LAYMAN'S REPORT 2010–2015

MoorLIFE

Bringing life back to moorlands in the Peak District and South Pennines

MOORS FOR THE FUTURE PARTNERSHIP

Protecting 2,500 hectares of the South Pennine moors – one of Europe's most important areas of blanket bog

Summary

BACKGROUND

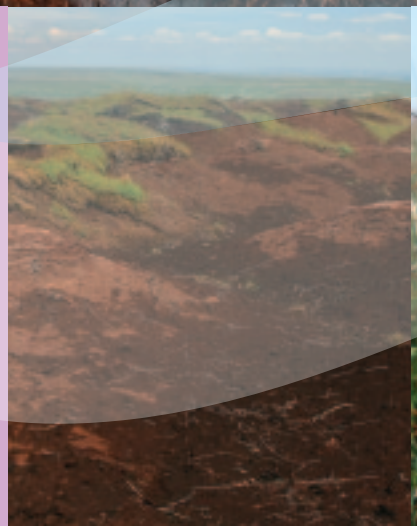
The five-year MoorLIFE project has protected 2,500 hectares of active blanket bog in the stunning landscapes of the Peak District National Park and South Pennine uplands of northern England. These well-visited areas are surrounded by major conurbations including Manchester, Sheffield and Huddersfield and suffer from the effects of human activity – both past and present.

Much of the active blanket bog was damaged over the past 200 years, by industrial pollution and wildfires, leaving vast areas of bare peat exposed and vulnerable to erosion by wind and rain. A landscape-wide approach was desperately needed to reverse this environmental catastrophe and prevent the peat from disappearing forever. This was possible thanks to funding of €6.7 million, including €5 million from the EU LIFE+ programme.

FROM DAMAGED PEAT TO GREEN MOORLANDS

In 2010, MoorLIFE – the biggest moorland conservation project in Europe – began work to protect active blanket bog. Conservation works have stabilised bare peat, reintroduced native plant species, raised the water table and reintroduced *Sphagnum* moss – a key peat-building plant that was all but wiped out from some areas.

- The project has restored a total of 893 hectares of badly damaged bog which has protected 2,500 hectares of active blanket bog from becoming eroded.
- Monitoring works show that the moorland is slowly recovering, and provides evidence of the multiple benefits of this vital conservation work.
- Innovative and ground-breaking communication tools will continue to teach visitors to this fragile landscape about its importance, inspiring them to protect and care for these unique places.



THE IMPORTANCE OF THE PROJECT

Active blanket bog is one of the Priority Habitat types in the EU Habitats Directive. Within the EU, blanket bogs are found primarily in the UK, which is why it is vital to protect these areas before they are lost completely.

The MoorLIFE project is located in the South Pennine Moors Special Area of Conservation (SAC). The SAC is part of the Natura 2000 network and is the second largest blanket bog SAC in England. It forms an extensive area of natural habitat at the southern end of the upland spine of the country, supporting one-third of England's active blanket bog habitat and internationally important wildlife.

The project area also forms part of two Special Protection Areas (or SPAs) under the Birds Directive – the South Pennine Moors Phases 1 and 2 SPAs. The key bird species of the SPA are dependent on blanket bog – breeding birds such as the golden plover (*Pluvialis apricaria*) and dunlin (*Calidris alpina*), and feeding birds such as the short-eared owl (*Asio flammeus*) and merlin (*Falco columbarius*).

The moors are important for recreation, as a source of drinking water, as a store of land-based carbon and in helping to mitigate flooding.

History of these moors

Lying next to the birthplace of the Industrial Revolution, the South Pennine Moors SAC suffered from 150 years of atmospheric pollution – probably more than any blanket bog in the world – including pollution from heavy metals and acid rain from the surrounding industrial heartlands such as the coal-fired textile industry around Manchester.

Much of the land management of these areas is driven by agriculture – mainly rough grazing for sheep – and grouse-shooting. Substantial areas of exposed peat also originate from wildfires, some 100 years old and some as recent as 2003.

The area has a long history of outdoor recreation – the Peak District was at the forefront of the right to roam movement in the early to mid-20th century, which led to the creation of the first national park in Britain.

As a result of their history and current use, the active blanket bogs of the South Pennine Moors SAC are now a complex, interspersed mosaic of eroding bare peat, and peat-forming vegetation dominated by cotton grass.

USES

Good for our well-being – recreation
The South Pennine Moors SAC is well used by walkers, fell runners, climbers and cyclists who enjoy the hills and spectacular scenery. Some 16.1 million people live within an hour's drive (or 40 miles) of the Peak District National Park boundary and it attracts millions of visitors each year. All four project sites lie on the Pennine Way, Britain's first long distance walking trail, which marked its 50th anniversary in April 2015.

Good for our health – drinking water
These moors are vital to water supplies – 70% of UK drinking water comes from the uplands and water from all four sites drains into reservoirs. The Peak District area alone provides 450 million litres of drinking water every day.

Good for our planet – carbon storage
Peatlands store the bulk of the UK's land-based carbon – worldwide they store more carbon than the earth's forests, locking it in and preventing it from being released as a greenhouse gas. Bare peat releases carbon as it erodes – it is estimated that 20 million tonnes of carbon is stored in the Peak District.

Good for our homes – flood mitigation
The South Pennine Moorlands SAC is a landscape of high rainfall with many of the surrounding communities subject to flooding. Monitoring has shown that restoring bare peat has reduced flood peaks and slowed overland flow.

Pressures and problems

HUMAN IMPACTS ON THE LANDSCAPE

There is significant historic damage caused by industrial pollution, summer wildfires, grazing levels and erosion.

The closeness of major cities puts pressure on these fragile areas as increasing numbers of people visit to enjoy the outdoors.

High visitor footfall leads to increased erosion of footpaths and surrounding vegetation, wildfires and disturbance to ground-nesting birds.

Overgrazing of the moors and inappropriate drainage by moorland grips has, in the past, added to this pressure.

THE PROBLEM WITH BARE PEAT

Bare peat erodes quickly at the rate of 25 mm a year, while active blanket bog produces new peat at a much slower rate of 1 mm a year. Bare peat has caused a number of problems:

- it threatens the intact areas of active blanket bog as more and more peat is eroded
- eroded peat is washed into streams and flows into reservoirs where it must be removed before the water is used for drinking
- carbon that was locked up in the peat is released, increasing carbon emissions
- bare peat areas are not used by wildlife or grazing animals as there is very little living there
- bare, eroded peatlands are unwelcoming places, inhospitable and unconducive for use as natural open spaces that improve people's health and well-being.

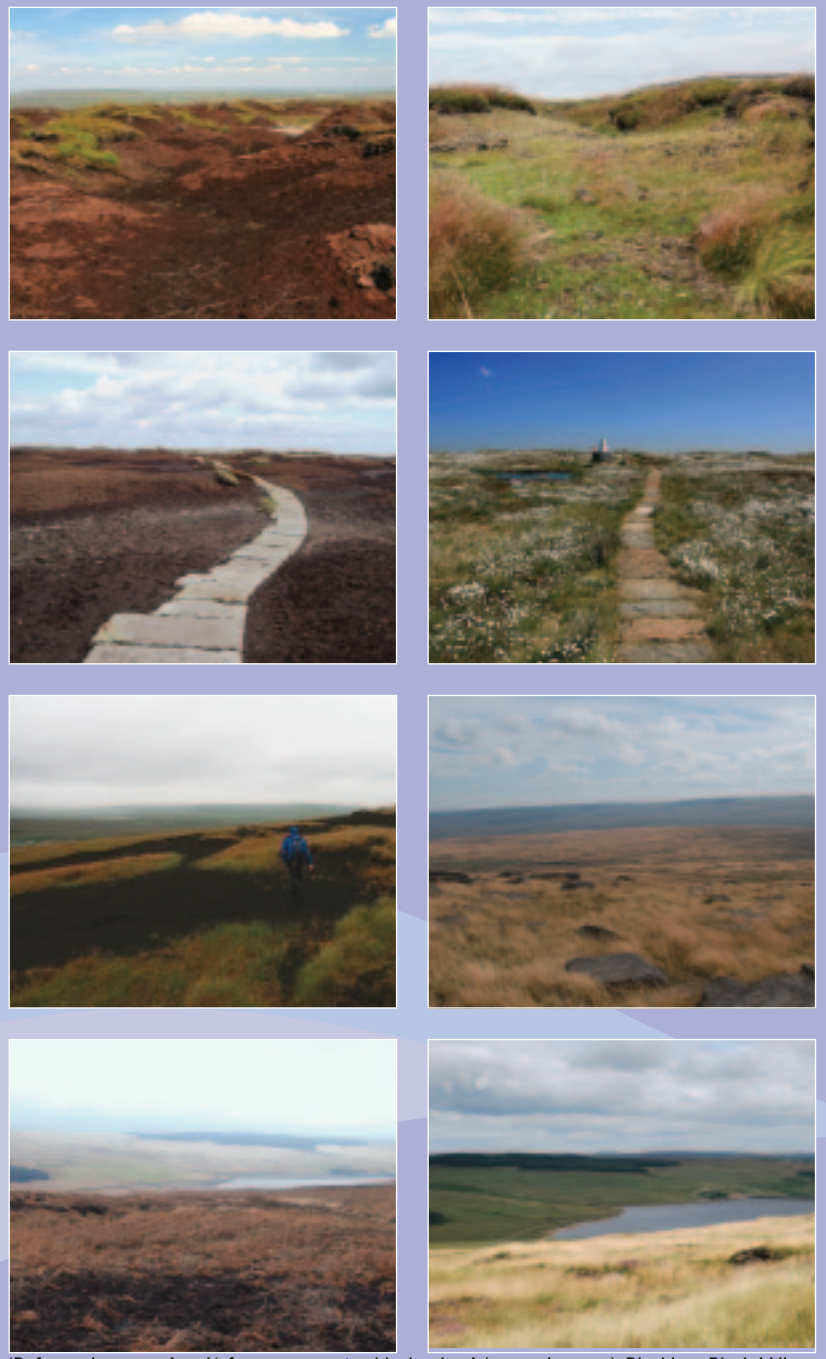
The pressures and problems proved to be too great a challenge for individual ownership or small-scale management, which is why the landscape-scale conservation approach provided by the EU-funded project was needed.

Locations

The four project sites lie within the South Pennine Moors SAC.

Bleaklow and Black Hill – situated in the Peak District National Park and within the South Pennines Phase 1 SPA and Dark Peak SSSI. Black Hill is mentioned in Alfred Wainwright's *Pennine Way Companion* (1968): 'It is not the only fell with a summit of peat, but no other shows such a desolate and hopeless quagmire to the sky; this is peat naked and unashamed.'

Rishworth Common and Turley Holes – within the South Pennines Phase 2 SPA and South Pennines SSSI. The Turley Holes site is at the southern tip of the 'Twite Triangle' – a breeding ground of the increasingly rare Twite or Pennine Finch (Photo right © Tim Melling).



'Before – bare peat' and 'after – recovering blanket bog' (top to bottom): Bleaklow, Black Hill, Rishworth Common and Turley Holes

How the MoorLIFE project is bringing life back to the moors

PROJECT AIM

The project aimed to take a significant step forward in the conservation of the project sites, protecting intact areas of active blanket bog, creating conditions for areas of inactive blanket bog to become active again and to contribute significantly to the functioning of the whole bog system at a landscape scale. These improvements would also help to enhance the breeding and feeding habitats for the bird species of the South Pennine Moors SPA.

WHAT WERE THE PROJECT OBJECTIVES?

The original project objectives were to:

- protect active blanket bog by treating the most badly damaged areas of the project sites, including bare and eroding peat
- undertake a comprehensive monitoring programme, including surveys of vegetation, carbon flux and hydrology
- actively engage with a diverse range of stakeholders, including gamekeepers, ramblers, researchers and farmers
- communicate the results and lessons learned within the project to a wide variety of interested parties through new and traditional media, including a fully interactive website and series of seminars / conferences
- ensure the future sustainability of the blanket bog through wildfire mitigation actions and by raising public awareness of wildfire risk and restoration
- develop knowledge and understanding and communicate this to practitioners and policy makers.

PARTNERS

All four project sites are on land owned by water companies, the National Trust or private landowners.

Project partner contributions:
Environment Agency – €101,000
Natural England – €241,000
United Utilities – €580,000
Yorkshire Water – €482,000
National Trust – €242,000
and the lead partner, Peak District National Park Authority – €37,000.

The Moors for the Future Partnership carried out the work as part of a wider programme of works – ensuring that the project benefited from the economies of scale offered by the partnership.

Conservation achievements

STABILISING

In total, conservation works protected around 2,500 hectares of active blanket bog. Stabilisation works were carried out over a total area of nearly 900 hectares, by covering bare peat within these areas with 2,300 tonnes of heather cuttings and 53 km geotextiles – rolls of netting like large fishing nets – that held the peat in place.

Peat damaged by industrial pollution can have the same level of acidity as lemon juice and almost nothing can grow in these inhospitable conditions. Lime was used to reduce this acidity, combined with fertiliser to give a boost of nutrients so that fast-growing grasses could form a temporary cover to stabilise the eroding peat until native plants became established. Areas of bare peat were reseeded with over 3,000 tonnes of lime and fertiliser and 43 tonnes of grass and heather seed, scattered from helicopters using special equipment.

200,000 plugs of native plants were then planted out by hand. These species increased the biodiversity of the sites and helped stabilise the peat.

DIVERSIFYING

Six species were used that, along with *Sphagnum* moss, make the basis for the active blanket bog vegetation community in the Peak District:

- cloudberry (*Rubus chamaemorus*)
- hare's-tail cotton grass (*Eriophorum vaginatum*)
- common cotton grass (*Eriophorum angustifolium*)
- bilberry (*Vaccinium myrtillus*)
- crowberry (*Empetrum nigrum*)
- cross leaved heath (*Erica tetralix*).

Plants were collected from sites above a height of 450 metres, within the South Pennine Moors SAC, ensuring that the plants produced were of local provenance. A cultivation method called micro-propagation was used to multiply the small amount of material many times to grow 200,000 plants for the MoorLIFE project.

RE-WETTING

Erosion gullies – channels in bare peat, also known as groughs – were blocked by building 4,000 dams from local stone or heather bales to raise the water table, ensuring that essential moisture is retained. The dams trap eroding peat and reduce the erosive power of rainfall, and also create pools for birds and other wildlife, and the wet conditions essential for the successful reintroduction of *Sphagnum* mosses.

Once the conditions were right, 1.5 billion fragments and 30,000 plug plants of *Sphagnum* were spread by hand to make new *Sphagnum* plants that will be essential for the formation of new peat.

Monitoring achievements

VEGETATION

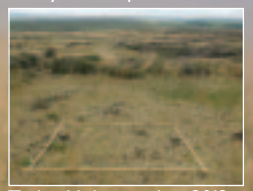
The success of the stabilisation of the bare and eroding peat was monitored through annual surveys of 228 fixed, two-metre squared monitoring plots on areas treated before and after conservation works, as well as on 'reference' bare peat sites and intact sites.

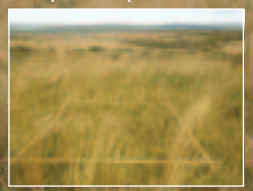
The application of grass seed and plug plants was shown to reduce bare peat cover within quadrats from 96% in 2010, to 14% in 2014, after completion of treatments – a reduction of 85%.

We aim to continue to monitor the transition of the grass cover to blanket bog vegetation, particularly the extent of peat-forming *Sphagnum* mosses. 119 plots have been set up and monitored for *Sphagnum*, together with transects to search for and record *Sphagnum* colonies.


Turley Holes quadrat 2010


Turley Holes quadrat 2011

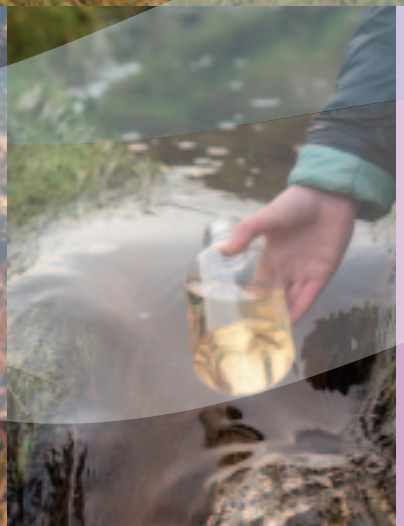

Turley Holes quadrat 2012


Turley Holes quadrat 2013

CARBON AUDIT

An audit was undertaken to calculate the carbon costs of carrying out conservation works of this nature. Greenhouse gas emissions resulting from the project's conservation works are offset by the prevention of continued erosion and the protection of current carbon stores within one year of revegetation.

Full results from the monitoring activities of the project are available in a separate report.



WATER AND CARBON

The impact of the conservation works on the water table was monitored by a dedicated team of staff and volunteers who collected thousands of measurements, as well as downloading data from automated 'loggers'.

The impact on the quality of the water running off the sites was monitored by collecting samples from streams at each site and measuring the levels of (dissolved organic) carbon in the water.

In addition, surveys of the amount of peat and water trapped behind gully blocks was measured to evidence their benefit in reducing the levels of peat that would have been washed away and increasing the time rainfall is kept on the blanket bog. Monitoring on Bleaklow showed that 100% of dams surveyed were holding water, and 82% were found to be holding peat in 2014.

Dissemination achievements

Education and awareness were vital parts of the project to ensure that the benefits of the conservation works were not compromised by visitor pressures. A range of products have been produced using traditional and digital media, including:

- a media campaign consisting of press releases, resulting in high levels of coverage including radio and television interviews at local, national and international level
- on-site visitor interpretation panels and works information noticeboards at key visitor access points for each of the sites, providing information about the project sites, the importance of blanket bogs and wildlife, together with up to date information about the conservation works
- moorland-themed teachers' packs for primary and secondary schools, including lesson plans and games
- a national competition for schools with the winners producing their own fire-aware video
- a four-minute video summarising the project and showcasing the scale and benefits of the work
- a series of four audio trails – guided walking tours of the project sites playable on smartphone or MP3 players
- a series of on-location video podcast interviews about the conservation and monitoring work
- a Be Fire Aware campaign – digital exhibitions at two visitor centres and online to educate visitors about the dangers of moorland wildfires
- a series of four moorland-themed identification guides as smartphone apps and printable guides to inspire and educate people about moorland features, plants and wildlife
- a series of leaflets and a feature about the project on the award-winning Harvey Maps Dark Peak Superwalker map
- a fully interactive website containing links to all digital products available for download, backed up by strong online presence on social media
- two project conferences and a seminar on best practice in *Sphagnum* reintroduction.

Full details of the communication and dissemination activities of the project are available in a separate report.

Top to bottom: Be Fire Aware launch; Conference registration; Black Hill field trip; MoorLIFE conference

MoorLIFE innovations

The project undertook the first carbon audit of moorland conservation works and the toolkit developed, including methodology, is available for use by other projects. New ways of *Sphagnum* application were developed for use in different situations. Continuing monitoring will provide vital information to inform best practice.

The UK's first interactive wildfire tool was produced, demonstrating to the public the real-time risk of moorland wildfires across the northern peatlands of the National Park. Visitors can interact with the model to understand the human effect on wildfire risk.

SPHAGNUM APPLICATION

Because of past industrial pollution, the *Sphagnum* mosses which form the peat of the project area were virtually eradicated. Therefore, innovative new methods of reintroducing them were developed during the course of the project. Eleven species of *Sphagnum* mosses were propagated using the same micro-propagation techniques used for growing plug plants. They were chopped into fragments and spread in one of the following ways:

- Where wide-scale application was needed they were placed in a protective bead (propagule) and applied directly onto the peat. It takes two to three years for the fragments to become established.
- Another wide-scale technique was trialled using bigger fragments of *Sphagnum* suspended in a nutrient-rich gel which was sprayed from a backpack. It is hoped that these fragments will become established quicker.
- Where a targeted approach was required, the fragments were grown in a greenhouse as plugs which formed mini-hummocks that were planted out by hand.

THE FUTURE

The project shows that a landscape-scale approach to upland conservation can achieve a significant transformation in five years. Results from monitoring show that the vegetation is recovering and even in the bare areas adjacent to the active blanket bog that the project was designed to protect, we are moving towards the conditions to create active blanket bog. There is still significant work to do but the future looks good for these precious open spaces.

Work on the five-year MoorLIFE project ended in August 2015 but the transformation does not stop there; these areas have been damaged by hundreds of years of pollution and need continuing efforts to build on this fantastic project. The Moors for the Future Partnership continues to seek funding and work on new and exciting conservation projects throughout the Peak District National Park and South Pennines to sustain these uplands.

The MoorLIFE project was co-funded by the European Union's LIFE+ Programme and delivered by the Moors for the Future Partnership. Led by the Peak District National Park Authority, partners of the MoorLIFE project included: Environment Agency, Natural England, National Trust, United Utilities and Yorkshire Water.

Produced as part of the MoorLIFE project by
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All information about the project, including dissemination and monitoring reports, is available from the MoorLIFE project website **www.moorsforthefuture.org.uk/moorlife**

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