Simon Drew describes how scientists are sharing their knowledge to turn research into action to cut carbon losses from the landscape.

We're all in it together

Most of us now recognise that human activities are contributing to global warming, and there is a growing realisation that we should be actively managing the carbon-storage potential of natural environments – the Earth's carbon cycle.

Plants use photosynthesis to extract CO_2 from the atmosphere and store it in solid form in their bodies. In peatlands plants do not decompose fully when they die and the carbon they contain is then stored in the peat which is formed. Peat contains more carbon per unit of area than any other habitat on Earth and covers roughly 15 per cent of the UK and holds about 2300 megatonnes (million tonnes) of carbon.

If the UK loses just 5 per cent of its peatland the equivalent of a year's worth of UK CO_2 production will escape into the atmosphere. So small changes can have a big effect, and this environment is vulnerable to changes in management practices and climate change.

Several large-scale activities have affected our peatlands over the last few decades, including extraction for fuel and compost, and managed burning for grouse shooting. After the Second World War there was a nationwide drainage programme intended to lower the water table and increase the amount of land available for sheep grazing. As the water table lowered the peat began to rot and give off carbon as CO_2.

It has taken decades for us to realise the effects of these activities, and in some places efforts are under way to repair the damage. But modern developments continue to pose a threat. One of these, which has received little attention so far but is likely to become increasingly important, is wind farms.

The wild and windy conditions that promote peatland vegetation growth are also good for generating energy, so peatlands are a desirable location for wind turbines. These complex developments can involve removing peat for turbine bases, felling woodlands to provide unimpeded wind flow, and draining wetlands to build new roads.

Scientists can look into all the implications for the environment and the economy, but how do we know we're asking the right questions, ones that will translate into practical solutions for the people who have to manage peatland environments every day?

Wind farms and wetlands

This is where knowledge exchange (KE) comes in; where researchers and research users join forces to learn from each other and turn the science into action. I am the network coordinator of Carbon Landscapes and Drainage (CLAD), a KE programme that brings together a range of people with an interest in peatland management – including researchers, conservationists, regulators, developers and environmental consultants – to look at the problems associated with

Peatland hydrology. Knowledge exchange between CLAD and Malaysian peatland researchers.

Simon Drew and Kenny Roberts installing a spectrolyser to measure in situ dissolved organic carbon in a stream draining a wind farm catchment.

CLAD has teamed up with a wind farm developer, Scottish and Southern Energy Renewables, to fund a PhD project on how carbon is lost during wind farm construction by quantifying how much carbon escapes through drainage pathways. But the student is also making use of the sediment record to set the carbon losses from the site in a historical context; we can probe long-term changes in carbon export using sediment deposited in a loch and a reservoir draining the catchment.

Susan Waldron recalibrating water quality monitoring equipment.

carbon lost via aquatic pathways (streams and rivers) from peatlands when they are disturbed, particularly due to developments like wind farms.

It sounds worthy, but how does it work in practice? To create a successful KE network, you have to overcome some of the natural suspicions and competitive instincts that most of us are subject to – for example, the perception that academics are locked in ivory towers studying impractical research questions, or concerns that land managers aren't always interested in scientific evidence when they make decisions.

But given the increasing interest in carbon management, it didn't take much to get people involved. The mutual benefits of cooperation and interaction were clear – the managers and practitioners get access to the latest science and thinking, while the researchers get an improved understanding of the mechanisms of change and management in peatlands – and the network quickly became largely self-sustaining.

CLAD aims to improve management practice through a variety of activities, some planned in advance, others ad hoc. We have established a series of annual meetings, each focusing on a particular topic; the first two covered how peatlands lose carbon in water and the role of drainage in restoring peatlands.

Other events are more practical; for example we ran a workshop demonstrating how to monitor carbon losses using new technology and techniques.

Some CLAD activities evolve according to the needs of the group. At our opening meeting some network members were particularly interested in learning to use an important new tool called the 'Carbon Payback Calculator for Windfarms Build on Peat'. (This was commissioned by the Scottish Government to give developers a way to estimate how long it would take for a wind farm to 'pay back' the carbon released in building it, by letting us burn less fossil fuel elsewhere.)

So we invited the tool's creators to a series of meetings, to demonstrate the calculator and answer questions from the people who would be using it. In turn the users' feedback shaped updates to the calculator – knowledge exchange in action. Being able to respond to the needs of the group has been fundamental to CLAD's success, keeping it relevant to everyone involved.

Direct research advances also flow from KE. We are field testing a spectrophotometer – an instrument that measures how much light water emits to let us make high-resolution measurements of its dissolved organic carbon (DOC) content while in the field.

DOC is one of the most important ways in which carbon is lost from peat and until now DOC data has been gathered by analysing samples in the lab. This new technology means we can get more detailed (and therefore more useful) data in the field. It was of great interest to everyone in CLAD – not just the researchers.

One of the most important outputs of the project will be a set of guidelines that outline best practice for developing peatlands, to minimise the impact of development on carbon losses and to mitigate the effects where they are unavoidable.

For me, knowledge exchange has been an exercise in learning by doing so far, but a very successful one. Professionals working in the field are often tied up with the day-to-day concerns of their jobs, and KE networks like CLAD let us all quickly identify and share our most pressing needs and latest knowledge.

But CLAD has only made a small dent in all the issues surrounding peatland management. We predict a much stronger demand for this kind of work in the future. ■

MORE INFORMATION

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