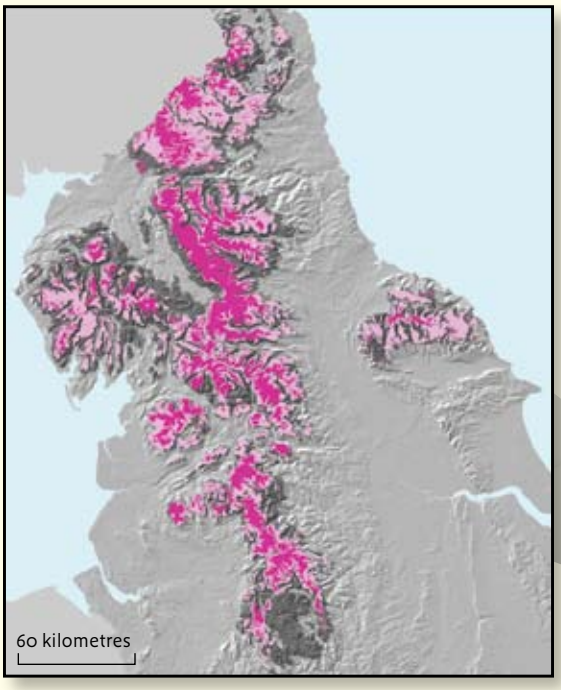
Climate regulation through

Carbon storage and sequestration

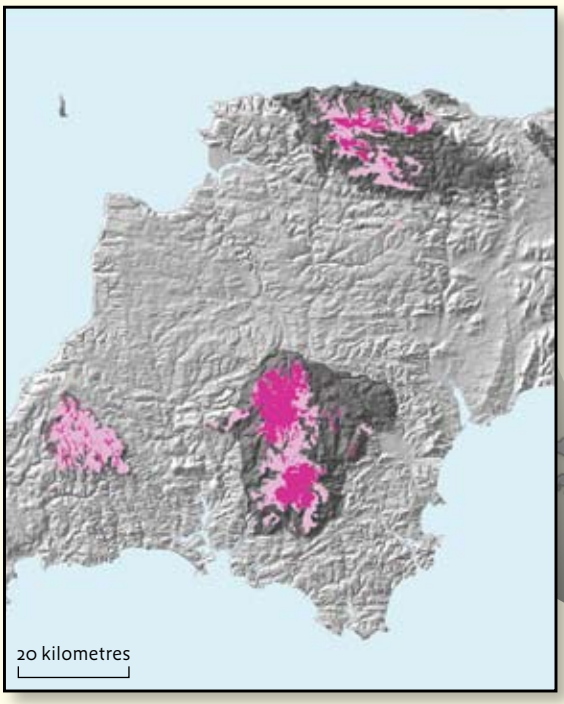
Peat soils in northern uplands



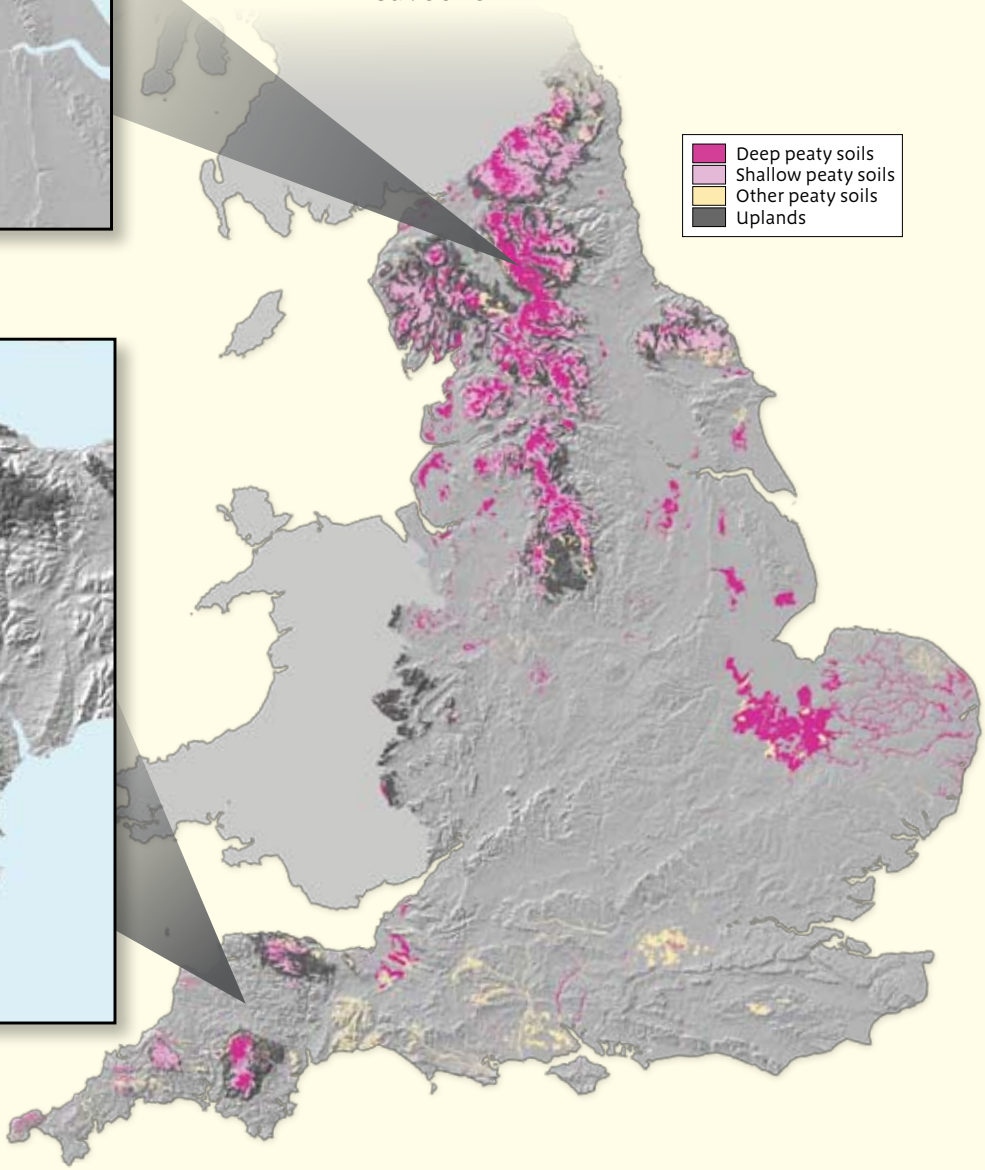
Where are our high-carbon peat soils?

- Upland soils are the largest carbon store in England. 300 million tonnes are stored in English peatlands, mostly in the uplands.
- Peat bogs sequester (soak up) atmospheric carbon dioxide in perpetuity, when in good condition. Billions of tonnes have been removed from the atmosphere globally since the last ice-age.
- Carbon is also stored in vegetation particularly woodlands and trees.

Peat soils in south west uplands



Peat soils



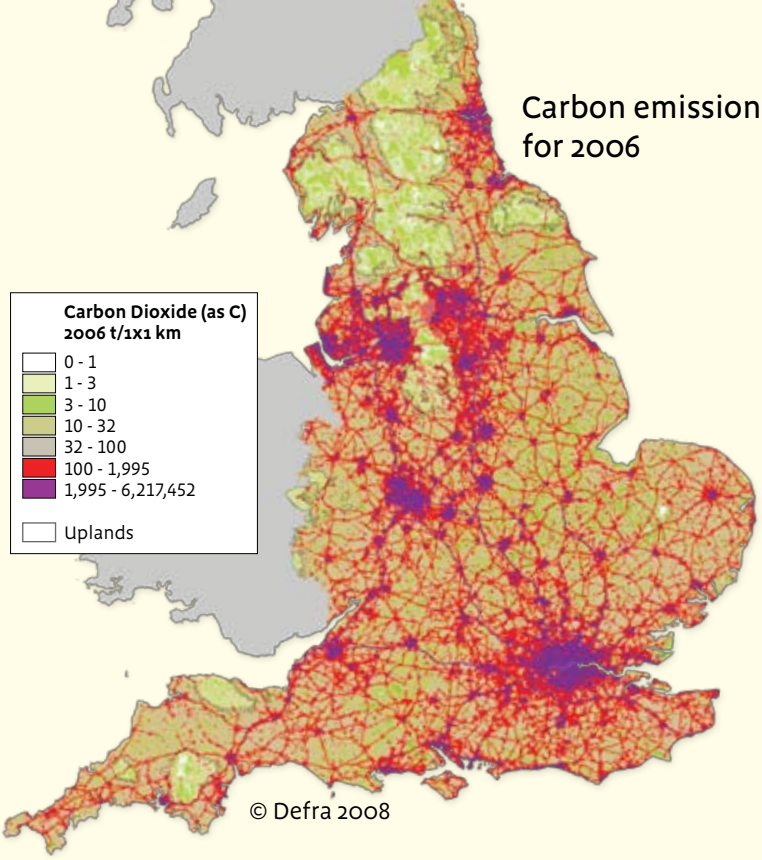
Why does this matter?

The level of carbon dioxide (CO_2) and other greenhouse gases in the atmosphere have significantly increased in recent decades through emissions from homes, industry and transport. Upland soils, if well managed, can help to counteract rising emissions by retaining stored carbon in their soils, and sequestering more CO_2 from the atmosphere.

Are peat bogs losing carbon?

The majority of upland peat bogs are estimated to be losing some CO_2. Tackling this through peat bog restoration is essential to avoid further losses.

Carbon emissions for 2006

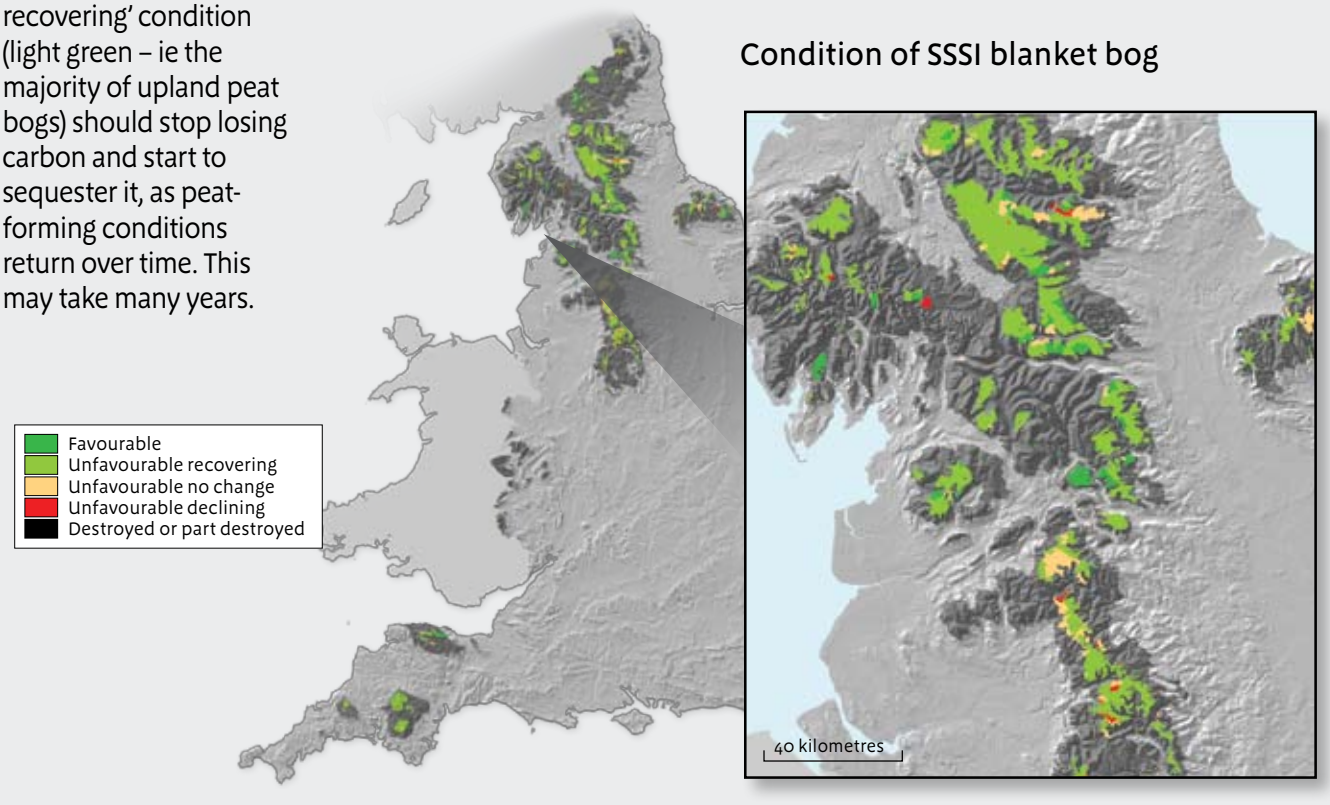


What state are peat bogs in?

- Many peat bogs are designated as SSSIs (Sites of Special Scientific Interest) for their nationally important vegetation and wildlife. The condition of SSSI features can be a useful proxy for the 'carbon status' of the soil.
- Bogs in 'favourable' condition (dark green on map) are waterlogged thus store carbon and support peat-forming plants that sequester carbon.
- Those in 'unfavourable recovering' condition (light green – ie the majority of upland peat bogs) should stop losing carbon and start to sequester it, as peat-forming conditions return over time. This may take many years.

Sphagnum moss

Condition of SSSI blanket bog

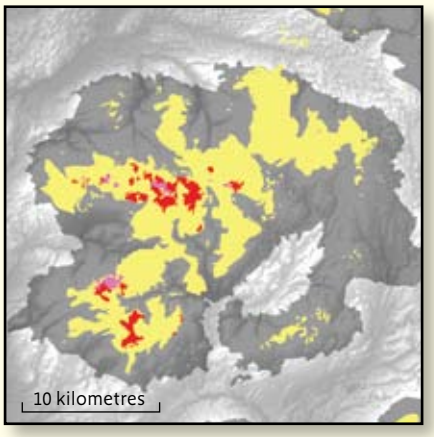


New ‘peat status’ mapping

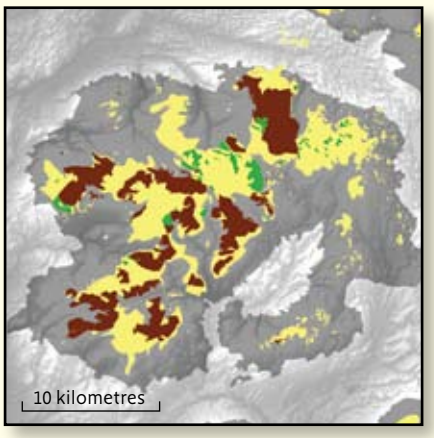
Recent mapping based on aerial photo interpretation has revealed more about the status of the soil, and the reasons for its current condition. This will help guide action on peat restoration.

Forest of Bowland

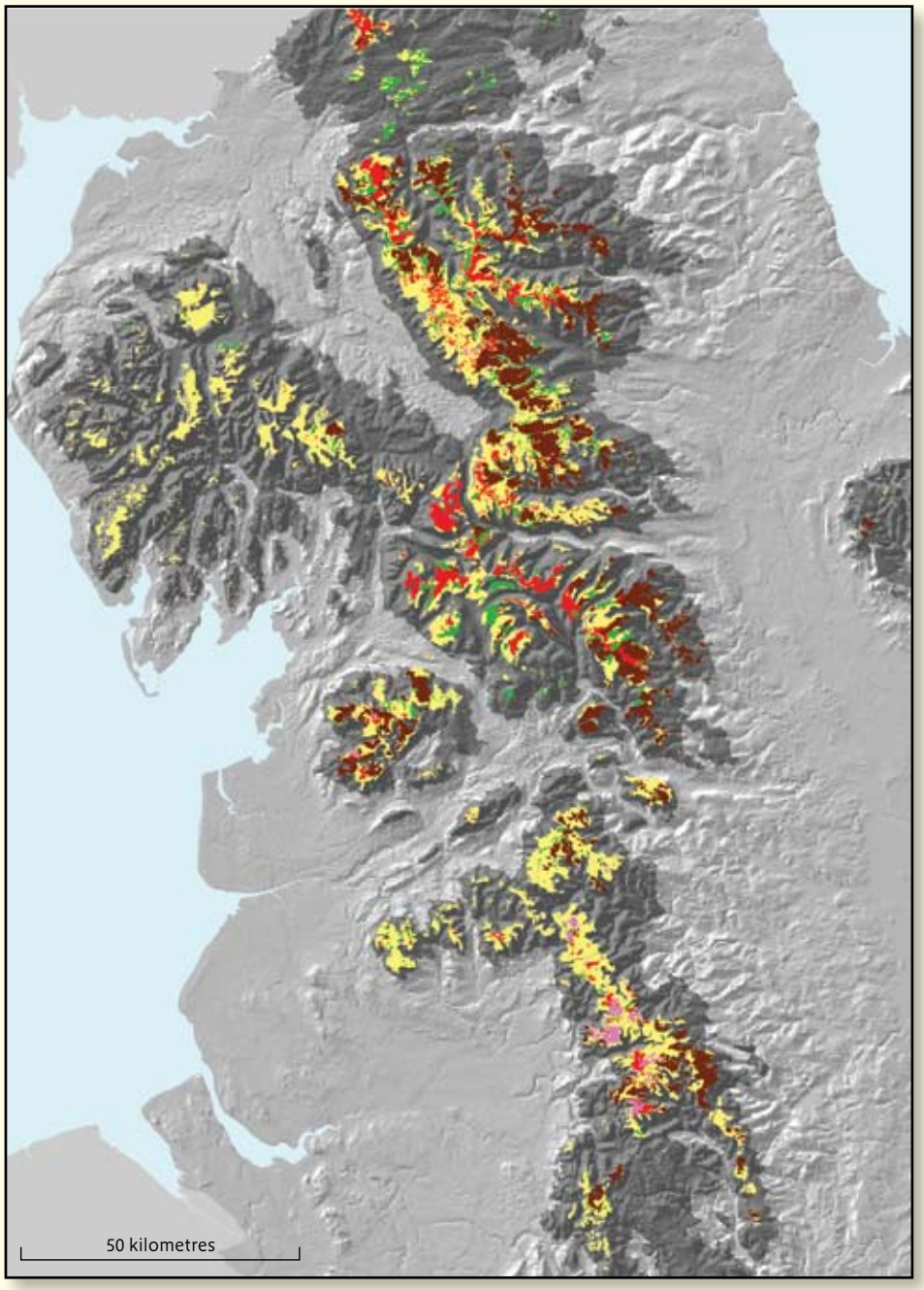
Bare and hagged



Gripped and burnt



Peat status



Deep peat

Bare peat
Peat soil with little vegetation

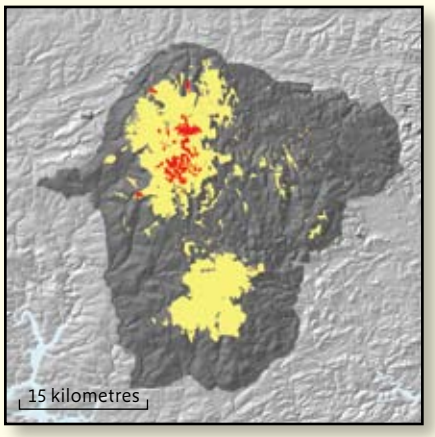
Hagged peat
Eroded peat with gullies and isolated peat blocks

Gripped peat
Peat artificially drained at regular intervals

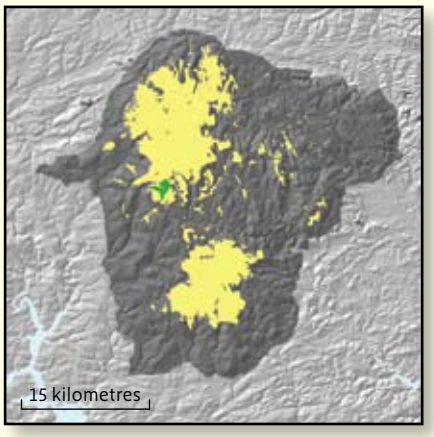
Burnt
Peat land vegetation managed by regular burning

Dartmoor

Bare and hagged

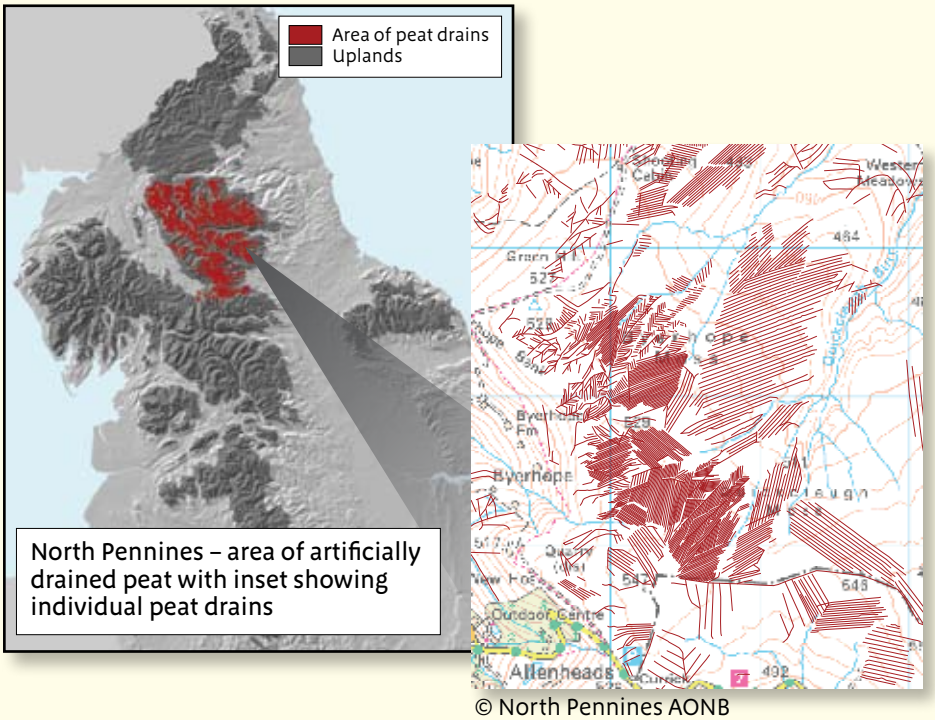


Gripped and burnt



How do drainage and burning affect carbon stores?

Upland peat has been extensively artificially drained, ostensibly to improve land for livestock grazing. Across the uplands there are an estimated 30,000 km of artificial peat drains (or 'grips'). This map shows all the drains just on North Pennines peat. These soils lose carbon through erosion and oxidation (drying out). Intensive burning – through wildfire, or sometimes by burns prescribed as part of grouse moor management – can destroy peat and peat forming mosses such as *Sphagnum*.



North Pennines – area of artificially drained peat with inset showing individual peat drains

© North Pennines AONB

Can peat restoration save carbon?

Restoration is costly but will reduce carbon losses on a significant scale, through:

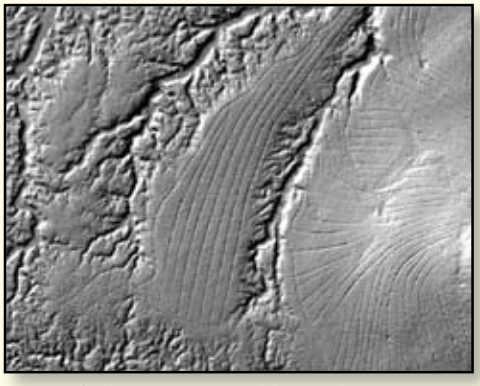
- Raising the water table by blocking peat drains
- Appropriate burning
- Restoring vegetation

Before blocking a peat drain

After blocking a peat drain

What about methane?

Healthy peat bogs emit methane, a more potent greenhouse gas than carbon dioxide. However it is likely that the carbon savings from restoring degraded bogs will outweigh any negative impacts on the climate from higher methane emissions. Natural England is leading research to better understand methane emissions following re-wetting.



LIDAR (a laser sourced digital terrain model) image of peat drains and gullies on Stean Moor, Yorkshire

© Natural England/Cranfield University

Land management challenges

- The scale of the restoration task required is huge. This LIDAR image shows the extent of artificial drainage channels on peat in one small area (Stean Moor in Yorkshire). Each drain may need a block inserted every 10 metres along its length.
- Some peat drains have developed into major eroding gullies – which are technically difficult and costly to restore.

Major gully erosion of peatland

Organisations like 'Moors for the Future' in the Peak District, the North Pennines AONB (Area of Oustanding Natural Beauty), and water companies like United Utilities, are leading the way in developing cost effective techniques to stop our blanket bog eroding.