

# Sinks, stores and soils – conserving land based carbon

Seminar Report

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Asiantaeth yr  
Amgylchedd Cymru  
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# 1 Introduction

## 1.1 Seminar aims

Conservation of land based carbon stores is widely recognised as a key priority for future land management. But does this receive due attention in efforts to tackle climate change? What should land managers be doing and how can they be rewarded? These are the issues this seminar set out to consider, the aim being to examine what ‘farming for carbon’ may mean and how it can be delivered.

There are a number of ways agriculture and land management contributes greenhouse gas emissions, or can make a difference to climate change. The focus here was the carbon beneath our feet in soils and land; how it can be protected and restored, and how to maximise land based carbon storage.

A range of experts from the fields of land management, conservation and climate change investigated the challenges of conserving land-based carbon and considered some practical solutions. There were opportunities to hear about good practice and analyse the tools already in place to protect and restore carbon stores. The focus was on participant discussion, seeking consensus on what action is required.

A review of Axis 2 of the Rural Development Plan for Wales is in progress and will propose how agri-environment schemes can better deliver environmental outcomes. The seminar took the opportunity to consider the role of these schemes in carbon conservation. This report contains a number of proposals for a revised Axis 2.

## 1.2 Why carbon conservation?

Other than the oceans, soil is the world’s largest store of carbon making it a crucial concern for climate change and reduction of greenhouse gas emissions. Research suggests a number of ways land use and cultivation are causing carbon emissions from land.

In recent years the trend has been for organic content of soils to decline: between 1980 and 1996 the average organic carbon content of the upper 15cm of Welsh soils under arable and permanent grassland declined by about 0.5%<sup>1</sup> with an associated increase in carbon emissions. Whilst the area of eroded peat in Wales has not been quantified, studies of upland erosion show that it is most extensive on organic (peat) soils.<sup>2</sup> Carbon losses from bare peat surfaces are estimated to be in the range of between 10 and 30 mm/ha/annum.<sup>3</sup>

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<sup>1</sup> Centre for Ecology and Hydrology 2002

<sup>2</sup> ECOSSE p67, 76

<sup>3</sup> ECOSSE p76

There are many benefits to be secured through carbon conservation in addition to climate change mitigation. Those identified by seminar participants included:

- habitat conservation and protection of biodiversity
- soil conservation
- landscape conservation
- protection of culturally significant sites and features
- regulation of water flows and improved water quality.

It was suggested that the seminar think in terms of protection and restoration as the goals for carbon conservation so existing stores are maintained and potential stores are realised.

### 1.3 *Seminar report*

This report summarises the presentations made to the seminar and the participant discussions which took place. Summaries of each discussion are based on the records made by the discussion groups and also incorporate written submissions received following the seminar. The report concludes with a reflection on the event.

### 1.4 *Acknowledgements*

Thanks to all those who participated in the seminar especially those who made presentations and acted as facilitators. Thanks also to Environment Agency Wales for hosting and supporting the event.

## 2 The significance of land based carbon to climate change

### **'Soils and their management in light of climate change'**

Presentation by Dr Roger Wade Climate Change Policy Advisor,  
Environment Agency Wales

#### 2.1 *Climate change: a global and local challenge*

Climate Change is a global problem and has been identified as a key priority for governments at all levels. The scientific and political community now accept that this is happening and that natural factors cannot explain recent warming. The scientific consensus is that this warming is mainly caused by human activity. Increased CO<sub>2</sub> in the atmosphere is warming the planet. In the last 150 years the atmospheric concentration of CO<sub>2</sub> has risen from 270ppm to 380ppm. To prevent "dangerous climate change" requires limiting CO<sub>2</sub> levels to 550ppm which means large reductions in emissions.

A certain level of climate change is now unavoidable. This is relatively predictable to 2040; what happens after that depends on how well we can reduce the global emissions of CO<sub>2</sub>.

The Stern Report<sup>4</sup> outlines the likely impacts of various temperature increases on food, water, ecosystems and extreme weather events and sets out the imperative to reduce CO<sub>2</sub> in the atmosphere by any means possible. It also shows that major irreversible changes can be expected somewhere between 2 and 3 degrees. This equates to atmospheric CO<sub>2</sub> of 450-550 ppm and will demand a cut of between 50-75% of the present emissions.

The Climate Change Bill sets UK targets for emission reduction of 28-32% by 2020 and 60% by 2050. The aspirational target for Welsh Assembly Government is 3% per year by 2011 in areas of devolved responsibility.

Sequestration must be a part of the response if such targets are to be achieved. If existing stores of carbon –soils, bogs, forests- are not protected and preserved then these targets will not achieve the desired results. Both are important- protection and sequestration.

#### 2.2 *The Carbon Cycle*

Human activity disrupts the balance of the natural carbon cycle. At present just over half of emissions arising from human activity are absorbed by land or the oceans. The other half remain in the atmosphere as CO<sub>2</sub> and are giving rise to the consequences of global warming.

It is then very important to ensure that the sinks of soil, vegetation and the sea remain in good order- and if we can help the natural processes to absorb more then the consequences of increased greenhouse emissions can be reduced.

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<sup>4</sup> [http://www.hm-treasury.gov.uk/media/4/3/Executive\\_Summary.pdf](http://www.hm-treasury.gov.uk/media/4/3/Executive_Summary.pdf)

### 2.3 Carbon Storage

Carbon is stored in various components of the cycle including 2000 Gt C in soils. This is much greater than the 500 Gt C stored in vegetation. Total carbon storage increases annually by 3.2 Gtonnes / year.

Welsh soils are estimated to store 150Mtonnes of carbon. The annual decline in Welsh soil carbon as calculated by the Cranfield Institute is 1.2 Mtonnes. If this is all lost to the atmosphere this would equate to around 10% of Welsh emissions of green house gases.

### 2.4 Agriculture and climate change

There are a number of ways agriculture can mitigate the causes of climate change, for example, reducing nitrogen emissions through slurry management. The Climate Change Levy encourages farmers to invest in energy efficiency and there are CAP incentives for energy crop production.

Crucially, agriculture has a role in carbon sequestration and storing carbon in soils and vegetation. Practices such as shallow tilling, converting arable land to grassland, and woodland management all have potential.

Figures from the Cranfield Institute indicate the potential for soil sequestration:

<u>Land use</u>	<u>Soil TC/ha/yr</u>
Broadleaved woodland	2.5
Coniferous Woodland	2.0
Upland coarse grass	1.3
Blanket Bog	0.7
Arable Crops	2.7
Permanent Grass	3.9
Reclaimed land	0.4

### 2.5 Climate change impacts

The best predictions we have for Wales' climate up to 2080 indicate some key risks with profound environmental, economic and social impacts:

- hotter summers, milder winters
- longer growing season
- more rain in winter, less in summer
- warmer seas and sea level rise 18-79cm
- increase in extreme years
- more droughts, heatwaves, flooding
- frequent and violent storms/gales

It is important that land and soils are protected against these changes. Likely impacts include:

- damage to cropping land on coasts, estuaries and floodplain

- increased irrigation needs in drier periods
- increased waterlogging and working on wet ground
- increased soil erosion through flash flooding
- salinisation of ground water due to decreased rainfall and increased temperatures
- subsidence.

It is difficult to predict how climate change may affect soils and their capacity to store carbon. Given that extremes of temperature and rainfall will be more likely, it is expected that erosion and drying will increase, reducing soil's capacity to store carbon.

The predicted impacts of climate change are likely to accelerate erosion of peat and therefore increase carbon emissions. A warmer climate will further dry the peat surface and an increase in severe rainfall events is likely to cause an increase in peat erosion.

As agriculture adapts to climate change, different practices will be introduced such as water storage, sprinklers and wallows to provide water and cooling to livestock.

### 3 Causes of carbon loss

#### 3.1 *Suggested causes of carbon loss from soil*

The main causes of carbon loss from soil identified in the recent ECOSSE report were used as the basis for discussion. These are:

- a. conversion of grassland, forests and natural vegetation to arable systems
- b. deep ploughing, causing rapid mineralisation of organic matter
- c. overgrazing which removes above ground vegetation, decreasing litter incorporation to the soil system
- d. soil erosion
- e. uncontrolled or poorly managed heather burns which burn soil organic matter
- f. increased temperatures.

The following additions to the list of causes were proposed by participants:

- g. soil sealing associated with building and development
- h. undergrazing
- i. forestry and tree planting on peat soils
- j. irrigation and increased run-off soil caused by soil compaction may exacerbate erosion.

Participants discussed whether this list is accurate and comprehensive. They agreed that all the suggested factors can be a cause of carbon loss with the following caveats:

- conversion of land to arable systems is not significant in Wales at present
- short term changes (e.g. temporary grass leys) should not be considered in isolation
- deep ploughing is unlikely to be significant at present
- the small area of arable production in Wales means summer fallow is not a significant issue
- the fate of carbon – particularly in dissolved form- lost through erosion is unknown
- problems related to burns often relate to arson
- further research of the impact of increased temperatures is required.

It was noted that the complexity of the processes at play and number of variables makes generalisation difficult. A particular activity will not necessarily always result in carbon loss; this depends on specific factors at that location and how the practice is undertaken. This makes it crucial to have a good understanding of each particular site and the site-specific causes of carbon loss, only then will it be possible to determine what actions will be beneficial.

There was agreement on the need for more and better data, for example on carbon sequestration rates, to improve the accuracy of the evidence and reach consensus on the science. Research has indicated a correlation



between temperature increases –as predicted under climate change- and mineralisation of soil but this is one area suggested for further investigation.

The issue of other greenhouse gas emissions was also raised with some concern about a focus on carbon to the exclusion of nitrogen and methane emissions. There is potential for changes in the nitrogen cycle to increase NOx emissions which would cancel out carbon savings. It was agreed that the full range of greenhouse gases must be considered when looking at soil issues.

### 3.2 *Suggested causes of carbon loss from peat*

Peat can be a source of greenhouse gases in several ways (See diagram p11).

The main causes of carbon loss from peat -both as a gas and in dissolved form- as suggested in the ECOSSE report were taken as the basis for discussion. These are:

- a. climate- erosion increases with altitude, summer drought dries the soil surface making it more vulnerable to erosion and wildfire
- b. burning- accidental and unmanaged fires
- c. grazing- can alter ground vegetation and in the extreme create bare patches of peat, exposing it to further erosion
- d. atmospheric pollution- acid deposition from industrialisation is thought to cause loss of Sphagnum and consequential loss of organic matter
- e. artificial drainage- artificial drainage may have altered the natural hydrology of peatland systems, potentially making them more susceptible to erosion forces
- f. bog bursts and slides –severe erosion events triggered by intense rainfall and increase with heavy storms
- g. trampling – by vehicles or walkers.

Participants proposed the following additions to the list of causes:

- h. land use change – including changes in response to CAP reform and climate change
- i. afforestation- change of land use to or from forestry
- j. road building and development- including windfarm developments on peat
- k. water resource management.

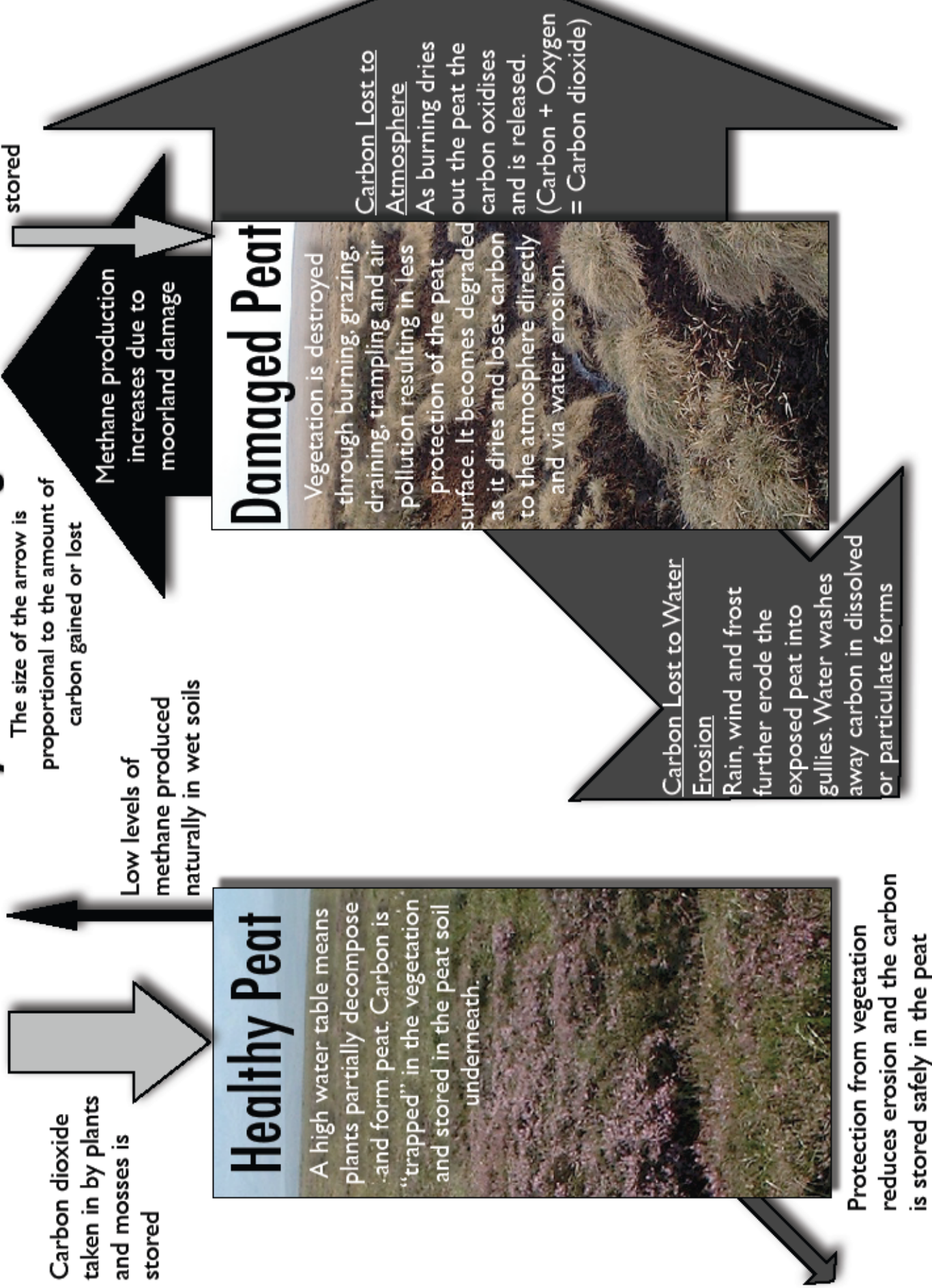
Participants discussed whether this list is accurate and comprehensive. They highlighted the importance of recognising carbon loss both to the atmosphere and in dissolved form. It was noted that the fate of carbon lost from soil is not certain. It was also noted that in relation to climate it is acidification and increased rain fall which result in erosion, and hence carbon losses. It was felt that the phenomena of bog bursts and slides is too rare to require significant consideration.

It was suggested that the main causes can be grouped into three categories: drying, erosion and land use change. Drying may be due to drainage, climate change or water extraction. Erosion may be related to drying or caused by development and inappropriate management. Land use may change through agricultural practice, forestry or development.

Whilst none of the individual causes were disputed the conclusion was that it is vital to consider all in their entirety rather than focus on single issues. The cumulative impact of a range of causes and interaction between them necessitates a holistic approach. The causes interact and work in conjunction so it is ineffective to address one in isolation. This is also important in light of the scale of external pressures such as industrial pollution.

Discussion also highlighted that some pressures are easier to remove and it may be sensible to focus on these rather than those which are difficult to control.

# Carbon Cycle and Storage in Peat



## **4 Existing land management tools and techniques for carbon management**

### **'Protecting Soil Carbon in Wales'**

Presentation by Peter Redfern, Environment Agency Wales

#### *4.1 Introduction*

What controls are in place to offer a degree of protection to soil carbon or carbon rich soils such as peat? Most controls are designed to protect other assets such as habitats or landscape rather than carbon per se and there is very little to protect carbon levels in mineral soils. That carbon protection often happens by proxy rather than design should not be undervalued – particularly when seeking multiple outcomes.

The main controls can be loosely divided into three scales: landscape, local and field scale. In many respects it is only at the two smaller scales that there is any real control on practices.

#### *4.2 Landscape scale*

Protection of soil carbon at a landscape scale is possible through:

- a. National Parks- aim to conserve landscape and protect special qualities of that landscape, park authorities work in partnership with land managers to encourage sympathetic management, also provides some planning restrictions.
- b. AONBs- similar to National Parks but managed by local authorities.
- c. Major Land owners- can implement certain policies on how land is managed by tenants or undertake special projects.

There are limited controls available and most are by negotiated management agreements. However, marketing of unique features and landscapes can provide economic incentives to better manage soil carbon.

#### *4.3 Local scale*

Protection of soil carbon at a local scale is possible through:

- a. Special Protection Areas – designated under the Birds Directive to preserve or re-establish habitats, 19 in Wales.
- b. Special Areas of Conservation - designated under the Habitats Directive, 90 in Wales designated for species and high habitat value.
- c. RAMSAR sites - Largely to protect important wetland sites but can offer protection for carbon rich soils such as those in bogs and fens, 10 sites in Wales.

- d. SSSIs—largely underpin Natura 200 and Ramsar sites 1000 in Wales comprising 11% of total land area.

National legislation protects these important habitats with CCW formulating agreements for their management. Public bodies have a duty to ensure activities do not adversely impact these sites which is enforced under the CRoW Act. Whilst these sites are not selected for soil or carbon the protection and management of these sites can protect and reinstate habitats that are associated with carbon rich soils such as peatlands and bogs. It may be useful to consider adapting these designations to acknowledge the importance of carbon protection.

#### 4.4 *Field scale*

Regulatory protection operating at a field scale is:

- a. Environmental Impact Assessment- EIA regulations are divided into a number of 'topic areas'. Planning largely controls mineral /peat extraction. Agriculture controls the management of uncultivated and semi-natural land e.g. cultivation, clearing existing vegetation or draining land. Forestry controls projects associated with afforestation and deforestation. EIA requires impact assessment of the likely environmental consequences of projects and so should prevent development and change that does not meet identified environmental and ecological objectives.
- b. Cross compliance- The main mechanism for regulating subsidy payments through the Single Farm Payment scheme. Good Agricultural and Environmental Condition controls carbon levels in relation to stubble burning, overgrazing, heather and grass burning. The total area of permanent pasture must be maintained so that it does not decline by more than 10% from 2003 national levels. Statutory Management Requirements 6&7 strengthen compliance with conditions and management agreements set out in SPAs, SCAs and SSSIs.

#### 4.5 *Incentives for carbon protection*

In addition to regulatory controls, a number of incentives exist which encourage protection or restoration of carbon rich soils.

- a. Tir Gofal – areas are not selected for carbon reasons but improved carbon management arises through options such as safeguarding existing on-farm habitats and features or reducing stocking rates.
- b. Tir Cynnal - resource management plans encourage land management that is beneficial to maintaining and improving soil carbon levels including grass leys, incorporating organic manures and avoiding deep ploughing. However, management plans do not have to be implemented.

- c. Organic Farming Scheme – encourages more extensive systems including ley rotations and use of organic inputs.
- d. Waste strategies – This will become increasingly important as local authorities have to meet recycling targets so pressure increases to recycle more biodegradable materials to land. EA and WRAP have produced The Compost Quality Protocol 2007, (The quality protocol for the production and use of quality compost from source-segregated biodegradable waste) which sets high standards that incentivise compost use by taking it out of the waste regulatory mechanism.
- e. Industry led incentives - assurance schemes and environmental branding may also encourage carbon management.

#### 4.6 *Future mechanisms*

Developments on the horizon may create regulations which require protection of soil carbon, or provide additional incentives for its management:

- a. Environmental Liability Directive – will only offer protection from soil contamination but will add weight to protection of Natura 2000 sites and potentially SSSIs.
- b. Soil Framework Directive.

## 5 Evaluation of existing tools

### 5.1 Introduction

Participants discussed how effective existing tools are in protecting and restoring carbon. They considered the strengths and weaknesses of the tools outlined above and had the opportunity to identify what other controls are already available. The key issue for consideration was whether these measures tackle the causes of carbon loss.

### 5.2 Analysis of existing tools

The discussion of each tool generated the following results:

a. Cross Compliance	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Requirements have indirectly improved carbon management through reduced stocking rates and better management.</li> <li>• Decoupling of subsidies from production has had the benefit of reducing stocking rates.</li> <li>• Virtually universal.</li> <li>• Supported by payment, with breaches resulting in loss of payment.</li> <li>• Good awareness.</li> <li>• Potential to make better use of this.</li> </ul>	<ul style="list-style-type: none"> <li>• Poor enforcement and a low level of inspection.</li> <li>• Narrow in scope.</li> <li>• Carbon is a hidden element.</li> <li>• Was not designed with carbon in mind.</li> <li>• Farmers have very poor understanding of carbon issues.</li> <li>• Farmer focus is on production.</li> <li>• Lack of clarity regarding cross compliance and delivery of carbon conservation.</li> <li>• Simplification has not brought benefits for carbon conservation.</li> <li>• May be less useful as Single Farm Payment declines in value</li> <li>• Regulatory burden.</li> </ul>
b. Environmental Impact Assessment Regulations	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Can act as a safeguard</li> <li>• Potential to be a tool for carbon conservation.</li> <li>• Development based requirements are well established.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of communication to farmers and land managers on the regulations.</li> <li>• Poor awareness amongst farmers.</li> <li>• Poorly understood in relation to agriculture.</li> <li>• Monitoring and enforcement is poor.</li> </ul>

	<ul style="list-style-type: none"> <li>• Difficult to ensure compliance.</li> <li>• Is only applicable on a habitat basis, not including soils.</li> <li>• Not designed for soils so are weak in this respect.</li> </ul>
c. Agri-environment schemes	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Provide incentives for action.</li> <li>• Funding available.</li> <li>• Organic systems can have positive impacts on carbon conservation.</li> <li>• Have potential to strengthen soil protection and good management.</li> <li>• Less Favoured Areas include carbon rich soils. The LFA could be redesignated on a carbon basis.</li> <li>• 80% coverage of LFA means huge potential to deliver public benefits.</li> <li>• Potential to be used for collaboration and cooperative working on a landscape scale.</li> <li>• Could be targeted.</li> </ul>	<ul style="list-style-type: none"> <li>• Are not carbon oriented.</li> <li>• Resource management plans must be more than a tick box exercise.</li> <li>• Organic farming can damage carbon management and be detrimental to soils.</li> <li>• Organic accreditation must build in carbon safeguards.</li> <li>• Inadequate funding.</li> <li>• Resource Management Plans are seen as a bureaucratic burden.</li> <li>• Designated sites have priority.</li> <li>• Are procedure not product based.</li> <li>• Need updating.</li> <li>• Lack a landscape scale approach.</li> <li>• Lack a way for farmers to work together.</li> <li>• Welfare not habitats or carbon is the key driver of the Organic Farm Scheme.</li> <li>• Inflexible.</li> <li>• Rewards and incentives are insufficient for the effort required.</li> </ul>
d. Designation (SSSIs, SACs, SPAs)	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Potential for carbon objectives to be added.</li> <li>• Some areas of peat are protected by designation.</li> </ul>	<ul style="list-style-type: none"> <li>• Were not designed with soil/carbon in mind.</li> <li>• Not all areas of peat are designated.</li> <li>• No designation for carbon in its own right.</li> </ul>
e. Restoration projects	



Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Targeted.</li> <li>• Multi-objective, improve water quality and habitats as well.</li> <li>• Exemplar.</li> <li>• Improve the knowledge base.</li> <li>• Provide an opportunity for advocacy.</li> </ul>	<ul style="list-style-type: none"> <li>• May not be adequately monitored for carbon impacts and monitoring may be poor.</li> <li>• Carbon must be written into project design and development from the outset.</li> <li>• Short term.</li> <li>• Small scale.</li> <li>• Lack synthesis of methods and results.</li> <li>• Impact monitoring is short term.</li> <li>• Poor monitoring means benefits can't be demonstrated.</li> <li>• Must consider all greenhouse gases.</li> </ul>
f. Farm Advisory Service	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Should provide advice on carbon conservation.</li> <li>• Will be able to promote best practice.</li> <li>• Can transfer knowledge and information.</li> </ul>	
g. Water Framework Directive	
Strengths	Weaknesses
	<ul style="list-style-type: none"> <li>• A top down process which results in some opposition/resistance.</li> <li>• Lack of awareness.</li> </ul>
h. Heather & Grass Burning Regulations	
Strengths	Weaknesses
<ul style="list-style-type: none"> <li>• Clear limits and guidance for managing upland vegetation.</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of awareness.</li> <li>• Lack of engagement with land managers.</li> </ul>
i. Other potentially useful tools: <ul style="list-style-type: none"> <li>• Catchment Flood Management Plans</li> <li>• Commons Act</li> <li>• LEAF</li> <li>• Asset Management Plans</li> <li>• Nitrate Vulnerable Zones</li> </ul>	

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|---|
| <ul style="list-style-type: none"><li>• Environment Strategy and Wales Spatial Plan</li><li>• Carbon Trust activity</li></ul> |
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### 5.3 *Barriers*

Participants were asked to identify barriers which limit the ability of these tools to deliver carbon management. The following were identified during discussion:

- Lack of clarity on exactly what we want to achieve in terms of carbon conservation and management.
- Lack of understanding and scientific knowledge, including lack of knowledge of carbon cycles and the time scales of the processes.
- Lack of accurate information and data to provide a baseline and emissions monitoring.
- Financial costs and lack of funding.
- Lack of economic models and valuations of the benefits and therefore lack of evidence of the economic benefit of carbon conservation.
- The tools were established in isolation so work in isolation of each other and do not meld together.
- Existing tools do not target carbon so carbon outputs are not monitored, carbon management is not required but incidental.
- Inadequate monitoring and analysis of activities.
- Poor communication with farmers and hence their poor awareness and understanding.
- Lack of political will to enforce regulations.
- Tools focus on the local scale with no coordination or facilitation to work at a landscape scale.
- Weak control of disturbance by access.
- It may not be successful to bolt carbon elements onto existing measures.
- Farmers feel the regulatory burden and may resist further controls.
- Lack of a carbon trading scheme.
- Most commons are not participating in agri-environment schemes.

Later discussion gave the opportunity to suggest ways to overcome some of these barriers.

## 6 Protecting soil carbon

### **'Soil protection in the National Trust'**

Presentation by Trystan Edwards, Farm and Countryside Advisor

#### 6.1 *Introduction*

The word 'carbon' did not even feature in the Trust's soil policy devised in 2003. It has now become central to our conservation objectives – a remarkable surge in interest and knowledge- with a number of carbon stewardship projects underway or in development around the UK. Key Trust projects include Wallington Carbon Neutral project, Wicken Fen Vision, High Peak, and the Upper Conwy Catchment project.

The 'Water Resources Risk Assessment' developed for the Trust by Haycock Associates provides a land management tool. It considers the catchment characteristics of Trust properties including land use, water use, soil, flood risk, water dependent habitats etc, and guides management. There is also potential for a Soil Resources Risk Assessment.

Understanding the carbon cycle and its fluxes is vital, and in terms of management, there are some painful truths for some features of conservation interest. For example good cover of heather on blanket bog lowers the water table, inhibiting sphagnum growth and thus bog growth so actually limits carbon storage.

#### 6.2 *Practical measures*

The National Trust uses a range of practical measures to promote carbon stewardship:

- a. Whole Farm Planning- The Trust has advocated and practised Whole Farm Planning since the end of the 1990s. The purpose is to look at all features of the farm: system, infrastructure, skills, nature conservation, resource management, archaeology, and land management. In terms of soil management, it considers cropping, and where there is no permanent pasture, cultivation type, slope, aspect, soil type, buffer and timing. The nature of farm tenancies means that in a number of cases the Trust has very little or no control over farm practice.
- b. Environmental Farm Standards- These are linked to the Fine Farm Produce Award, and are used when farmers wish to use the Trust brand to promote their produce. The Standards combine elements of FAWL, FABBL, organic standards, Freedom Foods and LEAF. Where soil management features heavily, we require full compliance with LEAF.
- c. Leadership in the Countryside- The Trust promotes and encourages best farm practice, including soil management. An annual competition for tenants rewards the best farmer in the

various categories. Good practice is also demonstrated on our in-hand farms; at Dinefwr for example, previously intensive dairy land was taken back in-hand to be managed for reversion to semi-natural permanent pasture.

- d. Training- New for 2008-9 is the Barclays-funded Rural Skills & Training project which will improve the skills and management of our tenants so that the environmental credentials of our farms improve. The range of courses will include Cross Compliance and Soil Management, and other specialist courses including hay meadow management.

### 6.3 Peat restoration

The National Trust in Wales has approximately 4431ha of blanket bog, some of which has been modified. Across the whole Trust there is a total of 14,114 ha of bog, therefore it has a significant amount of ownership of a particularly important habitat type and carbon store. Not all sites are in favourable condition and there is significant potential to improve carbon storage.

Activities are planned and in progress to address this:

- a. Upper Conwy- The vast blanket bog of the Migneint includes several hundred kilometres of grips installed to drain the land. A project has recently commenced to restore the bog condition, and monitor changes in water and carbon levels. The scale of the site means it will be some time before work is completed.
- b. Hafod y Llan - Bylchau Terfyn is a cwm on the property that has suffered from overgrazing and burning, and includes a small number of drains in the valley bottom bog. On a much smaller scale than the Migneint, work could be completed in one day, with no more than 10 or so grip blocks. A change in management is also beneficial, including a significant reduction in the flock size.
- c. Dyffryn Mymbyr- On this blanket bog grips are being blocked by fitting brash bales, heather bales, and constructing timber dams in the network of grips. A number of these ditches should respond quickly to the blocks, and we expect to see sphagnum develop rapidly, others where water is far more active may need more time, and further blocks to help.



Grip blocking on Dyffryn Mymbyr

## 7 Peat restoration activities

### 'High Peak'

Presentation by Helen Meech, National Trust Senior Policy Officer

#### 7.1 Introduction

Eroding peat at the High Peak causes problems of water colouration and sedimentation which result in significant costs for Severn Trent Water, costs which are ultimately borne by water customers. Restoring the High Peak's peatlands would not only benefit raw water quality, thus reducing the need for water treatment, but would also have significant benefits for biodiversity and landscape, and for wider society by reversing the loss of a significant carbon store.

#### 7.2 The Challenge

The Ashop catchment in the Southern Pennines of Derbyshire covers about 125km<sup>2</sup> of blanket peat bog of national and European importance, owned mainly by the National Trust. It supplies drinking water to the communities of Leicester, Sheffield, Derby and Nottingham, through the Ladybower reservoir system of Severn Trent Water plc.

Much of the peat, especially at high altitude, has been subject to erosion and degradation from the combined effects of drought, fire, overgrazing and atmospheric pollution. This has left vast areas of bare peat, with serious environmental, economic and social consequences:

- Oxidation of a significant carbon store;
- The designated SSSI and SAC blanket peat is in unfavourable condition;
- The drinking water is discoloured (the reason for 50% of customer complaints) and needs expensive and energy intensive treatment. The problem has been getting worse since the mid nineties;
- Peat erosion leads to sedimentation of the reservoirs, with 1-10 tonnes of peat slurry removed every day from Ladybower Reservoir. This peat has to be disposed of in landfill due to contamination with heavy metals from atmospheric deposition, and carcinogenic residues of the chemicals used in water treatment.

Dealing with these issues 'end of pipe' and in isolation is proving expensive and ineffective, with a growing financial burden on the water company, its customers, the National Trust and the public purse. It also fails to restore the health of the blanket peat and the quality of the hugely valuable water resource.

A proactive and long term approach was needed at a much larger spatial scale. A voluntary, public and private partnership was established, now facilitated by Moors for the Future bringing together the National Trust, Natural England, Peak District National Park Authority, United Utilities, Severn Trent Water, Environment Agency, Derbyshire County Council,

Sheffield City Council and several universities. By combining financial, intellectual and logistical resources, we are making progress in identifying and tackling the root causes of poor water condition.



Severely damaged peat, High Peak

### 7.3 *The benefits of peatland restoration*

The results of recent research carried out in the Peak District commissioned through the Moors for the Future partnership has shown that peatland restoration techniques can have multiple public benefits:

- a. Carbon storage- Worrall, Evans and team<sup>5</sup> have shown that both bare peat revegetation and gully blocking/grip blocking can both reduce carbon loss through erosion and enhance carbon sequestration, equating to net carbon storage of up to 135 tonnes carbon/km<sup>2</sup> per year.
- b. Improvements in water quality- Recent research by Helen O'Brien at Nottingham Trent University within the Ashop catchment (in press) has shown that gully blocking and the cessation of burning both result in a reduction in sediment run off. If replicated across the catchment, such management techniques should result in a significant decrease in the amount of sediment entering the Ladybower reservoir. The results for water colour are less clear, with an initial increase in water coloration following moorland management. However, this is expected to decrease with time, and there is strong evidence from elsewhere that peatland restoration can significantly reduce coloration.

In addition to these benefits, peatland restoration can help enhance wildlife habitats and restore species diversity, reduce flood risk and improve the natural beauty and recreational value of an area.

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<sup>5</sup> Peak District Moorland Carbon Flux, Moors for the Future Research Note No 12, June 2007

#### 7.4 *Restoring the peat*

After 25 years of restoration experiments supported by expert research, the Trust has found that the best long term way to restore peatlands is to 're-wet' them. One technique is to block off the hundreds of gullies and historic drainage ditches (known as "grips") that allow water to drain away, taking large amounts of peat sediment with it. Wood, stone and plastic dams are used to block water flow and prevent loss of sediment.

Water levels have been successfully raised in many areas. Re-vegetation with cotton grass also helps to stabilise further the peat and improve its water retention.

Within the High Peak, the Trust has identified the main peat areas at risk from erosion. Maps are being created of the gullies that need blocking most urgently, to provide the maximum protection to the key peat areas that are still intact. It is estimated that 25,000 gully blocks are needed to protect the intact peat at High Peak Estate. Currently 3,500 gully blocks have been put in place at a cost of £230,000.

As part of the Moors for the Future Partnership the Trust is involved in a range of activities to help restore and protect High Peak, including:

- a. Changing grazing patterns by significantly reducing the number of livestock on the moors in order to slow down the rate of vegetation loss and subsequent erosion.
- b. Preventing fires in the face of increasing summer temperatures and drought through local education programmes and a joint Fire Fighting Strategy for the Peak District moors.
- c. Managing visitor impacts by re-routing footpaths on damaged parts of the moors and re-building footpaths using stone flags.

The Trust faces a challenge in reconciling the need to restore the peatland of the High Peak with the needs of visitors at this iconic site - in 1932 a group of ramblers staged a Mass Trespass of Kinder Scout that was to prove pivotal in the fight for the right to roam.

#### 7.5 *The costs*

The National Trust estimates that £5 million is needed to restore the priority 4km<sup>2</sup> of bare peat on the High Peak estate through a mixture of vegetation restoration and gully blocking. This may seem like a large sum, but it is significantly less than the £25 million about to be spent by Severn Trent Water on its Ladybower water treatment works because the filters have again become clogged with sediment.

#### 7.6 *Conclusions*

There is significant scientific evidence to show the multiple benefits of peatland restoration, both for carbon storage and for water quality. However, the current policy and regulatory framework is such that it is difficult to secure investment in these essential environmental services.

The National Trust would like to see the regulation of the water industry changed, such that water companies are encouraged to invest in solutions which tackle water quality problems at source, rather than through resource and carbon intensive water treatment end-of-pipe. Investment through Asset Management Programmes should be permitted both on water companies' own land and on the land of neighbouring land owners within target catchments. Aligning public and private investment in this way will reap benefits not only for the environment, but also for the economy and society.



Recovering peat, High Peak



## 8 Options for improving land management

### 8.1 Introduction

A range of changes to land management practice have been suggested<sup>6</sup> to reduce soil carbon loss. These were taken as the basis for discussion:

- a. stop inversion/deep ploughing to reduce aeration and mineralisation
- b. switch to zero tillage systems to minimise soil disturbance
- c. include cover crops and green manures in rotations
- d. reduce summer fallow period and period of no ground cover
- e. practice soil conservation to reduce erosion and prevent loss of organic matter
- f. apply compost and manure to increase soil organic content
- g. retain grassland, forests and semi natural vegetation
- h. prevent overgrazing to allow litter to incorporate into the soil system
- i. practice burn management to avoid excessive heat and burn at appropriate times of year
- j. farm organically to increase soil organic content
- k. adopt agroforestry in cropping systems to increase biomass above ground.

### 8.2 Analysis of the options

Participants discussed whether these would help address the causes of carbon loss. All were agreed to be potentially beneficial with the following caveats:

- need to clarify exactly what is meant by deep ploughing
- the benefit of zero tillage depends on the soil, and can be counterbalanced by emission of other greenhouse gases; its overall impact is not certain
- cover crops may require tillage which can cause mineralisation and soil loss.
- use of compost and manure must follow best practice, and consider the impact on the overall balance of greenhouse gases
- optimum stocking rate should be determined according to local conditions
- organic practice is not always the best option for all sites, and best practice must be followed; Life Cycle Analysis would be useful to fully understand the carbon balance
- the benefit of agro-forestry depends on the location and soil type
- arable production in Wales is so limited that improved practice will have minimal impact.

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<sup>6</sup> Ball & Pretty 2002, ECOSSE 2006 and CCW 2007

Participants stressed that options for land management must suit the farm system and the farmer so there is a need for flexibility. Any controls must take account of the variability of land.

Concern was expressed that improving farm practice may have only minimal impact on severely damaged carbon stores so it may be more beneficial to focus efforts on severely degraded upland peat.

### 8.3 *Options for peat restoration*

Participants were also given the opportunity to discuss land management measures for peat restoration as suggested in research including the ECOSSE report. It was agreed that at this stage it is more important to focus at a strategic level to ensure that the importance of land management for climate change is recognised.

## 9 Improving agri-environment schemes

### 9.1 Suggested improvements

Participants discussed how agri-environment schemes could be changed to better deliver carbon conservation. The suggested improvements are a combination of specific practices to be prescribed or required by schemes, and structural changes to be made to the system of agri-environment schemes.

a. Scheme prescriptions and options:
<ul style="list-style-type: none"><li>• ensure ground cover at all times</li><li>• manage heath vegetation to retain fully functioning peat bogs</li><li>• new prescriptions for water and soil management</li><li>• focus on moorland management beyond de-stocking requirements</li><li>• prohibit new drainage of peat</li><li>• include drain/grip blocking in the capital works element</li><li>• an option for re-wetting deep peat</li><li>• an option for protection of shallow soils</li><li>• an option for zero cultivation and/or non inversion tillage grassland management</li></ul> <p>Participants highlighted that one-size fits all prescriptions will not be successful, rather they should be flexible to suit the needs of a specific site.</p>
b. Systemic changes:
<ul style="list-style-type: none"><li>• include an objective for greenhouse gases in new schemes</li><li>• monitor outcomes and impacts</li><li>• target areas of greatest need or greatest potential?</li><li>• devise prescriptions specific to a particular area</li><li>• enable use of anaerobic digestion</li><li>• combine agri-environment funding for carbon management with other funds e.g. Axis 3&amp;4</li><li>• make it easier for farmers and land managers to cooperate</li><li>• increase the agri-environment budget</li><li>• redefine the purpose of agri-environment as provision of public goods and broaden schemes beyond biodiversity</li><li>• focus LFA funding on positive conservation measures and attach carbon management requirements to Tir Mynydd</li></ul>

- introduce catchment scale schemes
- training for farmers
- flexible outcome focused schemes
- increase payment rates in line with increasing commodity prices
- greater flexibility to allow for local variations and opportunities.

## 10 Opportunities to improve carbon management

### 10.1 *New Tools and incentives*

Looking beyond agri-environment schemes, discussion considered other opportunities for delivering carbon management. Participants identified a range of tools and incentives to promote carbon conservation. These have been grouped under headings which illustrate the themes which emerged.

<p>a. Funding and financial incentives</p> <p>Funding to reward and pay for carbon management could come from a range of sources:</p> <ul style="list-style-type: none"><li>• developing a market for environmental goods</li><li>• carbon trading</li><li>• carbon credits</li><li>• market advantage and premium for products from well managed land e.g. carbon labelling products</li><li>• farm assurance schemes</li><li>• water company investment on land other than their own through their Asset Management Programmes</li><li>• investment from insurance companies</li><li>• EU Life programme</li><li>• Axes 3&amp;4</li><li>• Convergence funding</li><li>• Small scale CHP generation</li><li>• Tax relief.</li></ul> <p>Funding is needed for both restoration and ongoing maintenance. Purchasing land would be one way to invest in carbon conservation.</p>
<p>b. Integrate carbon objectives</p> <p>Carbon objectives should be incorporated in regulations being developed for other and more general purposes, e.g. Water Framework Directive, Soil Framework Directive, Cross Compliance.</p> <p>Forestry policy could also be adjusted to deliver peat restoration.</p> <p>Management of designated sites should specifically address carbon.</p>
<p>c. Regulation</p> <p>New regulation to deliver carbon conservation may be required. This could:</p> <ul style="list-style-type: none"><li>• create Carbon Vulnerable Zones</li><li>• introduce a licence to farm dependent on management of environmental services</li><li>• designate sites for soil e.g. SSSIs.</li></ul>

d. Education and communication

Improved awareness and understanding is required, not just amongst farmers and land managers, also the public so they support investment of public resources in carbon management, and are willing to pay a premium for carbon-friendly products. If farmers and land owners accept the importance of the issue they can determine the way forward.

Participants highlighted the need for integration and the benefits of an integrated approach - good water management will often deliver carbon and biodiversity benefits. They also called for a national approach to land management.

It was suggested that agri-environment schemes offer a short term opportunity to improve carbon conservation, whilst in the longer term other tools such as carbon trading will provide the necessary incentive.

## 10.2 Necessary Steps

Discussion then considered what needs to be in place to make these new measures possible; what changes are required to enable land management for carbon? The points raised can be organised under three key themes which emerged.

a. Essential information and understanding

We need:

- data and evidence to resolve the questions unanswered at present
- to establish what we want ecosystem services to deliver
- cost benefit analysis of carbon and agriculture
- research to allow calculation of the value, cost and benefits of action
- understanding and awareness
- pooling of experience, sharing research results and lessons learnt
- best practice guidelines and better understanding of what is best practice; no-regrets action requires full understanding
- to quantify the economic benefits of carbon management e.g. contribution to mitigating flood risk
- mapping of key sites.

b. Establishing appropriate structures and systems

We need:

- freedom to act facilitated by Government
- a long-term approach and long-term funding
- national carbon budgets
- links between carbon and spatial planning
- recognition of the functionality of resources and their current and future capabilities
- a strategic review of carbon issues including setting of national

<p>priorities</p> <ul style="list-style-type: none"> <li>• public bodies such as the Forestry Commission to demonstrate leadership</li> <li>• establishment of community biogas / biodigestor facilities</li> <li>• integration of carbon objectives with water and biodiversity ones</li> <li>• monitoring of environmental outcomes of agri-environment schemes</li> <li>• common international approaches and methodology linked to the Kyoto Protocol</li> <li>• a hierarchy of areas at risk to identify those at greatest risk and those most likely to benefit from action</li> <li>• pilot projects and use of them to communicate benefits, best practice and raise awareness</li> <li>• cooperation to deliver environmental outcomes at a landscape scale.</li> </ul>
<p>c. Securing funding</p>
<p>We need:</p> <ul style="list-style-type: none"> <li>• valuation of carbon and carbon capture</li> <li>• marketing of products' carbon benefits</li> <li>• joined up budgets- flooding, catchment management</li> <li>• Welsh Water to contribute to carbon management</li> <li>• political will and pressure.</li> </ul>

### 10.3 *Gaining support of Land Managers*

Participants were asked to suggest what benefits carbon conservation offers land managers, with a view to securing their support and commitment to delivery.

The following benefits to land managers were identified:

- The economic value of carbon conservation- it is cost effective to manage resources.
- Funding- delivering public benefits secures financial rewards.
- It is a way for farmers to contribute to society and gives them a crucial role in modern society.
- Market or branding advantages, particularly if linked to regional character.
- Greater variety of agri-environment options increases a farmer's choice and engages them in schemes.
- The wider benefits of a better environment e.g. tourism.
- It is a way to deliver environmental outcomes and public goods which society appreciates.

The business benefits were highlighted as those which will most attract land managers. The need for long term commitment was highlighted as essential to securing support: land managers need to be confident that carbon conservation will continue to secure rewards.

Information and understanding were also seen as essential pre-requisites for support: land managers need to understand what they are managing and why. It was suggested that with adequate understanding farmers will themselves respond to the issue, particularly where there are associated business opportunities; they will seek and act on market advantages.

Participants stressed that success in achieving land managers' buy-in to carbon conservation depends on availability of payments for providing ecosystem services and rewards for delivering crucial public benefits. This was highlighted to be part of a cultural shift from farmers to land managers, moving beyond a focus on food production.



## 11 Priorities for action

### 11.1 *Agreed priorities*

To conclude the discussions, participants were asked to identify the actions which should receive priority. From all the suggestions made during earlier discussions, they selected:

- A strategic approach, putting carbon and ecosystem services on the agenda and establishing societal value for environmental services.
- Identify and map key sites then target priority sites.
- Clarify what we want to achieve, develop common understanding and language.
- Set realistic targets.
- Put a value on carbon.
- Information and research to establish a baseline and improve understanding.
- Develop common monitoring standards and procedures.
- Establish pilot projects and use them to share best practice and promote the economic benefits of carbon conservation.
- Recognise the importance of a long time scale and the need for long term funding.
- Develop site specific measures not broad brush solutions.
- Coordinated action to tackle environmental services e.g. a national fire risk strategy.
- Cultural shift- farmers as land managers not just food producers, with a central role in society.
- Embedding water and carbon management on a landscape scale in revised agri-environment schemes.

## 12 Summary and conclusions

### **'An interpretation of the issues and how to proceed'** **By Hannah Pitt, National Trust**

#### 12.1 *Introduction*

It is almost impossible to summarise the multitude of ideas that this seminar generated, or to highlight one or two actions which provide the key which unlocks the problem of carbon conservation. Reflecting back on the presentations and discussions, however, themes emerge and there is a remarkable degree of consensus.

This is just one person's perspective on the day's discussions and where they take us towards tackling this aspect of the climate change challenge.

#### 12.2 *Seeking consensus*

There was no doubt amongst those present that land based carbon stores are a risk in terms of the causes of climate change, and that action must be taken to reduce this risk. In particular, the conclusion is unavoidable that urgent action is needed to restore peat before it is too late.

The specifics of how soils contribute to greenhouse gas emissions and how best to prevent this are still to be agreed. But agreeing that this is a major problem requiring urgent action is a powerful place from which to start.

It is possible to say with some confidence that existing tools offer a degree control and protection for land based carbon, despite not having been designed with this in mind. Protection will increase if these tools incorporate carbon objectives and are amended to maximise carbon benefits.

Discussions confirmed that agri-environment schemes can play a part in improving carbon conservation. They cannot do everything, particularly without a substantial increase in funding, but they should do more than at present. They are probably the most readily available and adaptable mechanism. In the long-term it is likely that other mechanisms will supersede them in driving management of land based carbon.

There was no question that carbon conservation can deliver benefits to land managers. If this can be successfully communicated then this offers an effective lever for action.

#### 12.3 *Science and understanding*

At various points in the seminar the uncertainty and complexity regarding the science on this issue was highlighted. Debate on carbon sequestration rates and greenhouse gas emissions from land continues, with huge variability in the assessments made and uncertainty about the accuracy of data. The need for further research and better data was agreed, as this would help remove

several barriers to action. It would be particularly beneficial to establish an agreed method for placing an economic value on carbon conservation.

The need for an improved evidence base relates very much to the lack of understanding of carbon conservation and its significance, particularly amongst land owners. Being able to communicate the economic benefits of carbon conservation seems key to securing farmers' support. There is also a danger that acting on the basis of inadequate or inaccurate data will not only jeopardise success, but will also lose the confidence of land managers and the public.

#### 12.4 *Short-term Actions*

The most pressing area for action – because it is a window of opportunity open at present- is to amend Axis 2 so schemes address the needs of soil and carbon. There are various ways to achieve this, all reliant on the fundamentally important step of integrating carbon objectives to schemes and setting carbon targets.

Effective communication –particularly with land managers- is also a priority to tackle in the immediate future, and has the advantage of being relatively cost effective. This will need to go hand in hand with further research, and data collection – perhaps from new pilot projects. National agencies may be best placed to establish good practice guidelines and promote these to land managers, together with information on the economic benefits of action.

Establishing the right framework can only be tackled at a national level. The Government could usefully identify national priorities and set targets to establish a shared understanding of what must be done. A particularly prickly nettle to grasp will be deciding whether to target areas of greatest need –the most degraded- or those with the greatest potential for success – the most restorable.

#### 12.5 *Longer- term actions*

In the longer-term successful carbon conservation will be achieved by having the right financial mechanisms in place to reward land management which reduces greenhouse gas emissions and sequesters carbon. Carbon trading or carbon budgets developed to meet climate change emissions reduction targets should provide investment in land management. Investment should also be available from those benefiting from land management, namely water and insurance companies.

If public understanding is improved then there is potential to generate funds through the consumer market, perhaps linked to carbon product labelling.

These solutions will take time to develop and establish, but they require the groundwork to be laid now. They rely on land based carbon being duly recognised as a priority for climate change policy.

## 12.6 *Integration*

If a single word rang loudest during the seminar discussions it would have to be integration. The causes of carbon loss from soil need to be addressed by an integrated approach, as does development of tools for improving carbon conservation.

Practices which protect soil often benefit water and biodiversity. It should therefore be possible to integrate a range of environmental objectives, and devise mechanisms with multiple environmental outcomes.

Integration is also the watch-word for policy development: there is a need for closer cooperation in developing policy for land use and that for climate change.

## 12.7 *Establishing a carbon culture*

The issue at the root of many of the challenges and barriers identified during the seminar is that land based carbon simply hasn't been a priority. It wasn't a consideration when most of the tools which guide land management were devised. Climate change means this cannot continue to be the case.

The key to improving carbon conservation is to establish a carbon culture where it is recognised as an important driver of land management, and there is good understanding of what must be done. This will be part of a broader shift which sees farmers move from being producers of food to being land managers rewarded for providing public and environmental benefits.

The culture shift will also need to reach the general public so they become carbon-conscious consumers, willing to support land management through the individual and public purse.

## Appendix 1: Case studies

# The Pumlumon Landscape Project

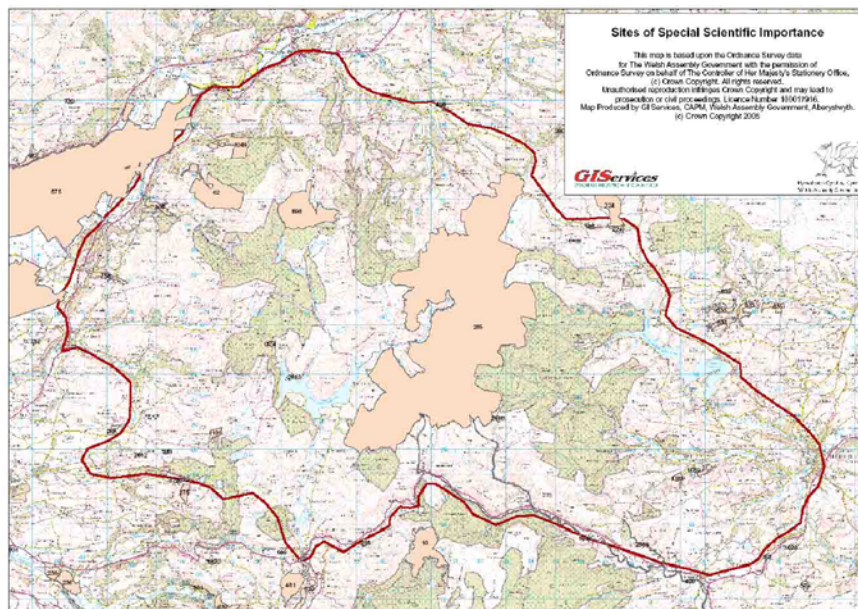
Pumlumon - a whole landscape for people, place and nature



The Pumlumon area is the largest watershed in Wales and is the source of the rivers Wye, Severn and Rheidol. The land holds a complex mosaic of locally, nationally and internationally important habitats and species, such as dry and wet dwarf-shrub heath, blanket bog, unimproved acid grassland and a number of oligotrophic lakes. Agriculturally improved grassland, broadleaved woodlands and forestry plantations are also characteristic features of the area. Pumlumon is important for breeding and wintering birds particularly Hen Harrier, Merlin, Short eared owl, Red and Black grouse, and a number of Red Data Book and UK BAP invertebrates.

Its landscapes are breathtaking, for their raw natural beauty and for their wide horizons and sense of space. However, like many areas of the Welsh uplands, intensive land use activities have resulted in a significant loss of biodiversity. Many of our upland habitats are being lost or are degraded and in poor condition. Over-grazing by sheep has induced soil compaction, which has resulted in diffuse pollution and increased flooding of the lowland areas.

**The Pumlumon Project** total area—40,000ha



**The vision of Wildlife Trust Wales is to:**

*Enhance the natural capital of the project area to allow the production of key ecosystem services that will provide the local community with a sustainable economic future.*

**Our aim is to:**

- Create landscape solutions that will address climate change, diffuse pollution, flooding, habitat loss and species decline by establishing ecosystems management.

- Enable the farming community to have a sustainable future through the sympathetic and sustainable management of natural capital.
- Encourage economic activity through the promotion of enhanced natural assets
- Empower communities to address environmental issues through sustainable environmental management

This ecosystem services approach will be achieved by Ecosystems Management through a Landscape Strategy and will include the management of carbon storage in soils (including peat), management of habitat grazing, soils management, the creation of ecological corridors and landscape scale hydrological management including the rewetting of damaged habitats.

### **A Practical Example – Allt Du**

#### **Site Details**

Habitat: Raised bog. M17 & M18, with M25 & M14.  
Area: 30.5 hectares  
Altitude: 300 metres



#### **Site Description:**

Upland raised peat bog which was drained and planted with Sitka Spruce in 1984, but this plantation largely failed. The current landowners are sympathetic and have been working towards restoration of the bog, with the help of the Montgomeryshire Wildlife Trust. A large area of conifers has been removed, currently leaving the larger trees round the boundary to retain the micro-climate. Peat dams were created in October 2006 and there are plans to install plastic piling dams to further raise the water levels.

#### **Working with the Farming Community**

The project can only work in partnership with strong local farming communities. We aim to support these through the creation of environmental management services that provide farmers and landowners with a sustainable income and through and Empowering and resourcing local communities to develop sustainable land-management, environmental, or tourism projects of their own design. To date we have 23 interested landowners

For further information about the project, please contact:

**The Montgomeryshire Wildlife Trust**, Tel: 01938 555654. E-mail: [clive@montwt.co.uk](mailto:clive@montwt.co.uk)

## **LIFE Restoring active blanket bog in Wales**

The LIFE Restoring active blanket bog in Wales project is a partnership between the Royal Society for the Protection of Birds, Countryside Council for Wales, Environment Agency Wales, and Forestry Commission Wales with the aim of restoring active blanket bog in the Berwyn and Migneint Special Areas of Conservation (SACs) in Wales.

The 56 month project was launched in August 2006, with the majority of project funding (75%) secured from the EU LIFE-Nature programme. Although large areas of blanket bog still occur in Wales, the majority have been seriously degraded through afforestation, encroachment by alien species (such as *Rhododendron ponticum* & Sitka Spruce *Picea sitchensis*), over grazing, drainage, and either deliberate or accidental burning.

During the project, significant and sustained improvement in the condition of blanket bogs in key areas of two SACs in North Wales will be achieved. A core project site is the RSPB Lake Vyrnwy reserve in Powys, where c. 100 km of moorland drain will be blocked. Intensive monitoring of the impacts of this work upon vegetation and hydrology will be carried out. It is hoped that this, in combination with research being carried out by UKPopNet at the same site will result in a Carbon budget being produced for the project work. For the first time, this would attempt to estimate the impacts of ditch blocking work upon carbon exchange at a landscape scale.

For more information on the project, contact the project manager Dr Jared Wilson via the website [www.GorgorsCymru.org](http://www.GorgorsCymru.org) .

## **Appendix 2: References and Further reading**

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**LIFE Restoring active blanket bog in Wales project**

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### Appendix 3: Participants

Jared	Wilson	Active Blanket Bog in Wales LIFE project
Katrin	Plassmann	Bangor University
Paul	Sinnadurai	Brecon Beacons National Park
Matthew	Ritchie	CADW
Brian	Pawson	CCW
Paddy	Rooney	CLA
Ruth	Chambers	Council for National Parks
Peter	Ogden	CPRW
Conor	Doherty	Environment Agency Wales
Richard	Davies	Environment Agency Wales
Peter	Redfern	Environment Agency Wales
Roger	Wade	Environment Agency Wales
Carys	Jones	National Assembly Members Research Service
Keith	Jones	National Trust
Ruth	Williams	National Trust
Hannah	Pitt	National Trust
Helen	Meech	National Trust
Trystan	Edwards	National Trust
Michelle	Clarke	NSRI
Dick	Thompson	NSRI
Jeff	Davies	RSPB Cymru
David	Lewis	Snowdonia Society
Rowland	Pittard	YHA Cymru
Havard	Prosser	WAG Dept. for Environment, Sustainability & Housing
James	Skates	WAG Dept. for Environment, Sustainability & Housing
David	Morris	WAG Dept. for Rural Affairs
Clive	Faulkner	Montgomery Wildlife Trust
Steven	Hughes	Montgomery Wildlife Trust