders through private-state property regimes. The alternative is to redistribute property rights to include a broader range of stakeholders so that they can legitimately lay claim to particular resource uses and so negotiate for management that serves their interests (Quinn *et al.*, 2010). However, financial support will still be necessary either

through compensation payments for income foregone or to pay for the production and maintenance of a broader range of services.

Although relatively small in extent, common property peatlands also represent unique policy challenges. Most of this land is under serious social, economic and environmental pressure, with smaller numbers of rightholders using the land and rapidly changing patterns of grazing pressure. The Commons Act 2006 provides the first national legislation in England and Wales for the improved management of common land by formally constituted commoners associations (Rodgers, 2009; Rodgers *et al.*, 2010). In Scotland, crofting common grazings are the prevailing form of common land, where over 800 administrative units cover approximately 5,000 km² (Committee of Inquiry on Crofting, 2008).

In Northern Ireland, the extraction of peat for fuel for commercial purposes is subject to planning approval under the Planning (Northern Ireland) Order 1991, and there are presently no extant approvals for this type of extraction. In certain, mostly rural, areas peat continues to be used mainly as a secondary source of fuel, and this is extracted through the exercise of historical turbary or land ownership rights. These rights are, however, subject to strict statutory consenting regulation in areas that have been declared ASSIs, or Natura 2000 sites. Such consents to extract peat for fuel are issued by the Northern Ireland Environment Agency in accordance with its Position Statement on Peat Cutting at Designated Sites that issued in March 2011[6] ,which is intended to ensure that cutting will not adversely impact on the special scientific interests.

Finally, it should be noted that the majority of peatlands are now accessible to members of the public through the Countryside and Rights of Way Act 2000 in England and Wales, Access to the Countryside (Northern Ireland) Order 1983 and the Land Reform (Scotland) Act 2003. These Acts also assign responsibilities with these rights though a Countryside Code in England and Wales, the Northern Ireland Country Code and an Outdoor Access Code in Scotland.

3. Policy instruments for sustainable peatland management

3.1 Information provision

Sustainable peatland management is often hindered by a lack of relevant knowledge amongst land owners, land managers and planners. As such, the adoption of best practice and adjustments to management objectives can be slow, compounding both environmental degradation and poor economic performance of these areas.

To combat this, policy interventions may seek to provide information via leaflets or (increasingly) on-line services such as the Peat Portal[7] and the Peat Compendium[8]. However, whilst comparatively cheap, such passive information provision relies on land managers having the time, ability and inclination to access such material. By contrast, more expensive but proactive advisory services, demonstration or "monitor" farms (as in Scotland and Wales, based on the New Zealand model) may be more effective at reaching the target audience – although they are still reliant on users' willingness to engage.

[6] http://www.doeni.gov.uk/niea/position_statement_on_peat_cutting_at_designated_sites.pdf
[7] http://www.peat-portal.net/
[8] http://www.peatlands.org.uk/

Information provision should not be confined to land owners and managers but extends to other rural residents and the wider public. Raising public awareness of the nature of benefits derived from peatlands (and the risks to these benefits) may itself help to achieve more sustainable management through altered consumption patterns.

One of the most effective ways of providing information on an ongoing basis, tailored to evolving needs and priorities may be through partnerships between researchers and members of the policy and practitioner communities. There are now a growing number of peatland partnerships and collaborations between researchers with companies, agencies and charities. Many of these have overlapping agendas, but different sectoral and geographical foci. There is now an urgent need to bring these initiatives together to co-ordinate research, policy and practice across the UK, avoiding duplication and enhancing collaboration to deliver more efficient and effective outcomes.

3.2 Capacity building

Whilst a lack of relevant information may indeed hinder appropriate peatland management decisions, it is also likely that managers' abilities to act appropriately on such information are sometimes constrained by other factors. For example, managers may lack the skills to interpret information and/or the human resources to put in place different management practices. Such constraints may be reduced through training schemes (as emphasised in Defra's Heather & Grass Burning Code review in 2007).

Management responses may also be limited by more physical constraints; a lack of equipment or infrastructure stemming from persistent under-investment, which in turn stems from the low profitability of most enterprises. These constraints may be eased through grant-aid, or sometimes direct state provision, for items such as roads or buildings.

Wider peatland communities may need to improve their ability to self-organise and act co-operatively (see section 3.6) and may require assistance in establishing alternative income-generating assets such as renewable energy installations (Quirk, 2007).

3.3 Financial instruments

Many of the wider ecosystem benefits derived from well-managed peatlands are not recognised by markets, nor are many of the costs of mismanagement. Hence although information provision and capacity building may aid the potential for more sustainable peatland management, the motivation or incentive to do so may be lacking. However, markets do exist for some outputs (e.g. peat itself, livestock, recreational activities) derived from peatlands and for many of the inputs (e.g. labour, energy, fertiliser) used in their management. Consequently it is possible to manipulate the relative prices of inputs and outputs in an attempt to discourage undesirable activities and to encourage desirable ones on peatlands.

Such manipulation can take various forms. For example, input costs can be lowered and output prices raised through the provision of grants, subsidies and tax breaks. Expenditure under both Pillars of the CAP is the dominant example of this approach in peatlands (see section 2.6). Conversely, input costs can be raised through the application of taxes or user fees and output revenue lowered (indirectly via changes in demand) through consumer taxes and charges. Removing existing subsidies would also have this effect. However if alternative arrangements were not made, this would have serious consequences for the viability of many peatland management units with possible implications for the active management required to deliver

some ecosystem services. For peatlands, incentive approaches could be used to, for instance, encourage reseeding with native species by making seed cheaper and/or paying for reseeding activities.

As well as being limited by the availability of public funding, the scope for using financial incentives is also constrained by current interpretations of WTO (and EU) rules relating to impacts on production and trade. Specifically, support under agri-environment schemes is limited to income foregone, costs incurred and an element to cover the recipient's transaction costs, rather than the value of benefits delivered.

The potential advantage of using market incentives is that the mechanisms already exist in the sense that land owners and managers already respond to price signals and such responses should be more efficient than regulatory or state control options. However, designing market incentives is rarely straightforward and unintended consequences are common, not least because inputs are often shared across many different activities and apparently separate outputs are often linked, making targeting difficult. This problem is amplified by the fact that the inputs and outputs targeted are only proxies for the ecosystem services that are actually the focus, meaning that the efficiency with which policy objectives are achieved is likely to be weakened.

3.4 Public funding of peatland management in the UK

Public funding for day-to-day peatland management in the UK is mainly delivered through agri-environment management agreements, which offer land managers annual payments per hectare over a period of 5 to10 years in return for site-specific, targeted actions. Agri-environment payment schemes are the responsibility of the four national administrations as part of their 2007-13 Rural Development Programmes, and are heavily dependent on co-financing from the European Agricultural Fund for Rural Development (Pillar 2 of the CAP). Habitat-specific analysis of agri-environment payments is incomplete, particularly for upland mosaic habitats and for older agreements, but it is estimated that about £6 million a year is spent across the UK on agri-environment management which benefits peatland. SSSI management agreements on peatland and peaty soils probably account for about £3 million a year, but many of these nationally funded agreements are being transferred to EU co-financed agri-environment schemes. Uptake of agri-environment management agreements has generally been higher for upland peat than for lowland habitats, where peatland restoration competes with intensive agriculture. Evaluation of the environmental impact of agri-environment payments is limited by the lack of habitat specific data, but the detailed management requirements are evidence-based and draw on practical experience of Natura 2000 restoration.

It should be noted that the expenditure each year on all types of agri-environment and SSSI management payments is equivalent to only a fraction of the total of £2.6 billion annual income support payments received by UK farmers from Pillar 1 of the CAP. Furthermore, there is no guarantee that the UK's allocation of CAP Pillar 2 funding, on which the domestic agri-environment budgets depend, will remain at the current level after the 2014 CAP reform.

Intensive peatland habitat restoration projects on key Natura 2000 sites, each taking around five years, are co-financed by LIFE which is the EU's financial instrument supporting environmental and nature conservation projects. LIFE funds are awarded competitively and there are currently three active peatland projects in England and Wales with a combined annual expenditure of between £2 million and £3 million.

In contrast to these public funds, a proportion of the £105 million that water companies plan to invest over the next five years in catchment planning in England, Scotland and Wales may be targeted at peatland, and up to £15 million has been allocated specifically to upland peatlands in England. (For more details on public funding see Keenleyside and Moxey 2011).

3.5 Classic regulation

Whilst all of the previous categories relate to different ways in which policy objectives may be sought through inducing voluntary changes in land owners and managers' behaviour, regulatory controls seek to constrain behaviour through rules and penalties. The attraction of regulation is that, if enforced, it can provide greater certainty and consistency of management practices than voluntary approaches. The disadvantages are that it can be expensive to administer and can impose significant compliance costs on land owners and managers. It can also be relatively inflexible, meaning that addressing spatial variation in conditions or changes over time can be cumbersome.

Regulatory controls could include simple prohibition bans on (damaging) activities such as drainage, ploughing or burning on peatland. Equally they could include the use of (non-tradable) licenses or permits to control the occurrence/timing of such activities, for example limiting who could cut peat, where and when. More generally, a formal spatial planning approach more familiar in an urban context could be used to specify (via zoning) where specified activities could or could not be undertaken in relation to peatland.

3.6 Direct state control

Although different in approach to the previous categories, state control is also an option. Rather than relying on private sector responses to information and incentives or compliance with regulatory controls, public ownership and/or management would offer a greater degree of direct control over how peatland was treated.

In principle, such an approach offers greater certainty in terms of the appropriateness and consistency of management practices. For example, public management should be hindered less by information or skill constraints and be less susceptible to market fluctuations. In practice, public sector bodies can themselves suffer from internal competency and resourcing issues that can (but not necessarily) diminish the potential advantages.

Perhaps more importantly, direct state control of rural land is not common in the UK context with only the Forestry Commission having a large presence, meaning that adopting such an approach for peatlands would mark a significant departure from convention. Moreover, the ability of the state to take ownership of peatlands would either involve considerable expense to purchase private interests or forced appropriation – either of which would be politically contentious. Hence it is unlikely that direct state control will feature prominently in future peatland policies.

3.7 Creating new markets

Apart from the Single Farm Payment, current agricultural support in most peatlands mainly provides income support and compensates for physical disadvantage, rather than rewarding provision of public goods, and there are questions over the cost effectiveness of this type of support for conservation (Marggraf, 2003). Although agri-environmental schemes administered

in the UK (e.g. via ELS/UELS in England and SRDP's Rural Priorities programme in Scotland) link funding to prescriptions that are designed to enhance the delivery of ecosystem services, these represent a relatively small proportion of all Government payments to land owners and managers. The current system does not consider the scales at which some ecosystem services (e.g. carbon sequestration and flood management) need to be managed in order to be delivered effectively, and payment levels do not take into account the different costs of delivering the same service in different contexts. Payments tend to focus on one ecosystem service at a time without necessarily considering knock-on effects to other ecosystem services provided by the same piece of land or connecting with wider societal issues as revealed through spatial planning considerations (for example Section 106 and Community Infrastructure Levy).

Given the fact that land owners and managers derive so few benefits themselves from many of the ecosystem services provided by the peatlands that they manage, (e.g. "externalities" such as flood protection or carbon storage – see section 1.4), there is a case for public intervention (Jack *et al.*, 2008). Payments for Ecosystem Services (PES) represent an increasingly discussed policy solution to delivering cost-effective service provision. PES is the practice of offering incentives to individuals or communities in exchange for voluntarily undertaking actions to increase the provision of well-defined ecosystem services that it would not otherwise have been economically viable to provide (after Wunder, 2007; Jack *et al.*, 2008; Sommerville *et al.*, 2009). By rewarding land owners and managers on the basis of the services they provide, PES provides a more explicit incentive to provide public goods for which they are not currently paid (Engel *et al.*, 2008). Importantly, PES may be able to help target policy incentives to areas where they can maximise the provision of a wide array of services in places where they are most needed, and where they can be most efficiently delivered. There is evidence that spatially targeting payments in this way enhances the economic efficiency of payment schemes (Wunscher *et al.*, 2008; Klimek *et al.*, 2008), offering the possibility of providing better value for taxpayers' money. Partly this is because targeting in this way allows payments to take account of natural variability in peatland environments. By facilitating land owners to collaborate across property boundaries, potentially bidding competitively for funds, it may be possible to further increase economic efficiency and deliver a number of important ecosystem services far more effectively (Groth, 2005; Goldman *et al.*, 2007; Wunscher *et al.*, 2008).

Payments may potentially be made for any ecosystem service, but some services may be easier to moneterise and attract private investment. As detailed in section 2.5, it may be possible to create carbon markets through the GHG Accounting Guidelines. OFFWAT are already paying for clean water via changes in peatland management by funding United Utilities' Sustainable Catchment Management Programme in Bowland and the Peak District[9].

Appendix 1 provides details of a "payment by potential results" approach that could facilitate payments for ecosystem services in peatlands. Table 4 suggests a range of options that could be incentivised under such a system, based on workshop findings from previous research.

Table 2 *Options for policy and practice that could be incentivised under a new system to enhance the sustainability of peatland management and adaptive capacity under future climate change (*based on a combination of facilitated site visit discussions [source a], an expert workshop [source b] and three 'research outcomes workshops' [source c] as part of the Sustainable Uplands project, and interviews and questionnaires using the Delphi technique from the Sustainable Estates project [source d])*

[9] http://unitedutilities.co.uk/scamp.aspx

Sustainability strategies	Policy and practice options	Source*
Managing risks to peatland environments	Restore peatlands e.g. gully and grip blocking to reduce erosion, riparian improvements	a, c, d
	Manage increasing recreation e.g. wildfire risk control, access management	a, c, d
	Manage visual and ecological impacts e.g. balance between grazing and heather burning, bracken control, removing grazing from sensitive areas/ restoration sites	b, c, d
	Include carbon storage/management payments in Environmental Stewardship grant schemes e.g. future farm payments linked to carbon sequestration	b, d
	Penalise inappropriate or damaging management outcomes	a, d
Managing peatlands for the long-term	Draw up long-term, integrated spatial plans for future change e.g. rewetting peat soils, woodland regeneration etc.	a, b, d
	Diversify income streams and add value to products, widening options e.g. investment in non-agricultural economic activity, managing for quality rather than quantity	a, b, d
	Develop innovative tax/trading systems e.g. individual 'carbon allocations', 'carbon tax', 'offsetting' schemes	a, b
	Provide financial incentives for multi-purpose, integrated benefits	a, b, c, d
Encouraging creativity in peatland management	Exemplify and reward creative and passionate land managers that make changes rather than allowing change to dictate practices	a, b, d
	Share best practice e.g. disseminate peatland restoration techniques/technology, exchange ideas/best practice between innovative practitioners and other stakeholders	a, b, c, d
	Deliver integrated training for land managers that encourages new skills, approaches and imagination	c, d
Managing peatlands collaboratively	Join up thinking and dialogue among stakeholders e.g. finding common ground, involving communities in decision-making and management, peer learning schemes	a, b, d
	Partner across the region e.g. habitat linkages, managing increased recreation, membership of cross-boundary fora	a, b, c, d
	Co-ordinate control of common problem species across management units e.g. new options for deer management and the control of tick populations	c, d
In-depth understanding of peatlands	Long-term, standardised monitoring to grow evidence base and develop best practice, increasing knowledge and management effectiveness, e.g. better understanding of: what allows gullies to re-vegetate	a, c, d
	Raise public awareness of peatland management e.g. educate about the multiples uses of peatlands and the role of land managers, provision of ranger service to educate/monitor access	a, d
	Integrate local experience and knowledge into management	a, c, d
	Offer advice for the management of peatlands	a, c

3.8 Conclusion

The range of instruments available for policy interventions is perhaps bewilderingly large. Even categorising individual instruments into the six classes described above may not remove apparent confusion over choices. Different types of instrument clearly have different

advantages and disadvantages, both in terms of their technical characteristics and their (political) acceptability. Another perspective on this is offered by considering how the presumed distribution of property rights is reflected in the baseline reference level of environmental quality (or performance, or level of ecosystem services) against which change is compared (Bromley & Hodge, 1990) (Figure 6).

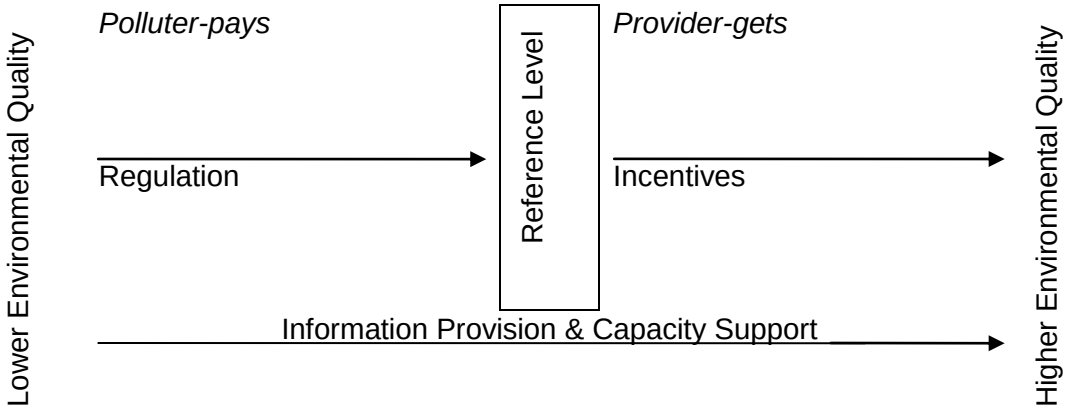

Figure 2 *Reference levels and instrument choices*

If land managers deliver environmental quality above the reference level, society rewards them (the "provider-gets-principle") implying the use of incentive instruments (via either existing or new markets), but if they deliver below it they are penalised (the "polluter-pays-principle") implying the use of regulatory instruments. The position of the reference level is not fixed but can change over time as scientific understanding and societal preferences evolve - although the political process by which this happens can be slow and complex. For many aspects of rural land management, the reference level has historically been relatively low, granting environmental property rights to land owners and managers and favouring incentives over regulation.

However, Figure 8 also shows that information provision and capacity building can be used in either case and both can be usefully deployed to support both regulatory and incentive-based approaches. This packaging of different types of instrument is the basis of "smart regulation", using combinations of instruments to deliver policy objectives rather than dogmatically preferring any individual instrument in isolation (Gunningham & Grabosky, 1998; Howlett & Raynor, 2007; Goulder & Parry, 2008).

4. Some Policy Options for Sustainable Peatland Management

4.1 National co-ordination of peatland policy and knowledge exchange

1. A range of options can be pursued to restore peatlands damaged by inappropriate management (such as drainage), based on the latest available research. This includes: ensuring land managers have access to and capacity to use the latest restoration

techniques; exchanging knowledge about new techniques and the relative performance of existing techniques; continuing to finance peatland restoration through existing schemes; and facilitating private funding of peatland restoration for carbon and other benefits.

2. There is a need for a national research, policy and practice community to exchange knowledge and create a shared agenda for understanding and sustaining upland and peatland ecosystems, human communities and the ecosystem services they provide under current and future land use and climate. By co-ordinating activities and integrating networks around a shared agenda, it may be possible to build teams that can attract additional external funding for research that provide a strong evidence base for development of effective peatland management and policy

3. Raising public awareness of the nature of benefits derived from peatlands (and the risks to these benefits) may itself help to achieve more sustainable management through altered consumption patterns (in particular peat products) e.g. via leaflets, interpretation boards and ranger services as well as more general public information campaigns and product labelling. Given the costs of doing this, awareness raising should be targeted to areas where restoration is most needed or being done, and integrated with schemes such as visitor payback (suggestion 12)

4.2 Accessing private finance for peatland restoration via carbon markets

4. Private financing of peatland restoration for carbon and other benefits by companies who wish to become carbon neutral, but are unable to further reduce greenhouse gas emissions at source, could supplement the cost of existing agri-environmental schemes (by at least 20%). This could free up money to incentivise cross-boundary collaboration between land owners and managers for the delivery of ecosystem services at wider spatial scales (see suggestions 9 and 10). Government may consider establishing its own carbon offset scheme based on peatland restoration (administered by DECC). This would need to be co-ordinated with and may potentially feed into existing peatland management schemes e.g. under UELS and SRDP (see suggestion 3). This scheme could potentially provide accreditation to peatland restoration activities that meet certain standards under DEFRA's Greenhouse Gas Reporting Guidelines. These standards would need to be set out in some form of new UK Peatland Carbon Code along with revision of DEFRA's Reporting Guidelines (see suggestion 7)

5. A multi-stakeholder group could be formed to develop a UK Peatland Carbon Code to quantify the emission reductions from peatland restoration projects in the UK and demonstrate to potential programme administrators and funding partners that greenhouse gas benefits from these projects can be reliably measured

6. To help focus effort, land and project participants for a carbon based peatland restoration pilot project(s) could be identified, targeting land where implementation costs are relatively low and where there is opportunity to scale up in the future (e.g. grip or gully blocking in upland blanket bogs)

7. In the longer-term, it may be possible to access much larger markets and hence leverage greater funding for peatland restoration if this could become part of a voluntary programme that could enable carbon credits from restoration to be traded on voluntary carbon markets. However some form of Government registry would then be required to record greenhouse

gas removals by peatland restoration projects to prevent double-counting under the Kyoto Protocol

4.3 Improving links between agricultural payments and provision of ecosystem services

8. The efficiency with which agricultural payments deliver ecosystem services could be enhanced by linking the two more effectively in a spatially targeted scheme that incentivises cross-boundary collaboration for the provision of certain services. This review suggests a framework for an input-based Payments for Ecosystem Services scheme in which: i) the potential of the land to provide different ecosystem services under different forms of management is first assessed; ii) the relative value to society of ecosystem services provided under different forms of management is assessed to derive a spatially targeted list of priority ecosystem services; iii) payments to land owners and managers are differentiated so that higher rates are available to support management for priority ecosystem services in the locations (and at the scales) that can most effectively provide them; and iv) management plans are then negotiated with land owners and managers and other relevant peatland stakeholders. Potential to provide services would be based on evidence from models used to identify and avoid the worst trade-offs between ecosystem services associated with different land management options. Spot checks of service provision would be a cost-effective first step towards a payment-by-results system linking rewards to environmental outcomes, while allowing farmers to select relevant methods. Such a scheme might help protect priority peatland ecosystem services from non-statutory sites, against the backdrop of the weakening of Government agencies or non-departmental public bodies core services through budgetary cuts. A trial scheme of this type could be piloted, for example in the Peak District National Park where attempts have been made to validate and calibrate the models.

9. Independently-facilitated groups could help negotiate these agreements: bringing together land management representatives and other stakeholders, with advisors within target areas; fostering negotiations on changes in land use and management to deliver a range of ecosystem services at that local scale; identifying locations that could most efficiently and sustainably provide different ecosystem services, by drawing on computer models and secondary data; bringing together scientific evidence, and critical knowledge from local land managers and others, to deliver local rather than ‘one-size-fits-all’ solutions; informing and validating the menu of ecosystem services to be rewarded in the area, and advising on how to target investment, in the interests of efficiency and effectiveness; and reconfiguring or creating new incentives to deliver the desired ecosystem services as efficiently as possible

4.4 Encouraging cross-boundary collaboration between peatland stakeholders

10. Agri-environmental schemes could include more collective payments to facilitate the management of ecosystem services across property boundaries and support self-governance of groups consisting of land owners and managers working alongside other peatland stakeholders. The simplest way to achieve this might be to provide a “co-operation bonus”, as currently happens under SRDP’s Rural Priorities via bonus points for collaboration. Those who do not co-operate with neighbours would not lose their subsidies but those who choose to co-operate would receive bonuses. This sort of incentive may be particularly important for the extension of habitat management beyond existing designated

areas in the face of climate change, and could be spatially targeted to areas that would provide particularly valuable habitat benefits.

11. Alternatively, Government may wish to consider an “entrepreneur incentive” that rewards creativity by providing payments to groups who choose to co-operate at a landscape scale to design their own strategies for providing ecosystem services. If groups competitively bid for funds, so that payments are linked to implementation costs, it may be possible to significantly increase the financial efficiency with which ecosystem services from peatland are delivered

4.5 Improving the planning system to benefit peatlands

12. Peatland communities could play a greater role in planning decisions, for example as part of the UK coalition Government’s Big Society initiative, prioritising local developments necessary to enable these remote communities to thrive e.g. visitor payback schemes can be tailored to local needs and help create a shared understanding of the environmental and economic benefits of peatlands. This will allow a more systematic approach to the delivery of economic and social infrastructure and encourage innovation and diversification in peatlands e.g. providing better mobile phone and high-speed broadband coverage in remote peatlands, including support for more community broadband schemes and improvement broadband for local communities and businesses via upgrading of public infrastructure (like schools)

13. Section 106 of the Town and Country Planning Act 1990 and the emerging provisions of the new Localism Bill in England and other policy instruments elsewhere (such as visitor payback) could be used to finance sustainable peatland management or restoration where developments take place within close proximity to peatlands and agreements can be secured between developers, visitors and planning authorities to offset adverse environmental effects of development. Similarly, the proposed Community Infrastructure Levy (currently on hold) could, in theory, provide funding to nearby peatland habitats and species that are considered to benefit the local community (as an alternative to funding the redevelopment of town halls etc.)

14. Spatial Planning might be able to help enhance the conservation value of peatlands under climate change through extending the area of habitat in good condition, utilising the concept of “green infrastructure” to connect current protected areas to non designated peatlands whilst providing a national to local framework for the delivery of spatial planning objectives

15. Re-consider a levy on extractive uses of peat. This was ruled out previously as administrative costs outweigh returns, but it may now be worth reconsidering. According to Which? Magazine, the three top performing “best buy” composts now are peat-free. Given that Defra follows the Ecosystems Approach, any decision on a levy should consider the wider benefits of preventing peat-cutting (e.g. on carbon, water quality, biodiversity). It may be possible to significantly reduce administrative costs of incorporating peat levy into the existing Aggregates Levy or the Community Infrastructure Levy to discourage extraction via the planning system. It may also be possible to divert peat extracted during infrastructure development (e.g. for wind turbines) to be used in the horticulture industry.

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Appendix 1: Payment by Potential Results – a Possible Framework for Paying for Ecosystem Services in Peatlands

With the increasing sophistication of computational modelling and valuation methods, it may soon be possible to realise an input-based, "payment by potential results" scheme that targets payments to the peatland locations (and at the scales) that can most efficiently provide priority ecosystem services without exposing land owners and managers to unnecessary financial risk. Figure 4 suggests a theoretical framework that may facilitate the development of such a scheme.

Step 1: Determine potential of land to provide ecosystem services under different forms of management

We suggest that first it is necessary to determine the potential of peatlands to provide a range of ecosystem services under different forms of management. Modelling would be used to help identify areas where the greatest ecosystem services benefits could be expected with payments linked to these potential results. Land management options in different locations would then attract different levels of payment depending on the potential of the land to provide ecosystem services under the management options that are chosen by land managers. For any given ecosystem service, multiple land management options could be provided for land managers to select, based on their local knowledge, to achieve multiple outcomes.

Figure 4: *Theoretical framework for a "payment-by-potential-results" PES scheme*

Instead of the intensive monitoring required under a pure "payment-by-results" approach, models would be calibrated and validated using "spot checks" which would cost much less. As models are refined, so the assumptions upon which payments are based could be further refined. We argue that even imperfect assumptions based on a modelled evidence base are likely to deliver more benefits for society at less cost. It is an approach that attempts to find a balance between the current approach of paying for activity and the ideal but more difficult to

implement approach of paying for results by using modelling to more clearly target support payments on those areas and activities that have the highest potential for delivering ecosystem services. One of the advantages of a model-based approach is the capacity for dynamic assessment of ecosystem service potential, as it is influenced by future climate change. In this way, it is possible to ensure that payments are based on a dynamic evidence-base that prevents future payments being made for activities which are no longer likely to provide benefits.

Step 2: Determine relative societal value of ecosystem services provided by different forms of management

Multi-functional landscapes inevitably lead to trade-offs between ecosystem services, which mean we will be faced with difficult choices about which ecosystem services to prioritise where. If ecosystem services are defined as the benefits that society derives from nature (after MA, 2005), then there is an argument for involving members of the public in these decisions in addition to land owners and managers.

While a combination of expert led and bio-physical modelling and research can identify where and how much different locations or habitats might contribute to ecosystem service provision in broad terms, this does not identify how much ecosystem services are worth, or how much should be paid as an incentive for managing them. Answers to these questions are inevitably subjective, as some people will place higher value on one ecosystem service than another and/or at different times or locations. There have, however, been significant developments in approaches to determine the value of ecosystem services. These may be used together with the knowledge about the relative impact different management regimes have on ecosystem service provision (Step 1) to determine incentive payments that reflect the value placed on a service by society.

In economic terms, the value of ecosystem services can be thought of as the way in which they contribute to different elements of 'Total Economic Value' (TEV), which comprises both direct (e.g. for food, fuel, or recreational use of natural areas) or indirect use (e.g. regulation of the water and carbon cycles) and non-use values (e.g. derived from the knowledge that biodiversity is being protected for future generations to enjoy).

To assess these values environmental economists have developed a range of economic techniques to capture some or all of the elements of TEV (Christie et al 2008), with some methods being more suited to capturing the values of different elements of TEV than others (e.g. revealed preference techniques might be more suitable for capturing use values while stated preference techniques might be more suited to capture non-use values.

Of course, although environmental valuation studies have now been generally accepted by both academic and policy-making communities (Arrow *et al.*, 1993; HM Treasury, 2003), there has been (and still is) debate about the validity of these methods (Sagoff, 1988; Diamond and Hausman, 1993; Bate, 1994; Gowdy, 2004).

In particular, there is a need to integrate discussion and reflection, and possibly background information, for people to recognise the significance of some ecosystem services (e.g. climate regulation) for their livelihoods and wellbeing. We deal with this in the following step.

Step 3: Differentiate payments so higher rates are available to support management for priority ecosystem services in the locations (and at the scales) that can most efficiently provide them

The values that members of the public assign to ecosystem services differ between regions, habitats and between stakeholder groups. For example, flood mitigation services might be more highly valued by people living within a floodplain than on a hillside, and peatland tends to have higher recreational values if located near a city. In contrast, the value of other services such as carbon sequestration tends to be the same wherever it occurs.

DEFRA's UK BAP Study (Christie *et al.*, 2010) showed how it is possible to derive spatially explicit information about the value people put on different ecosystem services from different locations. The project aimed to determine the economic value of implementing the UK Biodiversity Action Plans (e.g. the economic value of improving or extending the habitat of a threatened species). In this project, the researchers used the following steps:

i) Researchers used choice experiments to measure the public's value for a range of ecosystem services across 12 UK regions, giving participants time to acquire, discuss and reflect on information about the UK BAP and associated services;

ii) The relative contribution of different habitats to ecoystem services was achieved using a 'weighting matrix' in which ecological experts were asked to undertake a series of exercises that allowed them to allocate a range of services to different BAP habitats; and

iii) Information from the previous two steps was combined, together with the spatial area of each habitat, to determine the value of ecosystem services delivered by different BAP habitats across the UK (Table 3 – see Christie *et al.* 2010 for regional analysis). These results demonstrate that climate regulation and water regulation are the most highly valued services in peatland habitats.

We argue that this type of information could inform decisions about which ecosystem services to prioritise where. Further, this data could also be used to set differential payments for services that support management that provides services in locations where they are most highly valued.

Table 3: *Value of ecosystem services delivered by the UK BAP on peatland habitats (£m per annum).*

Ecosystem services	Blanket bog (£m)	Lowland raised bog (£m)	Fens (£m)
Wild Food	0.43	0	0.04
Non-food products	1.37	0	0.04
Climate regulation	226.88	0.94	0.06
Water regulation	231.57	-0.16	0.08
Sense of Place	37.55	0.23	0.00
Charismatic species	80.75	0.27	0.15
Non charismatic species	28.94	0.21	0.05
Total value	**607.49**	**1.49**	**0.43**

Step 4: Negotiate management plans with land owners and managers

This sort of policy change could only be considered through close participation with stakeholders. The need to manage certain ecosystem services at a landscape scale (such as flood prevention, water quality and habitats for species of both commercial and conservation value), requires co-ordination between land owners and managers at scales not currently seen in the United Kingdom and rarely seen internationally (Goldman *et al.*, 2007; Schwarz *et al.*,

2008). But how could agricultural payments more effectively encourage collaboration and co-ordinate actions to manage ecosystem services at a variety of scales, including those that cross land ownership boundaries?

In workshops conducted for this review, land owners and managers appeared to be aware of the need for co-operation across land ownership boundaries to manage certain ecosystem services, and this is already happening to an extent for nature conservation in designated sites (e.g. through the development of management plans in collaboration with Natural England, Scottish Natural Heritage, Countryside Council for Wales and the Environment and Heritage Service in Northern Ireland) and water quality through river basin management plans and programmes of measures under the Water Framework Directive. However, workshop participants were equally keen to emphasise the potential challenges of more collaborative working. For example, some tenants said their landlords were reluctant to facilitate collaboration between different estates, despite the willingness of tenants to co-ordinate work together. Payments can go directly to land owners under the new Upland Entry/Higher Level Scheme, but in this case tenants have less influence over the way they manage the land.

Linked to this, workshop participants emphasised the need for continuity and stability, so that they do not feel as though they are "chasing a moving target". Land owners and managers favour agreements that can guarantee payments for periods of at least 5 years that can allow them to plan ahead. A number of participants at the workshops expressed the view that these agreements must take into account the practicality of land management without bringing with them additional administration obligations. Participants suggested that uptake of new initiatives could be increased if the issues were communicated clearly and effectively to all stakeholders involved, acknowledging the importance of an influential social network when attempting to successfully introduce change in this area.

Goldman *et al.* (2007) suggest three ways of configuring payments to incentivise co-operation between land owners and managers:

i) A "co-operation bonus" would reward the provision of ecosystem services even without cooperation but adds a bonus for land owners and managers who choose to co-operate to provide services that span property boundaries (*c.f.* Parkhurst *et al.*, 2002). This is already done in the UK under SRDP's Rural Priorities via bonus points for collaboration with other applicants, based on regional priorities[10];
ii) An "entrepreneur incentive" would reward creativity by providing payments to land owners (including third parties who bring land owners together) who choose to co-operate at a landscape scale to design their own strategies for providing ecosystem services. In this system, all payments would be conditional upon cooperation; and
iii) Land owners could be allowed to vote to join a group of neighbouring owners to form an "ecosystem service district" through which payments for specific ecosystem services would be channeled. However, such districts may be complex and expensive to administer, particularly in peatlands where there are multiple overlapping ecosystem services.

[10] SRDP Rural Priorities – Proposal Assessment Criteria: http://www.scotland.gov.uk/Resource/Doc/915/0075659.pdf