



Peatland Programme

# UK PEATLAND STRATEGY

2018-2040

# CONTENTS

3	Foreword
5	Executive Summary
<b>6</b>	<b>INTRODUCTION</b>
10	Shared Responsibility
10	Step Change
<b>12</b>	<b>PART I. THE UK PEATLAND STRATEGY</b>
14	Goal: Conservation
15	Goal: Restoration
16	Goal: Adaptive Management
17	Goal: Sustainable Management
18	Goal: Co-ordinate
19	Goal: Communicate
20	Making it Happen
<b>22</b>	<b>PART II. BACKGROUND AND PURPOSE</b>
24	What are Peatlands?
26	Upland Peatlands
29	Lowland Peatlands
30	What do Peatlands do for Us?
34	Costs to Society from Damaged Peatlands
35	Work to Date: Government Leadership
36	Peatland Restoration: A Cost Effective Solution
38	Restoration and Sustainable Management to Date
<b>41</b>	<b>ANNEXES</b>
44	Glossary
46	References

“ Without further action it is likely that the current level of degradation will increase with climate change. Instead of providing vital and valued services, peatlands will increasingly cause costly problems to society.”

**UK Climate Change Committee**  
Adaptation Sub-Committee (2013)

# FOREWORD



We are at a pivotal moment in our human relationship with the planet. Faced with growing evidence of

the damaging consequences of our unsustainable living and exploitation of our natural resources, people show incredible ingenuity and ability to avoid disaster. The IUCN is the world's largest partnership of government and environmental bodies, and its global programme 2017 - 2020 embraces the desire for a sustainable future recognising that a healthy environment is key to our success.

Peatlands are among the most valuable ecosystems on Earth and a stark example of how important our natural environment is to our wellbeing. Occupying just 3% of the Earth's land surface, peatlands are our largest carbon store on land. They are places where people derive clean water and food, and can act as buffers for environmental disasters, such as flooding. They are also of global significance for biodiversity with the majority of peatland species and habitats rare, threatened or declining.

The vast fires and resultant haze of SE Asia and huge carbon impact of agricultural drainage of peatlands in Europe are highly visible reminders that we cannot continue with business as usual. During the 2016 IUCN World Conservation

Congress, a Motion on peatland conservation was passed calling for better protection and restoration of peatlands across all 180 peatland nations, recognising the catastrophic loss of carbon, biodiversity and harm to water systems that will occur unless urgent action is taken. This is reflective of the growing recognition of peatlands as a 'nature-based solution' to climate change both internationally and in the UK.

Excellent examples exist of countries around the world taking action to restore peatlands and their vital functions. Among these the UK stands out, showing leadership in tackling past degradation and setting a new long term commitment to their future as healthy ecosystems. The collaboration of Government, environmental NGOs, land managers and scientists under the umbrella of the IUCN UK Peatland Programme, an IUCN UK National Committee initiative, has played a key part in bringing about this new era for UK peatlands.

The UK Peatland Strategy helps capture the excellent work to date and build the foundations for long term conservation and sustainable management of peatlands. It provides the focus and vision so that all key stakeholders can pull together in the same direction, helping scale-up and strengthen existing efforts. The UK has recognised the need for greater ambition to address the 80% of peatlands still in a damaged

state. To do this effectively, long term commitments are required and the inclusion of peatlands in the 25 Year Environment Plan and development of country level action plans, such as Scotland's National Peatland Plan, are crucial to achieving success.

The UK Peatland Strategy aims to drive and co-ordinate action across the UK, supported by country level plans that will establish a course for peatland conservation and management at a more detailed level. This strategy recognises there are different peatlands and types of pressures within the UK and seeks to provide common goals across the four devolved administrations of England, Northern Ireland, Scotland and Wales towards an overarching aim of two million hectares under restoration or in good condition by 2040.

I am proud to introduce this excellent work and hope it will provide inspiration for all peatland nations as well as supporting new partnerships where lessons are learned and knowledge exchanged as part of a global effort to secure our peatland ecosystems.

**Inger Andersen**

Director General of the International Union for the Conservation of Nature (IUCN)



# EXECUTIVE SUMMARY

The vital connection between people and peatlands is an issue of global concern and the United Kingdom stands among those peatland nations that are leading the way in safeguarding this important part of our natural environment.

Beautiful and dramatic, UK peatlands are evocative landscapes home to rare and endangered wildlife. They are rich in cultural history; from prehistoric bog bodies preserved in the peat to the land management and recreational pursuits of today. Recognising their great importance to society has been a slow awakening but we are now beginning to understand the many benefits peatlands provide.

This awakening has come at a critical time with a staggering 80% of our peatlands in a damaged and deteriorating state. We are already witnessing the high costs of eroding, degraded peatlands to society at large, to the people who live and work among them and to those who enjoy visiting for recreation. The adverse consequences for future generations will be even greater if we do not intensify our efforts to repair and conserve our peatlands. Fortunately, there is a groundswell of support from across Government, environmental NGOs, farmers, sporting and business interests who are all committed to achieving this goal.

The UK Government has been world leading in supporting a strategic approach to peatland conservation and providing the necessary funding.

Partnerships across the UK have delivered often large scale, peatland restoration. These initiatives demonstrate we have the skills, techniques and knowledge to bring even the most degraded peatlands back on track towards healthy, functioning ecosystems. Whilst uncertainties remain, there is clear scientific evidence of the often immediate benefits to be gained for water, climate change, wildlife and land management.

The UK's first collaborative Peatland Strategy has been developed by the IUCN UK Peatland Programme to capture and embed, for the long term, a shared vision for our peatlands, helping maintain a focus across a broad partnership and allowing progress to be marked and celebrated.

The UK Peatland Strategy encompasses all peatlands in the United Kingdom and is also of relevance to the UK Overseas Territories. It sets the context for the devolved administrations strategic peatland action plans.

The goals contained within the UK Peatland Strategy recognise the diversity within and between peatlands and the pressures that

are exerted on them, but identifies a common way forward by:

- Conserving and enhancing the best and most readily recoverable peatlands
- Restoring heavily degraded peatland to functioning, peat-forming ecosystems
- Applying land uses that are compatible with healthy peatlands
- Shifting management of drained peatlands under intensive productive use towards wetter ways of farming
- Maintaining a formal, government supported programme to stimulate funding, share experience, promote best practice and monitor progress towards strategic goals
- Communicating peatland values, both intrinsic and measurable, to a wide audience.

The strategy is not an end in itself but a tool to support ongoing collaborative and co-ordinated effort to tackle one of the great environmental challenges of our time.

# INTRODUCTION

Peatlands – or mosses, mires, fens and bogs as this ecosystem is sometimes referred to – form a major part of the United Kingdom’s visual landscape. A common and evocative portrayal is of mossy hummocks, dark brooding pools of water and cotton grass heads bobbing in the breeze, yet globally these vast wetland landscapes, characterised by waterlogged soils made of decaying plants, come in all shapes and sizes.

Present on every continent, peatlands can be found in the form of tropical peat swamps in South East Asia to tundra permafrost in Russia and Canada (Fig. 1).

In the UK, three broad peatland types exist – blanket bog, raised bog and fen (Fig. 2). Covering over two million hectares – space enough to hold 1.6 million cricket matches at once – they are globally important, with as much as 13% of the world’s blanket bog formed in the cool, wet climate found here.

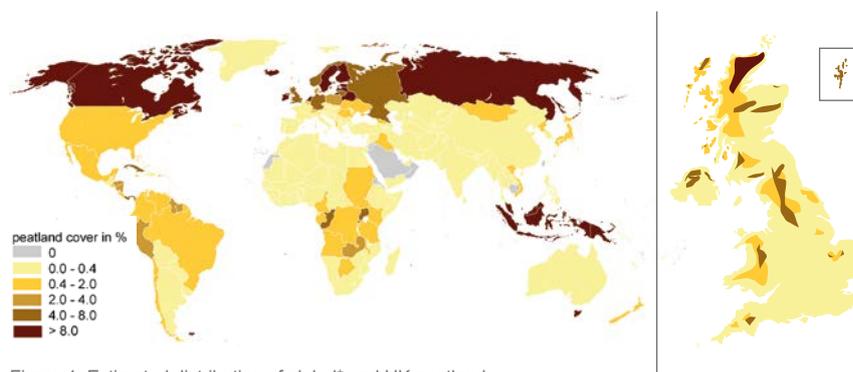


Figure 1: Estimated distribution of global\* and UK peatlands;  
\*reproduction with kind permission from Joosten (2009)

## BLANKET BOG

Globally rare, although in the UK forms the most widespread habitat. Typically occurs in the uplands as mantles of peat over extensive areas but can also be found in lowlands. Healthy blanket bog is mainly composed of bog vegetation fed only by precipitation and is consequently nutrient poor and acidic.





© John Morrison

## RAISED BOG

Localised domes of peat rising above the surrounding land and mainly found in the lowlands. Raised bogs are also nutrient poor and acidic, and consequently, the plant species found in raised bogs are similar to those in blanket bogs. Fed only by precipitation.



© Emma Goodyer

## FEN

In addition to precipitation, fens also receive water that has been in contact with the underlying geology and exhibit a wide range of types from base-poor fens that resemble bog-type vegetation (e.g. cotton grass, heather and *Sphagnum* mosses) to rich fens of sedges, reeds and brown mosses.

Figure 2: Three broad peatland types in the UK.

The importance of peatlands comes from the remarkable services they provide to society, which includes wildlife habitat, global carbon store (they contain twice as much carbon as all the world's forests), drinking water filtration, flood prevention, historical archive, grazing land and recreational areas.

The significance of peatlands is increasingly being understood by governments around the world, wider society and the people who live and work among them.

Whether managed for farming, sport or as a nature reserve, peatlands can provide a tranquil retreat and include some of the country's most important

protected areas for their species and outstanding natural beauty.

Covering around 10% of the UK land area, peatland habitat can be discovered in the most remote corners of the country, but also near the major centres of human population with livelihoods often intimately connected to their fate.

“ Peatlands are the terrestrial ecosystems with the highest carbon density on earth. The Paris Agreement requires us to protect this carbon by keeping wet peatlands wet and making all drained peatlands wet again, including those in agricultural use.”

**Hans Joosten**

Professor of Peatland Studies & Palaeoecology, University of Greifswald

Appreciation of the wide ranging impacts and benefits of peatlands is relatively recent and as a consequence the majority have been historically managed in a way that has left them in a damaged state, with an estimated 80% of UK peatlands in some way affected.

Improved understanding of peatlands and great advances in management techniques and scientific knowledge has led the UK to an important turning point in their conservation.

In the UK, we have the skills and expertise to take action in even the largest landscapes, to resolve conflicts and to bring about positive outcomes for peatlands and the

associated benefits (including economic and social). The last decade has seen an increase in the amount of damaged peatland being repaired and we are beginning to understand the scale of the task at hand.

A UK strategy will allow the devolved nations to make the most of this opportunity, setting the scene for a co-ordinated effort and shared agenda amongst all interested stakeholders. It will address the issues presented by damaged peatlands to avoid imposing a huge cost on future generations. Conserving peatland habitat and restoring degraded areas will make a better environment for all.

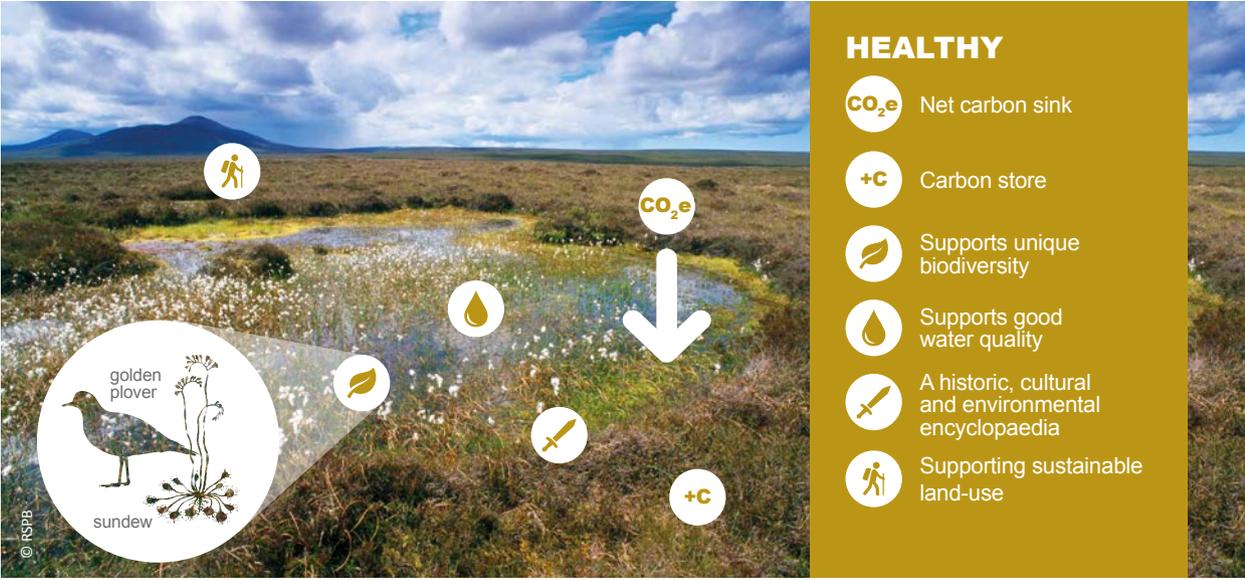


© Meli Cowie



© David Morris

# ECOSYSTEM SERVICES IN A HEALTHY PEATLAND



# IMPACT ON ECOSYSTEM SERVICES IN A DAMAGED PEATLAND



Figure 3: Ecosystem services in a healthy peatland vs. damaged peatland

# SHARED RESPONSIBILITY

Peatlands have a broad range of influences with different sectors of the land managing community pursuing their own objectives whether upland livestock farmers, lowland arable producers, water companies, sporting estates or nature conservation bodies. Others are interested in peatlands for recreation, cultural history or for some, their climate change role. A strategic approach is required to help address the different pressures and demands to

secure the best long term solution for society in a way that takes account of these multiple interests.

A key way forward is to give greater recognition to the economic implications of how peatlands are managed. To someone blissfully walking across a peatland, the exhilarating experience of wide open space, rich aromas of myrtle and the musical calls of wading birds may be priceless.

For others there is a more direct economic value such as the water company treating drinking water or the flood defence manager responding to peak flows. To help properly reflect these values among financial decision makers, peatlands can be considered as part of our natural capital – stocks of natural assets that provide valuable public benefits or ecosystem services for society (Fig. 3 & 4).

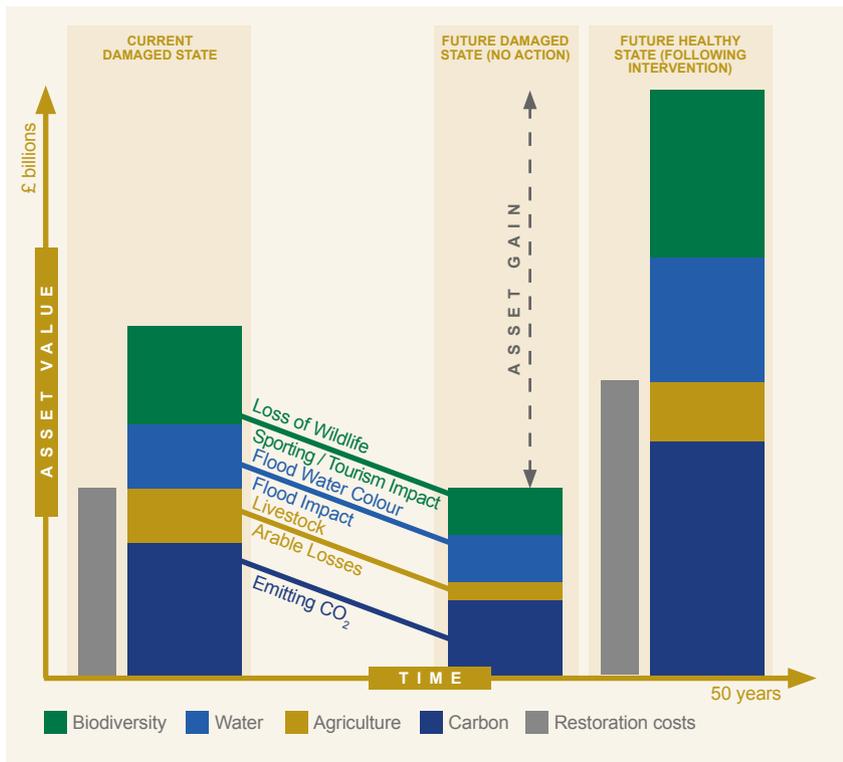


Figure 4: Comparing gains and costs in the transition between peatlands in different conditions

# STEP CHANGE

Action taken now will avoid far greater costs to society in future, hence the urgent need for this strategy. Such an important resource requires responsible management if we are to optimise the benefits and avoid the hugely damaging social and economic costs of environmental degradation.

Securing the long term future of our peatlands and the vital services they provide, particularly in the face of an already changing climate, will be achievable if we take a strategic approach, as recommended by IUCN Resolution 043 “*Securing the future for global peatlands*”. The UK is also required to meet international obligations towards peatlands and climate (see Annex 2). The UK Peatland Strategy will assist Government in meeting these.

## TEN GLOBAL PRIORITIES IDENTIFIED FOR PEATLANDS



Figure 5: Priorities for peatlands as identified by UN FAO and Wetlands International (2012)

### A UK PEATLAND STRATEGY WILL WORK ACROSS THE FOUR DEVOLVED COUNTRIES TO ACHIEVE:

- Better understanding of the value of UK peatlands
- Prioritisation of the restoration and conservation of peatlands and sufficient resources to support this
- A strong ethos of partnership working between scientists, practitioners, policy makers and land managers to deliver efficient and cost-effective peatland restoration and management
- Knowledge exchange and development of good practice across the peatland community, with efficient allocation of resources to support research and monitoring
- International collaboration to support action for global peatlands and climate
- National accounting to include the monitoring of habitat condition and reporting to support Greenhouse Gas inventories.

# PART I. THE UK PEATLAND STRATEGY: ACTION

The UK Peatland Strategy aims to drive and co-ordinate action across the UK, supported by country level plans that will establish a course for peatland conservation and management at a more detailed level. This strategy recognises there are different peatlands and types of pressures within the UK and seeks to provide common goals across the four devolved administrations of England, Northern Ireland, Scotland and Wales.



### 2040 VISION

Our peatlands are protected, enhanced, sustainably managed and are recognised for their intrinsic value and the public benefits they provide.

### 2040 TARGET

Two million hectares of peatland in good condition, under restoration or being sustainably managed by 2040.

Figure 6: Summary of the UK Peatland Strategy Goals.

A dual approach is proposed whereby:

- i. The four countries seek to make early advances where there are easy opportunities for conservation and restoration, utilising existing resource and expertise.
- ii. The four countries put in place measures now to expand delivery in the more challenging or costly areas.

Delivering the long term vision and goals of the strategy (see Fig. 6) will require significant levels of collaborative working: something that the IUCN UK Peatland Programme has already demonstrated is feasible and can be built further through the efforts of our partners.

The development of the strategy utilises the experience of the wide ranging national and local partnerships across policy, science and practice and the findings of a comprehensive

scientific review: the Commission of Inquiry on Peatlands (2011), undertaken by the IUCN UK Peatland Programme. It takes forward the Ministerial action statement on UK peatlands (Benyon, Griffiths, Attwood, & Wheelhouse, 2013) from the four devolved administrations and embraces national peatland action strategies to provide a co-ordinated focus covering all three main peatland types: blanket bogs, raised bogs and fens in the UK across some 2.6 million hectares of peatland.

The strategy also makes connection with peatlands in the UK Overseas Territories and work on peatlands globally through links with international bodies such as the IUCN, Wetlands International and the Global Peatlands Initiative. These links allow for knowledge sharing with international peatland projects in Europe and other major peatland areas such as those in South America, Africa and Southeast Asia.

“ If we are to deliver the scale and pace of peatland restoration and management necessary to achieve the goals set out within this strategy, we need co-ordination and focus across all sectors within the UK to help bring about positive change for peatlands and deliver wide ranging public benefits.”

**Clifton Bain**

Director, IUCN UK Peatland Programme



## CONSERVATION



© Lorne Gill / SNH

### Conserve and enhance, though restoration management the best and most readily recoverable peatlands

Early conservation to secure the best areas avoids higher costs and greater risks of failure associated with repair of more severely degraded areas.

Recover mire vegetation communities to areas where past management has resulted in a shift to other vegetation communities (e.g. heath).

## OBJECTIVES

Bring about the long-term preservation, enhancement and sustainable management of peatlands in areas that support:

- i. semi-natural mire plant communities and
- ii. other semi-natural vegetation on peat soils (e.g. heath) through:
  - a. Maintaining and enhancing a suite of local, national and international level of protected areas for biodiversity alongside wider measures to ensure the favourable status of peatland habitats and species across their range
  - b. Conserving functional ecosystem units as the building blocks for habitat networks
  - c. Preventing damage from development and conflicting land management
  - d. Ensure the full long-term costs of potentially damaging activity is properly taken into account during the decision making process.

## OUTCOMES (2018-2040)

- 95% of UK peatlands supporting semi-natural vegetation are under sustainable management for their peatland biodiversity and ecosystem function
- 95% of peatlands are protected under relevant local, national and/or international protected area designation types (or related designations post-Brexit)
- Cost savings are being made through avoiding the need for major interventions
- Policies are in place for peatland protection and restoration in new developments and land management change, including the prevention of intensification of artificial drainage and direct habitat destruction
- Environmental assessment processes are designed to assess full costs to carbon, water and biodiversity.

## MILESTONES

### 2020

Meet the IUCN UK Peatland Programme challenge: 1 million hectares of peatland in good condition, under restoration agreements and being sustainably managed.

Establish the current baseline and begin to define management plans.

### 2030

50% of the peatland resource is conserved in good condition.

### 2040

Target (95%) is achieved.

## RESTORATION



### Restore heavily degraded areas towards functioning peatland ecosystems

Whilst challenging, peatlands that are severely degraded can be stabilised through restoration intervention and placed on the road to recovery.

There are a number of heavily degraded sites across the UK where action can be taken now whilst assessing and prioritising other opportunities.

## OBJECTIVES

Restore peatland ecosystem function and enhance biodiversity through the restoration and ongoing sustainable management of upland and lowland peatlands that no longer support semi-natural vegetation but which have:

- a. remaining deep peat resource including mineral workings, deep drained, improved grasslands and closed canopy forestry plantations
- b. an adjacent semi-natural peatland site that depends on the degraded area coming under restoration management.

Safeguard restorable peatland areas from development and land management activity that would undermine restoration potential.

Optimise UK carbon efficiency by co-ordinating forest management, renewable energy development and peatland conservation through planning to ensure positive outcomes for all.

## OUTCOMES (2018-2040)

- Majority (80%) of heavily degraded peatlands in the UK are under restoration management aimed at recovering long-term security of the ecosystem
- Recognising that initial recovery halts losses but can begin to recover function across biodiversity and carbon sequestration:
  - a. Intervention to repair bare peat areas, former mineral workings and agricultural/afforested areas is underway to halt peat loss and re-establish peatland habitat where possible
  - b. Restoration work across the UK has been delivered as a result of both private and public finance.
- Land use development plans identify safeguards for peatlands, policies for forestry and renewables identify safeguards for peatlands
- Good practice restoration advice is available to support effective, efficient and sustainable peatland restoration.

## MILESTONES

### 2020

Meet the IUCN UK Peatland Programme challenge: 1 million hectares of peatland in good condition, under restoration agreements and being sustainably managed.

### 2030

Areas capable of restoration identified and given protection in development plans.

### 2040

Sites identified as priorities have restoration plans agreed and suitable funding routes identified.

## ADAPTIVE MANAGEMENT



### Shifting management of drained peatlands under intensive productive use to deliver wetter ways of farming

Some existing land uses currently rely on maintaining drainage of peatlands. Resulting negative environmental and socio-economic impacts can be reduced by providing new products that thrive on wet peatland soils, minimising the need for drainage.

This represents an opportunity to maintain farming livelihoods and generate new enterprises within UK agriculture.

## OBJECTIVES

1. Improve farming practices on peat soil to slow the loss of soil carbon by encouraging:
  - a. Partial conversion of ploughed land to grass conversion e.g. buffer strips, field corner management etc.
  - b. Other practices to reduce soil and soil carbon loss in the absence of re-wetting
  - c. Water management to encourage higher water levels within the peat soils.
2. Develop and introduce wetland agriculture systems to the UK:
  - a. Trial new systems for and new ways of working that can reduce the carbon impact of agricultural practices on peat soils. This will include the trial and development of novel crops.
  - b. Look to new markets for products from sustainably managed peatlands and develop alternative products where the use of peatland is unsustainable. In doing this, ensure that the burden of any impacts is not exported to other countries.

## OUTCOMES (2018-2040)

- The impact of greenhouse gas emissions from agricultural use of peat is reduced through a shift to wetter farming
- The distribution and extent of agricultural peat soils across the UK is maintained through the introduction of new soil management regimes and cropping systems.

## MILESTONES

### 2020

Vision agreed for agricultural soils.

### 2030

Early opportunities are being delivered for agricultural peat soils to bring them under sustainable management regimes.

### 2040

Vision for agricultural peat soils is delivered.

## SUSTAINABLE MANAGEMENT



### Applying land uses that are compatible with healthy peatlands

Conserving and rehabilitating peatlands, so that they function fully does not mean that these areas become off-limits to economic activity. Various options for site-adapted land use on wet and rewetted peatlands have been developed and tested, including farming, sporting and other recreation.

This includes minimal intervention where no action is required to maintain peatland habitat.

## OBJECTIVES

Sustainable management across UK peatlands can be achieved through:

- a. Demonstrating and communicating the benefits of healthy peatland landscapes and peatland restoration, and highlight the win-wins for wider society and specific land use activities
- b. Involving local communities at an early stage and support communities in overcoming any dependencies on unsustainable peatland use
- c. Developing economically viable systems for supporting peatland management:
  - i. Providing support for land managers who manage peatland sustainably, ensuring the right level of public funding to overcome any market failures
  - ii. Avoiding public money being directed into fiscal regimes that can result in peatland damage.

## OUTCOMES (2018-2040)

- Sustainable management practices adopted on 80% of UK peatlands
- Healthy peatlands are delivering benefits for land managers and rural economies. Land managers are recognised for the wider services the healthy peatlands they manage deliver for society
- Local communities are engaged at the earliest stage. Support is provided to help them to overcome their opportunity costs and dependence on unsustainable peatland use.

## MILESTONES

### 2020

Peatland carbon is incorporated into UK Greenhouse Gases inventory reporting and peatland management forms part of mitigation plans.

### 2030

All peatlands under sustainable management, as indicated by the Committee on Climate Change (2017).

## CO-ORDINATE



**Maintain a formal, government-supported programme to stimulate appropriate funding support, share experience and encourage good land management practice to support all of the strategic goals**

## OBJECTIVES

Establish and maintain a framework to ensure funding and policy support for:

- a. Capital costs of restoration and ongoing management
- b. Ongoing research and monitoring
- c. Maintaining existing landscape-scale peatland partnerships, specifically as peatland management and advisory groups or as part of wider landscape projects
- d. Communications work to boost peatland support with the public
- e. Development of alternative products e.g. for use in horticulture, paludiculture crops
- f. Applied research and monitoring to generate the evidence needed for delivery of funding support. For example, develop natural capital values for peatlands to support a natural capital based approach to management and restoration.

## OUTCOMES (2018-2040)

- Healthy peatlands have measurable ecosystem services value to society
- Peatlands and the services they provide have a measurable economic value that is recognised through funding support for their conservation and management. This will include improved greenhouse gas assessments and formal accounting methodologies
- Public funding is secured to support restoration in return for recovery of peatland benefits to society. This is delivered through national peatland action programmes, regional peatland partnerships, environmental bodies and agri-environment funding
- Government recognised carbon market standards for peatland restoration are adopted in private sector
- Innovative funding mechanisms, which deliver private funding to support the delivery of capital costs for peatland restoration, are established.

## MILESTONES

### 2020

Funding plan in place to resource the UK Peatland Strategy, comprised of public environmental funding, public benefit payments and private funding.

### 2030

Review public and private funding measures and address any shortfalls.

### 2040

Funding support is widely adopted across public and private sectors and is secured through a range of long-term programmes.

## COMMUNICATE



### Communicate peatland values, both intrinsic and measurable, to a wide audience.

Widespread public and organisational support is delivering long-term protection for those areas of peatland in good condition and is preventing damaging activity that would reduce peatland function in other areas. This recognition of peatland benefits is delivering the means for peatland conservation.

## OBJECTIVES

Communication instils public support for peatland conservation, restoration and sustainable management as delivered by accompanying goals:

- Provide printed and digital resources to enable understanding of peatlands
- Share peatland stories with the media
- Showcase peatland restoration case studies
- Disseminate key messages to stakeholders
- Present peatland science in an accessible format.

## OUTCOMES (2018-2040)

Peatlands are recognised for the benefits they provide and society is aware of both the benefits of healthy peatlands and impact of degradation.

## MILESTONES

### 2020

Increased peatland coverage in the media, which supports the goals of this strategy (demonstrated through an impact survey).

### 2030

Public attitudes survey demonstrates widespread knowledge of peatlands and support for public spending.

### 2040

With a large proportion of the UK's peatlands in good condition or under conservation management, communications work is focused on the benefits these habitats are delivering and the need to maintain conservation of these areas.

## MAKING IT HAPPEN: IMPLEMENTATION

The UK Peatland Strategy sits alongside the existing country level peatland plans and supports the development of additional or future plans.

A UK focus helps provide an overall picture of challenges and successes, builds synergy and allows progress against international peatland strategic objectives to be assessed.

A UK partnership across policy, science and practice also strengthens activity in each country by allowing exchange of ideas and co-operative

working. National plans for each of the four countries will reflect the different characters of peatlands present, the varied challenges faced within each administrative area and to develop and deliver focused public and private funding aligned with these needs.

Action plans will provide the eventual delivery of the wider strategic goals of the UK Peatland Strategy. It is recommended that each national plan addresses the priorities identified internationally for peatlands by the United Nations FAO (Fig. 5).

## MAKING IT HAPPEN: MONITORING

Monitoring of the strategic goals and milestones will be co-ordinated by the IUCN UK Peatland Programme. Annual summaries of progress in relation to these goals will be presented at their annual conference.

The Commission of Inquiry on Peatlands 2018 Update 'State of UK Peatlands' chapter will provide the baseline evidence for the amount of UK peatland resource under conservation and restoration management, as well as providing an assessment of progress towards the two million hectares by 2040 target

established by this strategy. Following on from this, reports on progress against the strategy will be produced every five years, summarising outputs from the four countries and devolved governments in addition to capturing progress by peatland partnerships and land managing groups.

This will encompass progress against the country action plans in addition to national level reporting for UK objectives such as greenhouse gas reporting and habitat conservation status.

“ We are committed to the sustainable management of all peatlands in Wales. As an example, Natural Resources Wales, with the support of the Welsh Government, has succeeded in obtaining funding from the EU LIFE programme to help restore peat bogs. This ambitious project will demonstrate the benefits of peatland restoration and generate long term environmental, economic and social benefits, in line with our Nature Recovery Action Plan and our commitment to the wellbeing of future generations.”

**Hannah Blythyn**  
Minister for the Environment,  
Welsh Government



## PART II. BACKGROUND AND PURPOSE: CURRENT SITUATION

Peatlands are one of the most valuable ecosystems on earth. They cover around 400 million hectares worldwide (around 3% of land area) and store the equivalent of 75% of atmospheric carbon – more than all other vegetation types in the world combined.

### GLOBAL SETTING AND POLICY COMMITMENTS

Despite their limited extent peatlands are a hugely significant global ecosystem and are recognised as such by world leaders for carbon, biodiversity and water, with major international agreements aimed at recognising the importance

of peatlands and securing their wellbeing (see Annex 2). Other countries are beginning to take action to tackle peatland degradation with the IUCN and the Global Peatlands Initiative encouraging countries to develop peatland strategies.

Around 8% of deep peat soils in the UK are assessed as being wasted, actively eroding or bare (equivalent to 1% of the UK land area).

**Joint Nature Conservation Committee, 2011**

### DISTRIBUTION AND STATE OF UK PEATLANDS

As one of the world's major peat nations, the UK's peatlands are among our most evocative landscapes, spanning the country from the blanket bogs of Caithness to the lowland fens of Cornwall. Peatlands form the UK's largest expanse of semi-natural habitat occupying 10% of the UK's land area (2.6 million ha) (Fig. 8) and are the largest component of the UK's wetland environment.

Peatlands are, by definition, wetlands, and it is the high water table that enables peat to form and support such a distinctive biodiversity. Peat formation is slow, typically at 1 mm per year: the deepest peats began to form immediately

after the last Ice Age so some peat soils are over 10 m deep.

The valuable services peatlands provide have not always been appreciated and, in the UK, only around 20% of peatlands remain in a near-natural state. The remaining 80% have been modified as a result of past and present management.

This is due to largely unsuccessful attempts post-World War II to drain them for agricultural improvement and commercial forestry, as well as burning and grazing management (see Fig. 7). This, in addition to the construction of infrastructure for development and commercial peat extraction for horticulture.

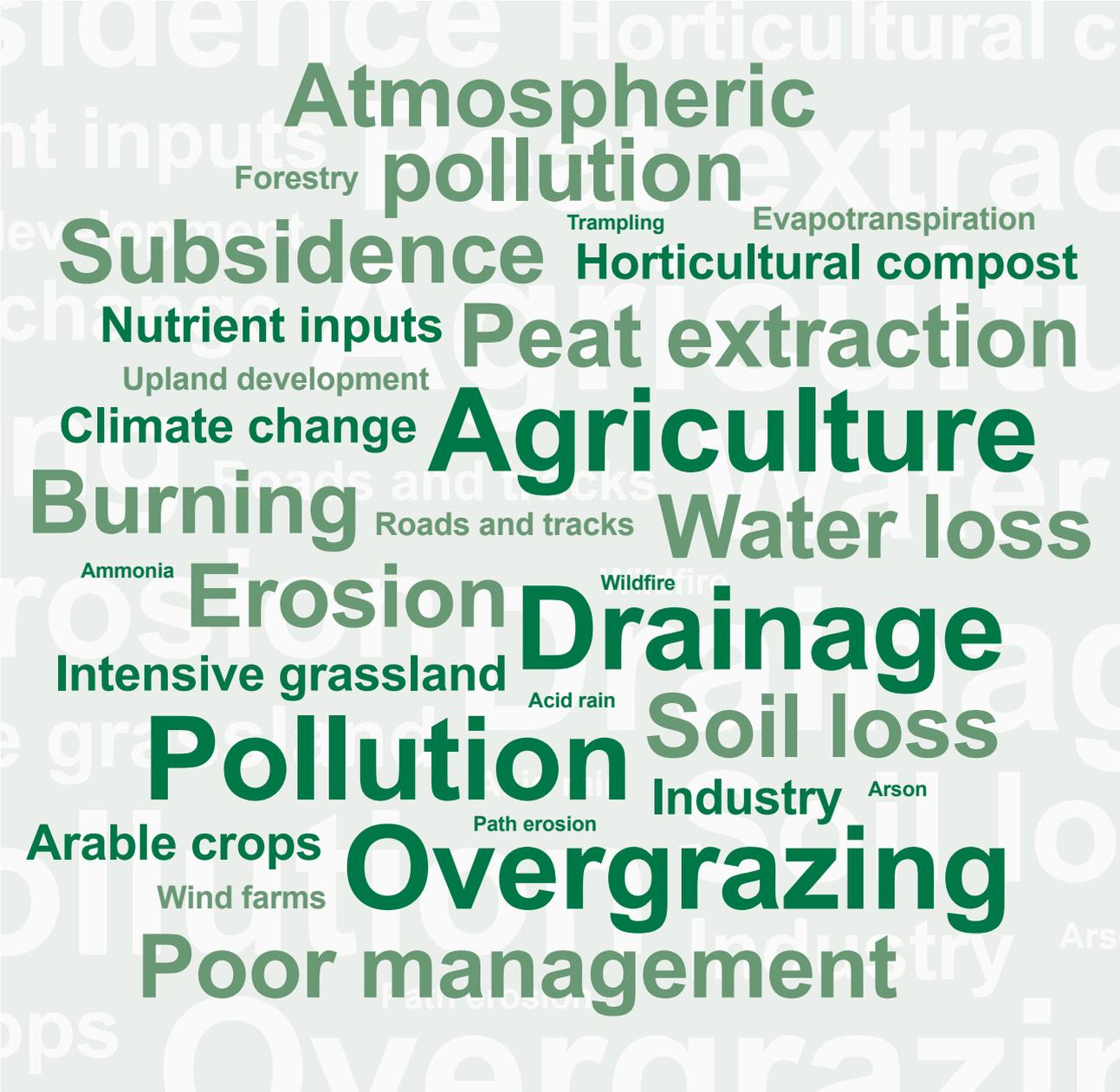


Figure 7: Pressures on peatland in the UK

## WHAT ARE PEATLANDS?

Peat and peatlands are described using a variety of terms and parameters. Internationally, there is a growing consensus of the definition of peat soils as being organic carbon rich soils with a depth exceeding 30 cm. In line with international consensus, this strategy defines peat as:

*“A wetland soil composed largely of semi-decomposed organic matter deposited in-situ, having a minimum organic content of 30% and a thickness greater than 30 cm.”* Finlayson & Milton (2016)

Peatlands are therefore areas of land that are characterised by a naturally accumulated layer of peat. The term peatland encompasses the whole ecosystem; the soil layer as well as the habitat supported by it.

In addition to the 2.6 million hectares of ‘peatland’ currently mapped in the UK, there is an equivalent area of shallow peaty-soils that are not considered a focus for this strategy, but which support EU Annex 1 priority habitats and play a valuable role in service provision such as carbon storage.

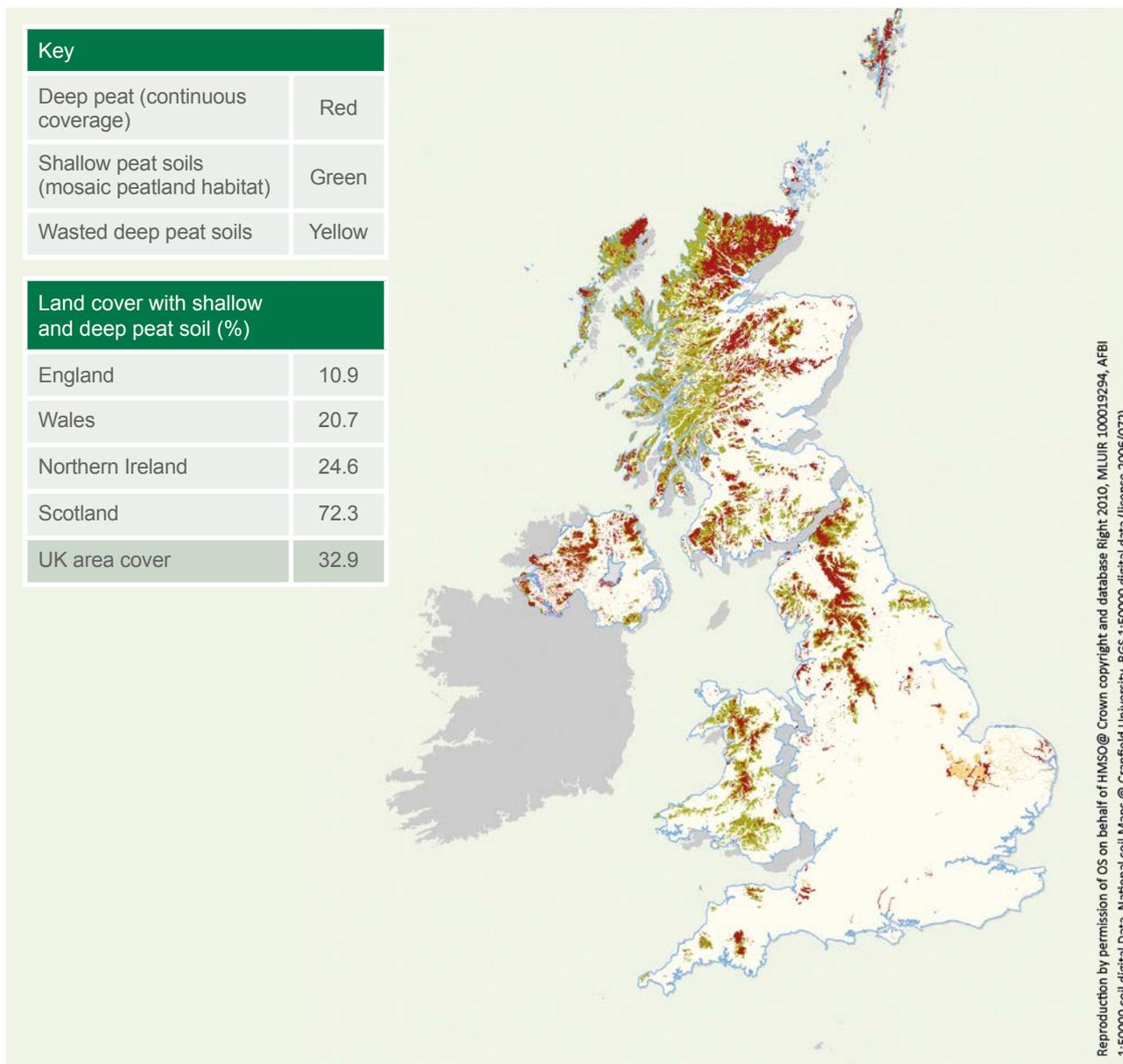


Figure 8: Land cover and distribution of peat soils within the UK. Note: This map is a compilation of available soil data sets in each country and peat has been defined and recorded differently in each: Scotland maps peat as >50 cm; Northern Ireland maps peaty soils as >40 cm and deep peat as being >50 cm; England and Wales define peaty soils as >10 cm and deep peat as being >40 cm. (Adapted from JNCC, 2011)

## UPLAND PEATLANDS

UK uplands are dominated by blanket bog with variable peat depth (c. 0.5 m –10 m). A wide range of impacts over time have led to severe degradation of habitat and erosion of peat soil. Many peatlands have long been used as grazing for sheep and in areas high stocking densities has resulted in overgrazing and trampling, compounded on some sites by high populations of wild deer.

Large areas of blanket bog were historically drained in an attempt to improve the land for forestry and agriculture although this is now no longer government supported. Burning is an ongoing moorland management tool for grouse and livestock production. This has extended into degraded blanket bogs from the shallower upland heath soils. Frequent repeat burning can degrade bog habitat, leading to reductions or loss of key bog species (plants and animals), reduced structural diversity and dominance of more typically heath species. The subsequent habitat degradation can compromise sustainable grouse and livestock production.

Some localised extraction for fuel continues particularly in the Scottish Isles and in Northern Ireland. New threats include upland development such as tracks and renewable energy schemes. Poorly located and designed built developments with associated drainage and excavation of peat can result in peatland degradation and habitat loss.

“ The British and Irish Isles have some of the best blanket bog in the world – a globally rare habitat that is only found in exceptionally wet and oceanic places around the globe. However, all our blanket bog is damaged in some way – through drainage, burning and over-grazing and in some areas through afforestation with non-native conifer plantations. The blanket bogs of our uplands and the north-western coastal lowlands form Britain’s largest semi-natural extant of remaining habitat of fundamental importance on the international stage. Restoration is a national imperative.”

**Rob Stoneman**

Co-Chair, IUCN UK Peatland Programme  
and CEO, Yorkshire Wildlife Trust







## LOWLAND PEATLANDS

A range of peatland types are found in the lowlands including fens, lowland raised bogs and even blanket bog, which can be present at sea-level in Scotland. Lowland peatland habitat is often highly fragmented due in part to variation in supporting hydrological conditions but also due to land use. For example, raised bog habitat was once estimated to cover about 70,000 ha, though only 5.5% of this area (about 3,800 ha) remains in a near-natural state (Lindsay & Immirzi, 1996).

Being relatively accessible compared to the uplands, the majority of lowland peatlands have been drained and most continue to be intensively managed for agriculture. The remaining peatlands are often surrounded by drained agricultural land which, in turn, impacts on the hydrology of the remaining habitat.

In addition, tillage on arable peat areas can result in considerable soil loss through washout and wind erosion and further subsidence. Centuries of drainage has seen some remarkable examples of peatland surfaces dropping several metres (Hutchinson, 1980).

One of the consequences of this is an increased flood risk and increased costs associated with having to maintain drainage of the land. There are, however, some productive areas of semi-natural fen peatland in the lowlands (e.g. Anglesey and The Broads) where high water tables have

been maintained and grazing livestock are managed at levels that allow some peatland vegetation to thrive.

Commercial mining of peat for horticulture, fuel and whisky production has largely taken place on lowland raised bogs, with numerous historic permissions still in existence, often with little planning control over management or after-use. Some permissions for extraction extend up until 2042 but there are government ambitions to phase out the use of peat in horticulture by 2030 (House of Commons Environment, Food and Rural Affairs Committee, 2012).

Extraction of peat results in highly degraded landscapes and causes major losses of both biodiversity and carbon. In some cases particularly where peat extraction affects internationally important wildlife sites, Government has bought out these extant permissions, providing compensation to the mining companies e.g. Thorne and Hatfield Moors (Brown, 2002).

“Resilience in the face of climate change has resulted in almost continuous peat formation for, in some cases, almost 10,000 years in the UK. Such adaptive capacity however, relies on the presence of ‘active’ living peatland vegetation. Restoration of UK peatlands to an active state is therefore essential to increase the opportunities for the future, continued resilience of UK peatlands to climate change.”

**Richard Lindsay**  
University of East London



## WHAT DO PEATLANDS DO FOR US?

Healthy peatlands deliver a range of benefits to the wider environment and society, such as:

### Climate regulation and adaptation

The accumulation and long-term storage of carbon as peat soil sets peatlands apart from other ecosystems: it means that they can play a key role in climate regulation.

Much of the UK's peatland, however, is no longer sequestering and storing carbon as a result of decades of unsuitable land management practices. Instead they have become a significant net source of greenhouse gases and represent a risk to global climate, emitting 16 million tonnes of CO<sub>2</sub>e each year (Department of Energy & Climate Change, Unpublished). This is equivalent to around half

“By increasing our investment more communities will be able to transform and use peatlands as an open space, regenerating it as a habitat for wildlife and reducing greenhouse gas emissions.”

**Roseanna Cunningham**  
Environment Secretary,  
Scottish Government



of all of the reduction efforts made annually in the UK (Department of Energy & Climate Change, 2016). Preventing further damage and restoring healthy ecosystem function can therefore play an important role in climate regulation within the UK.

Peatland function can be repaired through restoration, which aims to return wetland conditions by restoring hydrology: such rewetting is recognised under international climate change agreements as one of the permitted activities for reducing greenhouse gas emissions. General values for peatland emissions under different land uses have been agreed by the International Panel on Climate Change enabling countries to include emissions from damaged peatlands and savings from restored areas within national greenhouse gas accounting (IPCC, 2006).

Peatlands are also important in terms of adapting to the effects of climate

“From a climate perspective, [peatlands] are the most essential terrestrial ecosystem.”

**Tim Christophersen**  
Senior Program Officer, Forests  
and Climate, United Nations  
Environment Programme

change: their influence on water regulation by slowing water loss from the hills can help reduce flood peaks associated with higher rainfall impacts of climate change (Gao & Holden, 2016). Their water storage capacity also helps maintain base flows in drought periods. Restoring and maintaining peatlands in good condition and supporting species diversity enables peatland wildlife to better adapt to a changing climate providing more options for changes in species abundance and distribution than in damaged peatlands.

## Maintaining water quality and regulating flow

Peatlands are the headwaters for some of the UK's major water supply areas (e.g. the peatlands of the Peak District providing water to Manchester and Sheffield) and the river corridors of lowland peatlands (such as The Broads) provide areas of water storage within the natural floodplain. Up to 70% of UK drinking water is sourced from catchments dominated by peatland habitat (Natural England, 2009). Water derived from healthy peatlands is naturally of high quality with few pollutants and low nutrient levels, requiring straightforward treatment once it reaches a water treatment plant.

However, over the last 30 years, the amount of dissolved organic carbon, which creates the brown colour of peaty water, has doubled across many UK catchments (Yallop et al., 2010). Whilst some of this increase relates to decreasing acid pollution, there is also evidence that peatland degradation and unsustainable management can contribute to

“There appear to be few downsides to peatland restoration and a real potential for cost savings in providing long term public water supply. Peatland restoration offers a more sustainable future in water quality terms, as we're addressing the causes of poor water quality, not treating the worsening symptoms.”

**Andrew Walker**

Catchment Manager, Yorkshire Water

colour production with damaged peatlands being associated with higher colour. Peatland restoration offers a potentially cheaper and more sustainable option to improve the quality of raw water arising from peaty catchments, avoiding costly treatments and use of chemicals.

Restoration of damaged peatlands, combined with appropriate ongoing habitat management, may also contribute to regulation of flooding. Where bare peat is re-vegetated, there are significant increases in the time between peak rainfall and peak run-off and a reduction in the peak flow. Vegetation on the surface of the peat creates roughness and slows the flow of water over the land surface.

The water table in healthy peatlands fluctuates a little, but is usually close to the surface: in the uplands, the capacity to store significant additional water is therefore low and rain runs off intact peatlands quickly. However, the presence of artificial drainage channels or erosion gullies accelerates the rate at which water leaves a peatland catchment. Blocking drainage channels, as part of the restoration and re-wetting process, is likely to lead to reduced peak flows, a longer water retention time and slower run off rates (Wilson et al., 2011).

In managed lowland peatlands, such as The Fens in Cambridgeshire, the hydrological regime is artificially managed through pumped drainage of the land. This reduces the natural water storage capacity of the wetlands in these landscapes and rivers sit perched above the surrounding land. Research bodies and local partnerships are investigating whether better use can be made of the water in these landscapes through restoring some areas back to natural wetland and altering the agricultural practices in others to maintain productivity whilst reducing pumping costs.





© Pete Quinn



© Colin Dixon



© Tim Melly

### Supporting unique biodiversity

There are currently 444 designated sites (EU and Ramsar) in the UK with at least one peatland habitat present, however many peatland habitats remain undesignated (Lindsay & Clough, 2017).

Given peatlands form the UK's largest extent of semi-natural habitat, they have a particular role in conserving species. Some of these species are rare and/or declining and are priorities for conservation action. For bogs (rain-fed peatlands), the vegetation can be akin to that found in boreal latitudes supporting particularly distinctive biodiversity, with vegetation dominated by Sphagnum mosses and low shrubs supporting species of open ground.

The acidic, low-nutrient nature of most peatlands has led many of the plant species permanently associated with them to adapt and

develop distinctive features, e.g. the digestion of insects by the carnivorous round-leaved sundew, *Drosera rotundifolia* (Minayeva, Bragg, & Sirin, 2016). Many 'peatland' birds and mammals are typically associated with particular seasons, such as breeding season or during migration. Peatland invertebrates can act as an important food source, such as tipulids (crane flies) for breeding golden plover (*Pluvialis apricaria*) and red grouse (*Lagopus lagopus scoticus*) chicks.

Fen peatlands have developed under a wide range of wet conditions in all parts of the UK, from low-nutrient, acidic and bog-like through to high nutrient and base-rich. Consequently, a large number of species are associated with them. Some of these are now geographically restricted and rare, for example the swallowtail butterfly (*Papilio machaon*) which feeds on milk parsley (*Thyselium*

*palustre*) and is restricted to the Broads. Large fen complexes now provide the only habitat for many threatened bird species including common crane (*Grus grus*) and the rare spotted crake (*Porzana porzana*).

International policies that recognise peatlands for their often highly specialised biodiversity are numerous and include the Ramsar Convention, UN Convention on Biological Diversity, EU Biodiversity Strategy and EU Habitats and Birds Directives.

“ Too easily overlooked, the beauty of our peatland wildlife can come as a great surprise to those unfamiliar with these wonderful places.”

**Martin Harper**  
Conservation Director, RSPB

## Cultural landscapes with strong links to the UK's heritage

Peatlands maintain a unique archive of our cultural past. Beneath the peat, large tracts of prehistoric landscapes lie protected from modern disturbances. The waterlogged peat matrix itself is an oxygen-free environment and in such conditions, objects and structures made of wood and plants survive for millennia. It has been estimated that in excess of 20,500 archaeological sites exist beneath and within the peat in the UK (Gearey, et al., 2010). Peatlands themselves form part of the historic landscape and contain evidence of peat cutting, which goes back to the Roman period and continued through the Middle Ages, used as an alternative source of fuel to wood. Peatlands also record environmental change, as the peat layers of different depth can be dated. This archive includes the history of the particular

peatland, in the form of the remains of the plants that make up the peat and of the insects that lived on the bog. We can also learn of past changes in the landscape beyond the peatlands, which can be reconstructed from the pollen that blew into peatlands.

Peatlands provide many people with a 'sense of place'. As large semi-natural landscapes, they dominate all but two (Pembrokeshire Coast and South Downs) of our 15 UK National Parks and can provide local communities with a sense of inspiration and connectedness with their natural environment. Whilst peatlands have come to be regarded and valued a wilderness in some places, elsewhere peatland landscapes have been formed through the centuries-long utilisation of the peat itself, and this activity has contributed to the way communities understand peatlands. The challenge ahead is to manage peatland use in

“ Many of these [peatland] sites are cultural landscapes, forged by sometimes subtle interactions between people and nature over centuries, and sometimes by more dramatic human impacts.”

**Ian Rotherham**

Professor of Environmental Geography,  
Sheffield Hallam University

ways that minimise the damage and to look at economic and employment opportunities such as recreation and tourism (e.g. hill walking) or work in peatland restoration with volunteers and contractors to optimise the biological, cultural and economic value associated with healthy peatland habitats.



© Emma Goodyer



© British Museum

## COSTS TO SOCIETY FROM DAMAGED PEATLANDS

Much of the damage that has occurred to UK peatlands came about as a result of past values around land use, land 'improvement' and the value of environmental resources (commonly referred to as natural capital), as well as limited awareness of the dynamic nature of our natural environment and the extent to which human activity could alter it. Nevertheless, failure to address past actions and increase our efforts to urgently address the state of peatlands could represent a significant economic cost to future generations through carbon impacts alone.

The additional costs arising from loss of biodiversity, damage to farming, recreational and sporting interests, flooding and drinking

water impacts, will all add to the negative financial implications for businesses and taxpayers.

In 2011, the UK Government published the 'National Ecosystem Assessment' using economic analysis to detail the true value of nature. The benefit of inland water bodies, including peatlands, to water quality alone is worth £1.5 billion per year to the UK economy (UK NEA, 2011). The impact from carbon losses from peatlands, if restoration actions are not undertaken to address those losses, could extend to around £210 million per year (eftec, 2015). Taking these into account, the full costs of damaged peatlands to society including biodiversity loss, impacts on drinking

water and flood management could extend into the £billions (Committee on Climate Change, 2013). When we damage these ecosystems we lose their benefits at a measurable cost to society (Fig. 4, pg. 10). Moreover these studies demonstrate that spending on protecting and restoring nature is cost effective.

Likewise, Sir Nicholas Stern's review (Stern, 2006) highlighted that the benefits of strong, early action far outweigh the costs of inaction when considering the economics of climate change. The Governor of the Bank of England has pointed out that, if there is no action now, global warming could become one of the biggest risks to economic stability in the future (Carney, 2015).

The wise management of our natural environment is an important tool alongside reducing fossil fuel use in our efforts to tackle climate change. Conversely failure to act could see the breakdown of natural peatland carbon systems with serious consequences that would far outweigh all our mitigation efforts. With the majority of peatlands already in a damaged state, simply leaving them alone will create further liabilities as they deteriorate. Land use competition poses a very real threat to UK peatlands.

Ambitious targets for land uses such as forestry and renewable energy development begin to pose difficult questions about priorities for land use designation.



## WORK TO DATE – GOVERNMENT LEADERSHIP

Today, UK Government policy is geared towards the enhancement and sustainable management of peatlands. Localised pressures continue for new drainage or the preservation of existing drainage networks but measures, such as planning controls and regulatory guidance, seek to limit the effects on peatlands.

There is a shared agenda for peatlands among the four UK devolved administrations as illustrated in the Ministerial Statement of Action on Peatlands (Benyon, Griffiths, Attwood, & Wheelhouse, 2013):

- The Ministerial Statement highlights the intent for co-ordinated action on peatlands across the UK. Each administration approaches peatland restoration differently due to differences in land use, geography and local interpretation of EU and UK environmental legislation
- Defra, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs (Northern Ireland) recognised the impact that past land use has had on the condition of our peatland ecosystems and intend to act together to enhance the natural capital of UK peatlands
- The devolved administrations will look to shape land management policy, provide funding support through CAP (and its alternative post-Brexit replacement) and other mechanisms, as well as



Wildlife Trust staff meeting with Environment Under Secretary, Thérèse Coffey (second from right), on Manchester Mosslands

support research to facilitate the restoration of UK peatlands.

Early work in the UK has seen investment in peatland management aimed at restoring ecosystem function, particularly in England, Scotland and Wales. Much of this has been achieved through public funding, charitable giving as well as contributions from the private sector.

The United Kingdom's exit from the European Union presents funding challenges for peatland restoration, with a large percentage of restoration funds in the past having been distributed through EU funding for rural development including Common Agricultural Policy and EU LIFE grants, as well as support for academic research. Replacement funds are necessary to ensure action on the ground continues and international obligations including the Convention on Climate Change and Ramsar Convention are met.

“Peatlands are an iconic aspect of the English landscape, which are not only a haven for wildlife but also provide us with clean water and help reduce greenhouse emissions. [Restoring] thousands of hectares of this precious habitat to its natural state is a key part of our ambition to be the first generation to leave the natural environment in a better state than we found it.”

**Thérèse Coffey**  
Environment Under Secretary, Defra

# PEATLAND RESTORATION: A COST EFFECTIVE SOLUTION

The most cost effective way to ensure the long term future of our peatland carbon stocks is to take early action to maintain or restore peatlands to health, allowing these habitats to be resilient to the impacts of climate change. Looking after peatlands that

are in good condition has the least cost: maintaining the ecosystem with relatively low input, preserving large carbon stocks and important biodiversity whilst avoiding higher restoration costs at a later date.

For peatlands that are already damaged early intervention is a necessary investment; recovering the benefits and reducing the risks of further erosion and degradation. Restoration becomes more challenging the more degraded the peatland becomes, requiring innovative methods and incurring higher costs. Climate change, with increasing expectation of drier summers, is expected to make

restoration more difficult in the future, adding to the benefits of early action.

Compared with other carbon reduction technologies, peatland restoration brings significant levels of carbon savings at a moderate cost. Tried and tested methodologies make implementation immediately possible, with growing political support. Large areas can be restored or brought under sustainable management without major changes to land use, making it a readily achievable form of climate mitigation, particularly in the uplands where damaged peatlands are as much a liability to land managers as they are a threat to society.

“ [Peatland restoration is] one of the best investments we can make as a society.”

**Nicola Sturgeon**  
First Minister, Scottish Government



© Stephen Barlow



© Sara Green Butterfly Conservation

“ The long term value [from peatland restoration] of the public benefits is immeasurable. We have undertaken restoration to repair damage from many decades ago. It is good stewardship and estates want to maximise the public benefits that they can provide.”

**Malcolm Hay**

Owner, Edinglassie Estate

When taking these wider benefits into account, it is particularly cost effective. Hill farmers benefit from better grazing land, without large drains that threaten livestock safety; grouse moors see increases in crane fly numbers, providing food for chicks; communities are provided with a landscape to boost mental and physical wellbeing; arable farmers stop their important soils from eroding away; water companies see treatment bills reduced.

Restoration does however have an associated cost, with initial capital works representing the main expenditure. Maintaining the benefits noted above is relatively low cost, relying on sensible land management approaches that can be successfully aligned with productive use such as recreation (shooting, walking, nature tourism) and extensive grazing for meat and wool. Adaptive management practices that reduce greenhouse

gas emissions can be adopted e.g. adjusting grazed grassland management to allow higher water tables in the winter months or even a more radical reversion to semi-natural wetland to prevent carbon loss. Incentivising shifts in management for one aspect, carbon, can be successful in delivering benefits for water and key wetland species.

Peatland conservation and management can occur hand-in-hand with economic growth in rural areas, bringing new opportunities for employment through restoration and ongoing management as well as improving the environment for landscape and wildlife tourism. Sustainable management of lowland peatlands where water tables are kept high, often referred to as paludiculture, can bring new ventures such as providing materials for horticulture as peat use is phased out.



## CASE STUDY: PRACTITIONERS EXPERIENCE

### Barry Smithson

Contractor for Barker and Bland Ltd,  
restoring peatland with the Yorkshire  
Peat Partnership

It takes a particular strength of character to deal with the isolation of working in an enclosed cabin for eight hours a day, battered by the winds, rain, snow and occasional blinding sunlight that all characterise winter on the moor.

Barry, a digger driver for 15 years and a site foreman for four, smiles as he recollects his early experiences of restoring peatland: “When I was first hired I was told that I needed to forget everything I’d ever learned in the past and start again! It’s all new up here, you’ve got to read the ground – it’s so fragile and you need to drive the machines completely differently to keep them balanced and afloat.”

Smithson’s speciality is re-profiling and re-turving of eroding gully sides and ‘hags’. It involves the careful reshaping of the degrading peatland slopes and meticulous placement of heather turf taken from the gully top to provide a protective layer over the newly shaped features. “The hardest part of the job is making as little mess as possible when moving machines about. Again you need to read the ground, don’t do any sharp turns and take care not to scrape any turf off.”



“The first time I ever saw this process I was in awe. I couldn’t believe how delicate a weighty 10 tonne digger could be – and it was nothing short of a miracle to see the bare, black eroded gullies transformed, from one day to the next, into apparently healthy, vegetated slopes abutting their valleys of meandering streams.” A self-confessed perfectionist, Smithson takes particular joy out of these creations: “I get a good feeling from a job well done – there’s nothing worse than looking at a landscape that is black with bare peat. It’s very satisfying to be able to change that.”

It is thanks to people like Barry that our peatlands now have a chance to regenerate and once again return to be the valuable carbon sinks and healthy habitats they once were. It is an extraordinary legacy. For him, this demanding, specialist work has its own rewards: “It’s great work! You’re out of the way, on your own, in the fresh open air every day – and one of the greatest feelings is to be able to look across the moor and see no blackened areas of peat! It also makes me very proud to think I may be reducing the effects of climate change.”

## RESTORATION AND SUSTAINABLE MANAGEMENT TO DATE

Sustainable management and restoration of peatlands has seen remarkable progress in the UK over the past few decades, with ambitious and innovative projects restoring great swathes of habitat including designated wildlife sites (Fig. 9).

Peatland ecosystems are not bound by political or administrative units and regional partnerships e.g. Moors for the Future Partnership and Yorkshire Peat Partnership, have taken up the challenge of addressing peatland restoration over large areas.

These partnerships have taken into consideration multiple objectives when restoring the land and helped to bring in funding across a range of different public and private sectors (Fig. 10). Collectively, restoration in excess of 110,000 ha has taken place since 1990, mostly on privately owned land, with an additional c.840,000 ha considered to be in favourable (good) condition through the latest UK BAP assessments.

We now need to intensify and broaden our efforts, building on the expertise and achievements already made, and continuing to work with the devolved administrations to bring about the best outcome for the UK’s peatlands as a whole (Fig. 11).



Figure 9: Map indicating UK peatland restoration site locations to date (2017)

### FUNDING TYPE: GRANT

A number of site-specific and landscape-scale projects funded for their biodiversity and climate benefits. Typically deliver capital restoration works and demonstration of techniques used, addressing research gaps and engaging both local and international communities.

#### EXAMPLES

- European Commission e.g. Cumbria BogLIFE (funded by EU LIFE+)
- National Lottery e.g. The Flow Country Peatlands Partnership (funded by Heritage Lottery Fund)
- Charitable Trusts e.g. IUCN UK Peatland Programme (funded by Peter De Haan Charitable Trust)
- Landfill Communities Fund e.g. Langlands Moss (funded by SITA Trust)

### FUNDING TYPE: PRIVATE

Spearheaded by the utilities sector, opportunities exist for private companies to invest in UK peatlands for their climate and water management benefits. In addition, new investment mechanisms are being developed including the Peatland Code, a voluntary standard for peatland restoration projects that can attract funding on the basis of carbon benefits.

#### EXAMPLE

- Water companies e.g. Northumbria Water (funding North Pennines AONB Peatland Partnership) and South West Water (funding Exmoor Mires Partnership)

### FUNDING TYPE: PUBLIC (ENVIRONMENTAL STEWARDSHIP)

The UK's devolved Common Agricultural Policy (CAP) rural development programme and agri-environment/ forestry measures contribute to facilitating management and restoration in some areas of the UK. However, CAP has not been implemented uniformly across the UK and has led to damage through perverse incentives in some cases (Moxey, 2016).

#### EXAMPLE

- Agri-environment payments

Figure 10: Sources of peatland conservation and restoration up to 2017



Figure 11: Opportunities presented by well-managed peatlands

RISKS AND POTENTIAL BARRIERS	STRATEGY GOALS	POTENTIAL SOLUTIONS
<p><b>Designation:</b> Historically the main tool for peatland protection, many peatlands in near-natural condition are outside the current designated network and some that are designated are degraded.</p>	<ul style="list-style-type: none"> <li><span style="color: #800000;">■</span> Conserve and enhance through management the best and most readily recoverable peatlands</li> <li><span style="color: #008000;">■</span> Restore degraded areas to functioning peatland ecosystems.</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain and enhance protected areas</li> <li>• Restore ecosystem function through restoration and ongoing sustainable management</li> <li>• Prevent damage from development and adverse land management.</li> </ul>
<p><b>Unco-ordinated approach:</b> Without an overarching framework for restoration there is a risk of short term, opportunistic activity leaving projects vulnerable and progress slow, imposing greater costs in the future.</p>	<ul style="list-style-type: none"> <li><span style="color: #800000;">■</span> Maintain a formal programme to stimulate appropriate funding support, share experience and encourage good land management practice.</li> </ul>	<ul style="list-style-type: none"> <li>• Maintain existing landscape-scale partnerships to advise and lead on peatland management</li> <li>• Establish funding support for long term restoration and sustainable management.</li> </ul>
<p><b>Lack of co-ordinated monitoring:</b> Peatland monitoring is crucial to demonstrate impact yet funding for research and restoration does not typically cover it or is short-term. Lack of data and strategic monitoring can result in a lack of necessary evidence and the use of unsuitable methods or duplication of efforts.</p>	<ul style="list-style-type: none"> <li><span style="color: #800000;">■</span> Maintain a formal programme to stimulate appropriate funding support, share experience and encourage good land management practice.</li> </ul>	<ul style="list-style-type: none"> <li>• Establish funding for ongoing research and monitoring</li> <li>• Maintain existing landscape-scale partnership to continue long term monitoring work.</li> </ul>
<p><b>Lack of policy and funding for sustainable management:</b> The widespread scale of peatland damage is not matched by available resources for restoration, with current funding heavily reliant on EU sources that will come to an end post-Brexit. Short-term funding and a market failure to reward land managers for sustainable management of public resources may prevent a long-term approach to peatland management being taken, putting them at risk.</p>	<ul style="list-style-type: none"> <li><span style="color: #000080;">■</span> Apply land uses that are compatible with healthy peatlands</li> <li><span style="color: #808080;">■</span> Adapt management of drained peatlands under intensive productive use</li> <li><span style="color: #800000;">■</span> Maintain a formal programme to stimulate appropriate funding support, share experience and encourage good land management practice.</li> </ul>	<ul style="list-style-type: none"> <li>• Apply research and monitoring to evidence funding need</li> <li>• Establish economically viable funding mechanisms for restoration and sustainable management of peatlands</li> <li>• Develop alternative products to enable adaption of management techniques and introduce wetland agricultural systems</li> <li>• Account for costs of damaging activities in decision-making.</li> </ul>
<p><b>Peatlands are not adequately communicated:</b> Whilst evidence exists to the benefits of healthy peatlands it is not widely appreciated by the general public. In addition, a lack of professional expertise as fewer people train in the broad skill set required to sustainably manage peatlands may lead to further decline.</p>	<ul style="list-style-type: none"> <li><span style="color: #000080;">■</span> Communicate peatland values, both intrinsic and measurable to a wide audience</li> <li><span style="color: #800000;">■</span> Maintain a formal programme to stimulate appropriate funding support, share experience and encourage good land management practice.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the benefits of healthy peatlands and their restoration, highlighting win-wins for society</li> <li>• Co-ordinate key messages across peatland community for stronger voice</li> <li>• Explain peatland science in a more accessible way</li> <li>• Involve local communities in peatland management and provide support to overcome dependencies on unsustainable peatland use.</li> </ul>

## ANNEX 2

International climate change, water and environment policy recognises the global significance of peatlands

### INTERNATIONAL RECOGNITION

Ramsar Convention on Wetlands	<p>1996 Recommendation 6.1 Conservation of peatlands</p> <p>1999 Recommendation 7.1 A global action plan for the wise use and management of peatlands</p> <p>2002 Resolution VIII.17 Guidelines for Global Action on Peatlands</p> <p>2015 Resolution XII.11 Peatlands, climate change and wise use: Implications for the Ramsar Convention.</p>
IUCN World Conservation Congress: peatland resolution (Hawaii 2016)	Resolution 043: Securing the future for global peatlands. Calls for action to protect, restore and sustainably manage peatlands.
United Nations (UN) Convention on Biological Diversity	<p>Aichi Biodiversity Targets: Strategic Goal C – Target 15</p> <p>Requires conservation and restoration of peatlands, highlighting their role in mitigating and adapting to climate change as well as supporting rare and threatened wildlife.</p>
UN Framework Convention on Climate Change (UNFCCC)	<p>Kyoto Protocol and national accounting for peatlands</p> <p>Peatlands can be included on a voluntary basis in national greenhouse gas accounting. The IPCC has produced guidance on reporting on emissions and sequestration of wetlands (including peatlands) following restoration.</p>
UN Sustainable Development Goals (SDGs)	<p>SDG2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture.</p> <p>SDG13: Take urgent action to combat climate change and its impacts.</p> <p>SDG15: Life on land; sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.</p>

## UK AND EUROPEAN RECOGNITION

European Climate Change Programme (ECCP)	ECCP feeds into a package of policy measures, such as GHG inventories: Requires all peatland to be accounted for by 2020. <i>UK Carbon Budget 5: “Adopting more sustainable land management practices, particularly in the case of peatland habitats, will safeguard agricultural productivity and other benefits provided by the natural environment, as well as protecting important carbon stores.”</i>
European Water Framework Directive (WFD) (2000)	Horizontal Guidance on Wetlands: Peatlands are included as ecosystems that influence water quality or quantity as well as those dependent upon groundwater.
EU Habitats Directive	Council Directive 92/43/EEC (Annex 1 habitats <sup>1</sup> ): Classify protected sites and ensure favourable status of peatland habitats across their natural range. This includes designations such as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) that may designate peatlands as priority habitats or designate specific peatland species. <i>UK Biodiversity targets: “By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification”.</i>
EU Birds Directive – Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (codified version)	Article 3 of Council Directive 2009/147/EC, stipulates: 1. In the light of the requirements referred to in Article 2, Member States shall take the requisite measures to preserve, maintain or re-establish a sufficient diversity and area of habitats for all the species of birds referred to in Article 1. 2. The preservation, maintenance and re-establishment of biotopes and habitats shall include primarily the following measures: (a) creation of protected areas; (b) upkeep and management in accordance with the ecological needs of habitats inside and outside the protected zones; (c) re-establishment of destroyed biotopes; (d) creation of biotopes.
UK National Ecosystem Assessment (NEA)	The Millennium Ecosystem Assessment (MEA) recognised the importance of ecosystem services to the well-being of society and highlighted that many of these services are being degraded or lost. The UK Government responded by conducting a UK NEA: for peatlands this described the range of services provided by these habitats and their current condition.
Post-Brexit policies (which replace any rescinded commitments elsewhere e.g. under EU environmental legislation)	<i>To be confirmed</i>

<sup>1</sup> These include raised bog, degraded raised bog, blanket bog, transition mires, depressions on peat substrates of Rhynchosporion, calcareous fens, alkaline fens and bog woodland as well as some Northern Atlantic wet heaths, temperate Atlantic wet heaths and lowland meadows dependent on peat depth.

# GLOSSARY

## Annex 1 Priority Habitats

Habitats listed under the European Habitats Directive, with the main aim of promoting the maintenance of biodiversity. EU Member States are required to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status, introducing robust protection for those habitats and species of European importance. Almost all types of peatland with natural/ semi-natural vegetation in the UK are listed as being Annex 1 priority habitats.

## Biodiversity

The variability among living organisms from all sources including terrestrial, marine and other aquatic ecosystems; this includes biodiversity within species, between species and of ecosystems.

## Bog

A bog is a particular type of wetland, which is waterlogged by direct rainfall only. Bogs are nutrient-poor and acidic habitats and support a less diverse range of species than other wetlands but contain many unique species that are specialised to bog peatlands.

*Compare with Fen.*

## Bog peat

Peat soil containing dead and decaying plant material including Sphagnum mosses, formed in waterlogged, low nutrient conditions.

## Carbon sequestration

A natural or artificial process by which carbon dioxide is removed from the atmosphere and stored, which helps to mitigate global warming.

## Climate adaptation

Adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates the impact of climate change.

## Climate mitigation

Process to reduce or prevent emission of greenhouse gases, either by using new technologies or renewable energies, or by changing management practices and/or consumer behaviour.

## CO<sub>2</sub>e

CO<sub>2</sub>e, or carbon dioxide equivalent, is a standard unit for measuring carbon footprints. The idea is to express the impact of each different greenhouse gas in terms of the amount of CO<sub>2</sub> that would create the same amount of warming.

## Ecosystem

A biological community of interacting organisms and their physical environment.

## Ecosystem function

The biological, geochemical and physical processes and components that take place or occur within an ecosystem.

## Ecosystem services

Ecosystem services are the benefits provided by ecosystems that contribute to making human life both possible and worth living.

## Favourable condition

A designated feature(s) within a site is being adequately conserved and monitoring demonstrates that the feature(s) are meeting mandatory requirements (regulated by Government).

## Fen

A fen is a wetland that receives water and nutrients from surface and/or groundwater, as well as from rainfall. Fen vegetation is typically more diverse than that found in bogs due to variation in water supply and the range of nutrients and dissolved minerals within the water.

*Compare with Bog.*

## Fen peat

Peat soil containing dead and decaying plant material from fen vegetation. Due to the variable nature of fen peatlands, fen peat can be variable in structure and nutrient content.

## Greenhouse gases (GHGs)

Gases that cause the greenhouse effect and therefore contribute to climate change. Includes carbon dioxide, which is emitted by degraded peatlands.

### **Mire**

An internationally recognised term that encompasses all actively peat forming, waterlogged wetlands e.g. bogs, fens, swamps etc.

### **Moorland**

Open, semi-natural habitat on acidic mineral and peat soil, characterised by dwarf-shrubs including heather and gorse.

### **Natural capital**

Stocks of natural assets that provide valuable flows of ecosystem services for society.

### **Near-natural condition**

Vegetation that has either minimal or no signs of human disturbance and is in an almost pristine condition. This may be habitat that has limited disturbance or is recovering from past-disturbance to such an extent that species composition and environmental and ecological processes are indistinguishable from its natural state.

### **Organo-mineral soil**

Organo-mineral soils are classed as having an organic layer of 50 cm or less in Scotland and Northern Ireland, or 40 cm or less in England and Wales. They can include humus-iron podzols, peaty podzols, surface and ground water peaty gleys, peaty rankers and podzolic rankers.

### **Paludiculture**

Wet cultivation of peatlands that allows sustainable production to occur with either limited or no drainage required.

### **Peat soil**

In England, peat soils are commonly defined as being over 40 cm, whereas in Scotland they are defined as being in excess of 50 cm. Internationally, many countries apply a definition of 30 cm. The UK Strategy adopts a broader, more holistic categorisation of peat soils to recognise the importance of carbon-rich shallower soils and the habitats they support including wet heath.

### **Restoration**

Restoration, as referred to in this document, takes time. It often requires initial input and then a period time to recover, and is sometimes a process with multiple interventions and monitoring. Restoration is dependent on the extent and nature of damage being repaired.

### **Semi-natural vegetation**

Vegetation impacted by deliberate or inadvertent human disturbance, but which has recovered to such an extent that species composition and environmental and ecological processes are close to its natural state.

### **Sphagnum moss**

Sphagnum is a genus containing almost 400 species of moss, of which, around 20 species are found in the UK. They are commonly referred to as 'peat mosses'. They are highly resistant to decay and contain a chemical called sphagnum that inhibits microbial activity. This slows decomposition and is the main contributor to the formation of peat.

### **Sustainable management**

Management of natural resources in a way and at a rate that maintains and enhances the resilience of ecosystems and the benefits they provide.

### **Wetland**

Land area that is saturated with water either permanently or seasonally.

## REFERENCES

- Bain, C. G., Bonn, A., Stoneman, R., Chapman, S., Coupar, A., Evans, M., Gearey, B., Howat, M., Joosten, H., Keenleyside, C., Labadz, J., Lindsay, R., Littlewood, N., Lunt, P., Miller, C.J., Moxey, A., Orr, H., Reed, M., Smith, P., Swales, V., Thompson, D.B.A., Thompson, P.S., Van de Noort, R., Wilson, J.D. & Worrall, F. (2011). *IUCN UK Commission of Inquiry on Peatlands*. Edinburgh: IUCN UK Peatland Programme. Retrieved 2018, from: <http://www.iucn-uk-peatlandprogramme.org/publications/commission-inquiry>
- Benyon, R., Griffiths, J., Attwood, A., & Wheelhouse, P. (2013). *Ministerial Statement: Securing Benefits for UK Peatlands*. Retrieved 2017, from: <http://www.iucn-uk-peatlandprogramme.org/sites/www.iucn-uk-peatlandprogramme.org/files/20130205%20Joint%20DA%20letter%20to%20IUCN.pdf>
- Brown, P. (2002). Government pays £17m to save endangered peat bogs. *The Guardian*. Retrieved 2017, from: <https://www.theguardian.com/uk/2002/feb/28/highereducation.biologicalscience>
- Carney, M. (2015). Breaking the tragedy of the horizon – climate change and financial stability. Retrieved 2017, from: <http://www.bankofengland.co.uk/publications/Pages/speeches/2015/844.aspx>
- Committee on Climate Change (2013). *Managing the Land in a Changing Climate: Adaptation Sub-Committee Progress Report*. Retrieved 2018, from: <https://www.theccc.org.uk/publication/managing-the-land-in-a-changing-climate/>
- Committee on Climate Change (2017). *Progress in Preparing for Climate Change*. Retrieved 2018, from: <https://www.theccc.org.uk/wp-content/uploads/2017/06/2017-Report-to-Parliament-Progress-in-preparing-for-climate-change.pdf>
- Department of Energy & Climate Change (2016). *Final UK Greenhouse Gas Emissions National Statistics: 1990-2014*. London: DECC.
- eftec (2015). *The Economic Case for Investment in Natural Capital in England. Final Report for the Natural Capital Committee*.
- Finlayson, C.M. & Milton, G.R. (2016). Peatlands. In C.M. Finlayson, G.R. Milton, R. Prentice & N. Davidson (Eds), *The Wetlands Book*. Springer Reference.
- Gao, J., Holden, J., & Kirkby, M. (2016). The impact of land-cover change on flood peaks in peatland basins. *Water Resources Research*, 52(5), 3477-3492.
- Gearey, B., Bermingham, N., Chapman, H., Charman, D., Fletcher, W., Fyfe, R., Quartermaine & Van de Noort, R. (2010). *Peatlands and the Historic Environment*. Edinburgh: IUCN UK Peatland Programme. Retrieved 2017, from: <http://www.iucn-uk-peatlandprogramme.org/publications/commission-inquiry/work-commission/peatlands-and-historic-environment>
- House of Commons Environment, Food and Rural Affairs Committee (2012). *Natural Environment White Paper. Fourth Report of Session 2012-13*. London: The Stationary Office Limited.
- Hutchinson, J. N. (1980). The Record of Peat Wastage in the East Anglian Fenlands at Holme Post. *Journal of Ecology*, 68(1), 229-249.
- IPCC (2006). Agriculture, Forestry and Other Land Use. In *IPCC Guidelines for National Greenhouse Gas Inventories (Vol. 4)*. Retrieved 2017, from: [http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4\\_Volume4/V4\\_07\\_Ch7\\_Wetlands.pdf](http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_07_Ch7_Wetlands.pdf)

- Joint Nature Conservation Committee (2011). *Towards an assessment of the state of UK peatlands*. JNCC Report No. 445.
- Joosten, H. (2009) The global peatland CO<sub>2</sub> picture. Peatland status and drainage related emissions in all countries of the world. Wetlands International.
- Lindsay, R. A., & Clough, J. (2017). In H. Joosten, F. Tanneberger, & A. Moen (Eds.), *Mires and Peatlands of Europe* (pp. 705-720). Stuttgart: Schweizerbart Science Publishers.
- Lindsay, R., & Immirzi, P. (1996). *An Inventory of Lowland Raised Bogs in Great Britain*. Edinburgh: Scottish Natural Heritage.
- Minayeva, T., Bragg, O., & Sirin, A. (2016). Peatland biodiversity and its restoration. In A. Bonn, T. Allott, M. Evans, H. Joosten, & R. Stoneman (Eds.), *Peatland Restoration and Ecosystem Services: Science, Policy and Practice*. 44-62: Cambridge University Press.
- Moxey, A. (2016) *Assessing the opportunity costs associated with peatland restoration*. Edinburgh: IUCN UK Peatland Programme
- Natural England (2009). *Mapping values: the vital nature of our uplands – an atlas linking environment and people*.
- Natural England (2010). *England's peatlands: Carbon storage and greenhouse gases*. Natural England.
- Stern, N. (2006). *Economics of Climate Change*. London: HM Treasury.
- UK NEA (2011). *UK National Ecosystem Assessment*. Retrieved from <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>
- UN FAO and Wetlands International (2012). *Peatlands – guidance for climate change mitigation through conservation, rehabilitation and sustainable use*. Retrieved 2018, from: <http://www.fao.org/docrep/015/an762e/an762e.pdf>.
- Wilson, L., Wilson, J., Holden, J., Johnstone, I., Armstrong, A., & Morris, M. (2011). Ditch blocking, water chemistry and organic carbon flux: evidence that blanket bog restoration reduces soil erosion and fluvial carbon loss. *Science of the Total Environment*, 409, 2010-2018.
- Yallop, A. R., Clutterbuck, B., & Thacker, J. (2010). Increase in humic dissolved organic carbon export from upland peat catchments: the role of temperature, declining sulphur deposition and changes in land management. *Climate Research*, 45(24), 43-56.

The International Union for the Conservation of Nature (IUCN) UK Peatland Programme exists to promote peatland restoration in the UK and advocates the multiple benefits of peatlands through partnerships, strong science, sound policy and effective practice.

[www.iucn-uk-peatlandprogramme.org](http://www.iucn-uk-peatlandprogramme.org)  [@iucnpeat](https://twitter.com/iucnpeat)

