

A Secure Peatland Future

A vision and strategy for the protection, restoration and sustainable management of UK peatlands

Introduction

Peatlands are a major component of the UK's visual landscape and we continue to discover the many ways in which this ecosystem is of huge significance for society as well as for the people who live and work among it.

As a nation we have not always appreciated the many benefits peatlands can provide and as a consequence the majority have been managed in a way that has left them in poor ecological condition. We have not only lost the vital services they provide but also the resource itself, releasing vast quantities of carbon to the atmosphere and surrounding water sources. The result being a cost to society both economic and environmental. To ensure their wellbeing the UK must take a lead in the growing global agenda to maintain and restore peatland resources.

Peatlands have many influences and potential benefits across a wide range of sectors but despite great advances in techniques for managing and restoring peatlands and scientific understanding there is a lack of coordinated effort. If the scale of the problem is to be addressed successfully there is a need for a focussed effort and a shared agenda. The signals are strong that this can be achieved; we have the skills and expertise to tackle even the largest landscapes, to resolve conflicts and to bring about positive outcomes for peatlands. This strategy aims to harnesses that innovation and commitment and set us on path that will avoid imposing huge cost on future generations and make a better environment for us all.

Part I. Background and Purpose

Current situation

Global setting and policy commitments

Found from the tropics to the poles, and in at least 175 countries, peatlands cover around 4 million km² or 3% of the world land area and contain the equivalent of 75% of all atmospheric carbon; twice that of the world's forest biomass. Despite their limited extent they are a hugely significant global ecosystem whose importance for climate change, biodiversity and water has been recognised by world leaders, with major international agreements aimed at recognising their importance and securing their well-being (Table 1).

Table 1: International climate change, water and environment policy recognises the global significance of peatlands

INTERNATIONAL RECOGNITION	
Ramsar Convention on Wetlands	1996 Recommendation 6.1 Conservation of peatlands 1999 Recommendation 7.1 A global action plan for the wise use and management of peatlands 2002 Resolution VIII.17 Guidelines for Global Action on Peatlands 2015 Resolution XII.11 Peatlands, climate change and wise use: Implications for the Ramsar Convention.
IUCN World Conservation Congress: peatland resolution (Hawaii 2016)	Resolution 046- Securing the future for global peatlands . Calls for action to protect, restore and sustainably manage peatlands.
United Nations (UN) Convention on Biological Diversity	Aichi Biodiversity Targets: Strategic goal C- Target 15 Requires conservation and restoration of peatlands, highlighting their role in mitigating and adapting to climate change as well as supporting rare and threatened wildlife
UN Framework Convention on Climate Change (UNFCCC)	Kyoto Protocol and national accounting for peatlands Peatlands can be included on a voluntary basis in national GHG accounting. The IPCC has produced guidance on reporting on emissions and sequestration of wetlands (including peatlands) following restoration.
UN Sustainable Development Goals (SDGs)	SDG2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture. SDG13: Take urgent action to combat climate change and its impacts SDG15: Life on land; sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss.
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 ¹): Classify protected sites and ensure favourable status of peatland habitats across their natural range. UK Biodiversity targets - <i>“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>
UK National Ecosystem Assessment (NEA)	The Millennium Ecosystem Assessment (MEA) 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.

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 northern Scotland to the mires of Dartmoor. Peatlands form the UK's largest expanse of semi-natural habitat occupying 10% the UK's land area (26,000km²) (Figure 1) and representing 10% of Europe's peatland area. Peatlands support rare and threatened wildlife and provide recreational areas for sporting and countryside enjoyment. They are widely used for agriculture both in marginal farmland upland areas and more intensive lowland situations. Peatlands are the largest component of the UK's wetland environment, as both sources of drinking water and controlling water flow and storage. There are three main types of peatland in the UK:

Blanket mire - the most widespread peatland type that occurs in the uplands as mantles of peat over large areas. Blanket mire is mainly composed of bog vegetation, fed only by precipitation and consequently nutrient poor and acidic.

Raised bog - localised domes of peat rising above the surrounding land and mainly found in the lowlands. These systems are entirely rain-fed.

Fen - in addition to precipitation, fens also receive water that has been in contact with mineral soil or bedrock and exhibit a wide range of types from base-poor fens that exhibit bog-type vegetation (i.e. cotton grasses, heathers and Sphagnum mosses) to rich fens of sedges, reeds and brown mosses.

The valuable services peatlands provide have not always been appreciated and, in the UK, less than 20% of the peatlands remain in a near-natural state. The remaining 80% have been modified (see Figure 1) as a result of management past and present, mainly as a result of often unsuccessful attempts at agricultural improvement, and forestry planting as well as built development and commercial peat extraction for horticulture.

¹ 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.

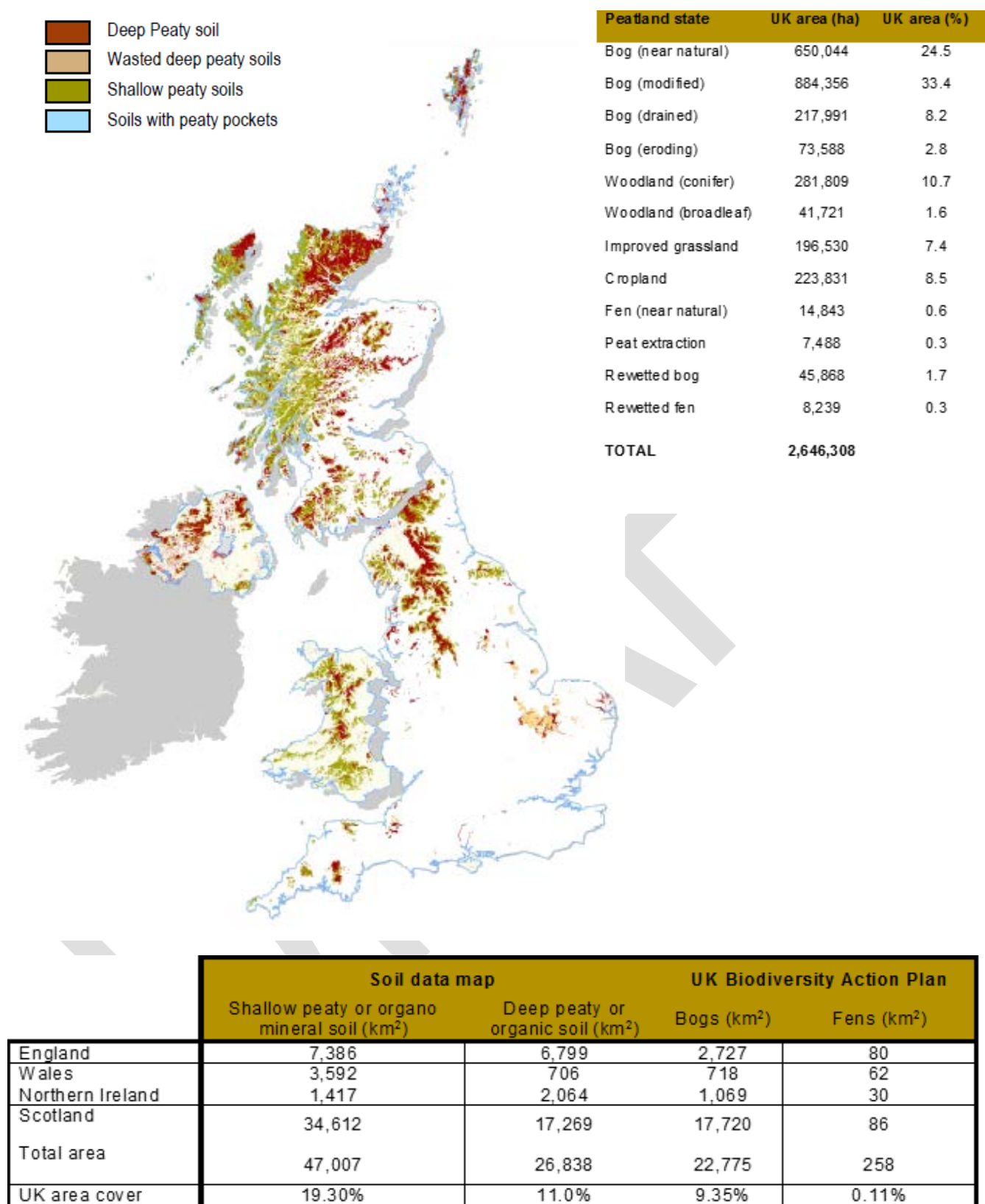


Figure 1 Peatland distribution and state across the UK (adapted from JNCC, 'Towards an assessment of the state of UK peatlands' (2011)).

Upland peatlands

Upland peatlands largely occur as blanket bogs over often remote hilly regions. The depth of peat is variable but is typically over 2m deep and sometimes as much as 10m deep. Traditionally, these peatland areas were used for marginal grazing for sheep and, in Scotland, red deer. More recently, moorland management has extended up the hill from upland heath communities to blanket peat areas with cyclical burning used to encourage heather growth for red grouse. Much of these upland areas have been extensively drained ('gripped') in the past and, although now often not actively maintained, these drains can continue to dewater the peatland even when grown over by vegetation, unless restoration work is carried out to block the drain. Frequent repeat burning results in reduced Sphagnum growth, which when allied to other impacts such as high livestock numbers and/or wild-fires, drainage networks and, historic air pollution around industrial areas, has led to extensive areas of bare peat. Around 8%² of deep peaty soil in the UK is assessed as being wasted, actively eroding or bare (equivalent to 1% of the UK land area).

In areas of bare, eroding peat, carbon losses can be as high as 23 tonnes CO₂e per ha per year³. Ongoing impacts from grazing and burning and the presence of forestry plantations and associated drainage can exacerbate carbon losses from already modified peatlands as well as reducing water quality, degrading wildlife and exacerbating floods.

Relatively small areas of blanket bog were historically cut to provide peat for fuel and some localised activity continues particularly in Highlands of Scotland and Northern Ireland uplands. New threats include the development of windfarms and hydro-energy schemes, including tracks. Poorly located and poorly designed developments with associated drainage and loss of peat can cause significant carbon emissions (through the degradation of peat) as well as having damaging impacts on wildlife. Indeed, recent research shows that wind-farms should generally avoid peatland areas given high carbon losses from peatland degradation can exceed carbon gains from renewable energy⁴.

Lowland peatlands

Lowland peatlands are mostly fragmented fens and lowland raised bogs (though blanket bog extends to sea-level in the far NW of the UK). Being relatively accessible compared to the uplands, the majority have been historically drained and most continue to be intensively managed for agriculture. The low water tables required for agriculture are achieved by the active maintenance of historic drainage systems. Peatlands naturally consist of over 95% water and when drained they become unstable and subside. In addition, tillage on arable peat areas can result in considerable soil loss and further subsidence. Centuries of drainage has seen some remarkable examples of peatlands surfaces dropping several metres e.g. Holme Fen which is now the lowest lying land in mainland Britain at 2.75m below sea level due to a subsidence and loss of around 4m of peat. One of the consequences of this is an increased flood risk and increased costs associated with having to drain the land. Soil loss and subsidence also has a resulting carbon impact: Carbon losses on peat cultivated for crops can be as high as 36.6 tonnes CO₂e per hectare per

² Joint Nature Conservation Committee, 2011. Towards an assessment of the state of UK Peatlands, JNCC report No. 445. 8% figure calculated from Table 8 (p39) and takes into account, bare, hagged and gullied, wasted, and extracted peat (251,646ha or 7.6% of deep peat soils) and makes some allowance for cultivated cropland on peat being bare/eroding also (+ 60,312 ha = 9.5% of deep peat soils)

³ Smyth, M.A., Taylor, E.S., Birnie, R.V., Artz, R.R.E., Dickie, I., Evans, C., Gray, A., Moxey, A., Prior, S., Littlewood, N. and Bonaventura, M. (2015, p19) Developing Peatland Carbon Metrics and Financial Modelling to Inform the Pilot Phase UK Peatland Code. Report to Defra for Project NR0165, Crichton Carbon Centre, Dumfries

⁴ Jo Smith, Dali Rani Nayak & Pete Smith (2012) Renewable energy: Avoid constructing wind farms on peat. *Nature*, 489, 33.

year⁵; Intensive, heavily drained grassland on peatlands are a net source of carbon but considerably less than cropland (around 5.6 to 16.5 CO₂e h⁻¹ yr⁻¹)⁶.

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 changes in soil tillage regimes in areas where traditional vegetable crops are grown. Given such high rates of organic rich soil loss, complete loss of soil and soil dependent agriculture is imminent in many areas. A rapid transition to forms of agriculture that cope with high water levels (paludiculture) will be important if the UK is to conserve organic rich soils.

Lowland semi natural peatland habitat is highly fragmented. For example, raised bog habitat was always a fairly rare habitat estimated to cover about 70,000 ha, though only 5.5% of this area (about 3,800 ha) remains in a near-natural state⁶. These small habitat islands are often surrounded by drained agricultural land which, in turn, impacts on the hydrological integrity of the remaining peatland fragments (especially raised bogs). There are, however, some productive areas of semi-natural fen peatland habitat in the lowlands (e.g. Anglesey) where high water tables have been maintained and grazing livestock are managed at levels which allow some peatland vegetation to thrive.

Commercial mining of peat for horticulture has, also, largely taken place on lowland raised bogs, with numerous historic permissions still in existence often with little planning control over management or after use. Extraction of the peat and the resulting bare peat landscape has high associated carbon loss. 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, Wedholme Flow and Bolton Fell Moss).

Peatland benefits

Climate

Capacity for long-term carbon storage sets peatlands apart from other ecosystems and means that they play a key role in climate mitigation. Peatlands are naturally waterlogged which slows down decomposition and enables plant remains, containing carbon removed from the atmosphere by photosynthesis, to be laid down as peat. Peatlands in their near natural state can accumulate carbon at a rate of 30-70 tonnes per km² per year. An area of healthy peatland the size of a football pitch can sequester as much carbon every year as is annually emitted by an average family car. Because of this capacity for sequestration and storage of carbon, peatlands play a key role in climate mitigation as well as being important in terms of climate adaptation, e.g. through water regulation reducing flood peaks and providing drought base-flows.

As a result of past damage much of the UK's peatland is no longer sequestering and storing carbon. It has instead become a significant carbon source through emissions from modified peat soils. Damaged peatlands currently emit 16 million⁷ tonnes of CO₂e each year, which is equivalent to around half of all of the reduction efforts made annually in the UK⁸. Emissions from drained peatland continue as long as water levels remain low and the peat is oxidising; potentially lasting for centuries in the deepest peats.

Peatland carbon function can be repaired through restoration which aims to return wetland conditions. Such rewetting is recognised under international climate change agreements as one of the permitted activities for

⁵ Artz, R., Chapman, S., Potts, J., Wilson, D., Heinemeyer, A., Evans, C., Moxley, J., (2016) WP3. Emission factors applicable to UK peatlands. Report to the Department of Energy and Climate.

⁶ Lindsay, R. and Immerzi, P. (1996) *An Inventory of Lowland Raised Bogs in Great Britain*. SNH, Edinburgh.

⁷ DECC report (*unpublished, in draft*)

⁸ UK emissions reduction was 38.8 MtCO₂e (2013-2014) across both industrial and residual sectors. Department of Energy and Climate Change (2014) UK Greenhouse Gas Emissions, Final Figures: Statistical release 2nd February 2016

reducing greenhouse gas emissions. General values for peatland emissions under different land uses have been agreed by the International Panel on Climate Change⁹ enabling countries to include emissions from damaged peatlands and savings from restored areas within national greenhouse gas accounting.

Peatlands are also important in terms of adapting to the effects of climate change: their influence on water regulation slowing water loss from the hills can help reduce flood peaks associated with higher rainfall impacts of climate change. Their water storage capacity also helps maintain base flows in drought periods. Restoring and maintaining peatlands in good condition enables peatland wildlife to better adapt to a changing climate providing more options for changes in species abundance and distribution than in damaged peatlands.

Water

Peatlands are the headwaters for some of the UK's major water supply areas. Water derived from functioning peatlands is naturally of high quality with few pollutants and low nutrient levels (i.e. easy to treat). However, over the last 30 years, the amount of dissolved organic carbon, the brown colour of peaty water, has doubled across many UK catchments. Whilst some of this increase relates to decreasing acid pollution, there is also evidence that peatland condition and management can contribute to colour production with damaged peatlands being associated with higher colour. Removal of this colour represents an additional treatment cost for water companies: coloured water is not only seen as undesirable by consumers but the reaction of the peaty water with chlorine treatment can produce carcinogenic by-products. Water companies have to remove organic compounds from raw water before treating with chlorine. Potentially cheaper and certainly more sustainable is the restoration of peatlands within water catchments to improve the quality of raw water prior to treatment.

Restoration of damaged peatlands may also contribute to regulation of flooding. The water table in healthy peatlands fluctuates a little, but is usually close to the surface. The capacity to store significant additional water is therefore low and rain runs off intact peatlands quickly. However, the presence of artificial drainage channels accelerates the rate at which water leaves a peatland catchment. Blocking drains - part of the peatland restoration and re-wetting process - is likely to lead to less flashy peak flows a longer water retention time and therefore slower run off rates.

Biodiversity

UK peatlands provide habitat for a particular type of wildlife adapted to living in wet and often nutrient poor conditions. Some of these species are rare and/or declining and are priorities for conservation action, e.g. curlew, all species of Sphagnum moss, fen orchid and club mosses. Given UK peatlands form the UK's largest extent of semi-natural habitat, they have a particular role in conserving species dependent on those landscapes – red grouse, red deer, greenshank or dunlin are all good examples. For our rain-fed peatlands (lowland raised bogs and blanket bog), the vegetation is 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.

Peatlands are, by definition, wetlands and it is the high water table that both enables peat to form and support such a distinctive biodiversity. Peat formation is slow, typically at 1mm per year. The deepest peats began to form immediately after the last Ice Age (the Devensian) laying down peat throughout the present inter-glacial period (the Holocene) to form peat deposits that are over 10 m deep.

⁹ IPCC Guidelines for National Greenhouse Gas Inventories. Volume 4: Agriculture, Forestry and Other Land Use (2006) http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/4_Volume4/V4_07_Ch7_Wetlands.pdf

Heritage and culture

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 UK¹⁰. Peatlands themselves also 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, offering an alternative source for fuel.

Peatlands also record environmental change, as the peat layers of different depth can be dated. This archive includes the history of the peatlands themselves, in the form of the remains of the plants that make up the peat and of the insects that lived on the bogs. 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 our National Parks and can provide local communities a sense of inspiration and connectedness with their natural environment. Whilst peatlands have come to be regarded and valued as wildernesses 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 uses in ways that minimise the damage and to look at new economic and employment opportunities such as recreation and tourism or work in peatland restoration with volunteers and contractors.

Costs to society from damaged peatlands

Failure to increase our efforts to urgently address the state of peatlands could cost society billions of pounds in future through carbon impacts alone. The additional costs arising from loss of biodiversity, damage to farming and sporting interests, flooding and drinking water impacts, will all add to the negative financial implications for businesses and taxpayers.

"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)

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 are worth £1.5 billion per year to the UK economy¹¹. The impact from carbon losses from peatlands, if restoration actions are not undertaken to address those losses, could extend to around £210 million per year¹². [The full costs of damaged peatlands to society including biodiversity loss, impacts on drinking water and flood management could extend into £billions](#)¹³. When we damage these ecosystems we lose these

¹⁰ Geary, B., Bermingham, N., Chapman, H., Charman, D., Fletcher, W., Fyfe, R., Quartermaine, J., Charman, D., Van de Noort, R. & Heathcote, J. (2010) Peatlands and the historic environment. Report to IUCN UK Peatland Programme, Edinburgh. www.iucn-uk-peatlandprogramme.org/scientificreviews

¹¹ UK National Ecosystem Assessment (2011) <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>

¹² eftec (2015) The Economic Case For Investment in Natural Capital in England. Final Report for the Natural Capital Committee.

¹³ Adaptation Sub-Committee progress report (2013) Managing the land in a changing climate.

benefits at a measurable cost to society (Fig. 2). Moreover these studies demonstrate that spending on protecting and restoring nature is cost effective.

Likewise, [Sir Nicholas Stern's review](#)¹⁴ highlighted that the benefits of strong, early action far outweigh the costs of inaction when considering the economic costs 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 future¹⁵.

The wise management of our natural environment and ecosystems such as peatlands are 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.

Overarching UK policy commitments

In the past, land managers were financially encouraged to drain peatlands and 'improve' them for agricultural use. Today, UK Government policy is geared towards the enhancement and sustainable management of peatlands. There continue to be localised pressures for new peatland drainage (e.g. windfarms, commercial peat mining and other pressures from the built environment) but measures, such as planning controls, seek to limit the effects on peatlands.

There is a shared agenda for peatlands among the four UK devolved administrations as illustrated in the 2013 Ministerial Statement of Action on Peatlands:

- Defra, the Scottish Government, the Welsh Government and the Northern Ireland Executive 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 authorities will look to shape land management policy, provide funding support through CAP and other mechanisms, as well as supporting research to facilitate the restoration of UK peatlands.
- The 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.

Early work in the UK has seen investment in peatland management aimed at restoring ecosystem function. Much of this has been achieved through public funding, charitable giving as well as contributions from business.

Peatland restoration: a cost effective solution

"Restoration of peatlands is a low hanging fruit, and among the most cost-effective options for mitigating climate change."

Achim Steiner UN Under-Secretary General and Executive Director UN Environment Programme (UNEP)

¹⁴ Stern, N. (2006). *Economics of Climate Change*. HM Treasury, London.

¹⁵ <http://www.bankofengland.co.uk/publications/Pages/speeches/2015/844.aspx>

The most cost effective way to ensure the long term future for our peatland carbon stocks is to take early action to maintain or restore peatlands to functioning peatland ecosystems, resilient to the impacts of climate change. Looking after those peatlands that are in good condition has the least cost; maintaining the ecosystem with relatively low input whilst avoiding higher restoration costs at a later date. For peatlands which are already damaged early intervention is a sensible investment; recovering the benefits and reducing the risks of further erosion and degradation. Restoration becomes more challenging the more degraded the peatland becomes. 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.

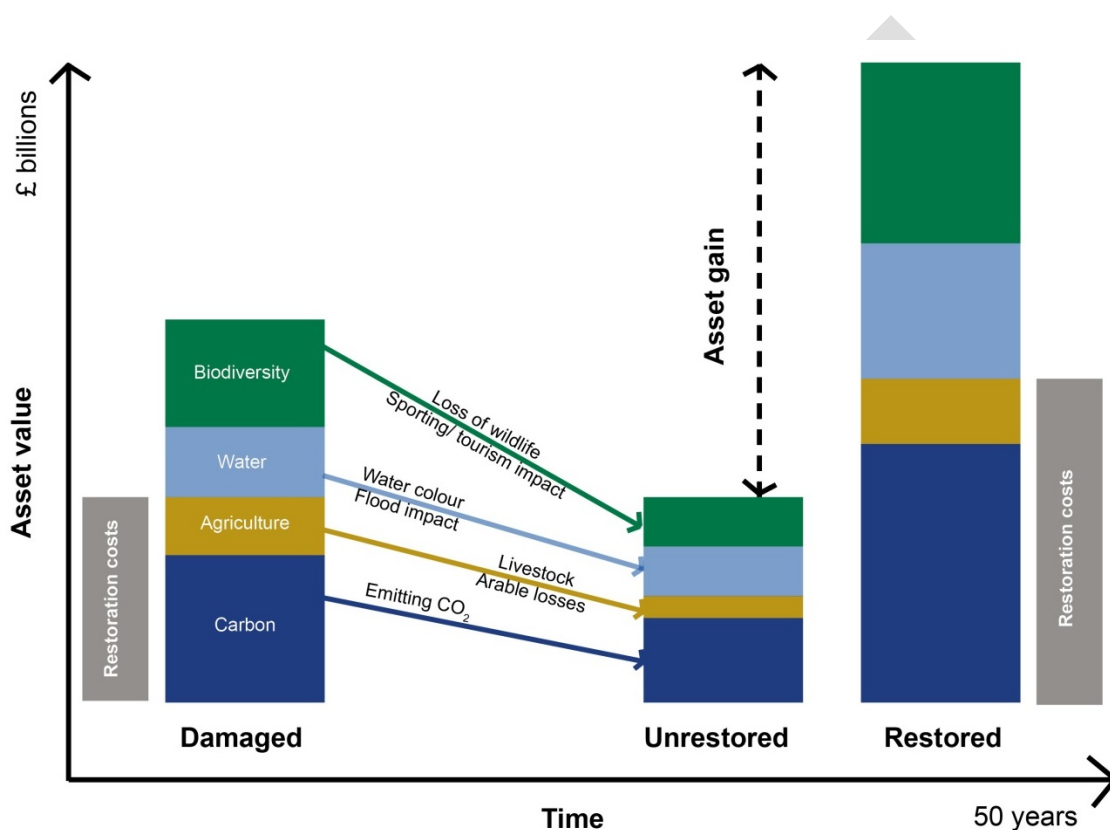


Figure 2 Comparing gains and costs in the transition between peatlands in different conditions.

Peatland restoration brings about significant levels of carbon savings at a moderate cost alongside other carbon reducing technologies and most importantly it is ready for implementation with no delays due to developing technologies or gaining political support. It is particularly cost effective when the wider benefits are taken into account, such as biodiversity and water. It is a readily achievable form of climate mitigation as large areas can be made available without major changes to land use, particularly in the uplands where damaged peatlands here are as much a liability to land managers as they are a threat to society: securing healthy functioning peatlands provides win-wins for land managers alongside biodiversity, climate change and water. Restoration does however have an associated cost with initial capital works representing the main expenditure. Maintaining those benefits is relatively low cost, relying on sensible land management approaches that can be aligned with productive use such as some forms of recreation (some types of shooting, walking, nature tourism etc.) and extensive grazing for meat and wool.

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.

Restoration and sustainable management to date

Peatland restoration and sustainable management across the UK to date has been ambitious with considerable progress made in the last few decades. The total area of peatland that has undergone restoration management in the UK is around 46,000ha. Work has largely focussed on rewetting peatland habitat to conserve the important biodiversity of peatlands through agri-environment schemes and, to a lesser extent, to improve raw drinking water quality prior to treatment. 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.

Peatland ecosystems are not bound by political or administrative units. Regional partnerships (see Table 2) have taken up the challenge of addressing peatland restoration over large areas, deploying ecosystem management principles to ensure regional land use objectives are taken into account when restoring peatlands. These partnerships also help bring in funding across a range of different public and private sectors:

- **Grant funding-** the UK has been successful in securing grant funding e.g. EU LIFE and Heritage Lottery Fund (HLF), for a number of site specific and landscape scale projects delivering conservation objectives and additional climate benefits through the recovery of habitat function. These projects typically deliver capital restoration works as well as demonstrating the techniques used, addressing research gaps and engaging with the local and international community on peatland issues.
- **Private funding-** the opportunities that exist for private investment have been demonstrated by the utilities sector, which consists of regional, private companies in the UK. Due to the water quality and climate benefits of healthy peatlands, restoration has been viewed as a wise investment by these companies in peat dominated catchments. In addition, new investment mechanisms for private funding have been developed such as the Peatland Code; a voluntary standard for peatland restoration projects in the UK which can attract private funding on the basis of their carbon benefits.
- **Public funding for environmental stewardship-** the UK's devolved Common Agricultural Policy (CAP) rural development programmes and agri-environment/forestry measures contribute to facilitating some management requirements of peatlands. However, [CAP has not been implemented equally in each of the devolved countries](#)¹⁶ and has in some cases lead to peatland damage through perverse incentives.

Table 2

Examples of recent peatland partnership projects

An interactive map of UK peatland projects can be found at <http://www.iucn-uk-peatlandprogramme.org/projects>

Regional initiatives

Flows to the Future Meres and Mosses The Great Fen	Moors for the Future North Pennines AONB SCaMP	Yorkshire Peat Partnership Exmoor Mires Making Space for Water
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National initiatives

Peatland Action (Scotland)	Welsh Peatland Action
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¹⁶ Moxey, A., (2016) Assessing the opportunity costs associated with peatland restoration. A report for IUCN UK Peatland Programme

Current barriers and the risk of business as usual

There are a number of risks associated with the current model of peatland management in the UK which this strategy aims to address:

- 1. Many peatlands in near-natural condition are outside of the current designated conservation framework and some of those which are designated are degraded.**
 - A lack of structured management agreements and no formal legal protection through designation leaves these healthy peatlands at risk from changing land use or mismanagement.
 - Protecting those peatlands which are in good condition conserves a refuge for important biodiversity which may no longer exist in degraded peatland areas.
 - Degraded peatlands occur even within designated sites meaning our most valuable wildlife refugia are at risk unless conservation designations are maintained and remedial action takes place.
 - The widespread scale of peatland damage presents a challenge for securing sufficient funding sources.
- 2. An uncoordinated approach with no overarching framework for restoration risks short term, opportunistic activity.**
 - Restoration projects are left vulnerable, coming to a halt through loss of direction and funding with no ability to learn from lessons and exchange knowledge. A lack of coordination also makes it difficult to monitor progress in our achievements.
 - Small individual projects are unable to benefit from economies of scale.
 - Current rate of progress will leave majority of peatlands degraded for many decades and impose ever increasing costs on future generations.
 - There are dangers of maximising one outcome for a single benefit to the detriment of the ecosystem as a whole. For example, revegetation of bare peat to productive grassland may reduce carbon emissions but represents a short term measure and missed opportunities for carbon sequestration potential and biodiversity gains.
- 3. Monitoring peatland management is crucial to demonstrate impact and is currently poorly co-ordinated across the UK.**
 - A lack of strategic approach to monitoring and survey can lead to unsuitable methods being used or even duplication of effort: cost savings could be made with a strategic steer and clear purpose given to the use of the data collected.
 - Research funding does not typically cover routine monitoring of peatlands. Lack of data for simple environmental variables in peatlands make it difficult to provide evidence to attract funding and policy support.
 - Short-term monitoring conducted whilst a habitat is recovering post-restoration can lead to, perverse conclusions and there is a danger if conclusions from this data are used to inform policy.
- 4. There is currently little available policy or funding support for the ongoing sustainable management of peatlands.**
 - The current funding model relies heavily on EU funding sources. The resources required to secure the benefits of peatland restoration and conservation needs to be addressed in the development and deployment of post-Brexit funding for the natural environment
 - Large amounts of funding are being directed to short-term restoration projects which have no means of securing the future long-term management of the site. This can discourage land managers and risks losing momentum amongst stakeholders. Peatlands that have begun to be restored are then vulnerable as the ongoing adaptive management which is often needed to restore them to their full ecological potential is neglected.

- Current restoration effort is delivering GHG savings through emissions reduction and restoring C sequestration function to restored peatlands. These savings have no guarantee of long-term security if the restored areas are not brought under long term sustainable management.
- There is a market failure to reward land managers who manage peatlands sustainably for the public benefits they provide. Alternative land uses, or even development on peatland, may be seen as more attractive than conservation of the habitat itself and land managers can become reluctant to engage in long term sustainable peatland management.
- Peat soils under agricultural systems are not presently under sustainable management and there are high rates of peat soil loss in these systems.

5. **Peatlands are poorly understood.**

- Whilst evidence exists of the benefits of healthy peatlands and the cost of damaged areas it is not yet widely appreciated.
- Not all peatlands are the same and often a site-specific approach is required. Understanding and informing management of peatlands requires a broad skill set. There is a concern that there is a lack of developing professional expertise, particularly with an ecological focus.

The need for UK strategic action

Peatlands are part of our natural capital – stocks of natural assets which provide valuable flows of ecosystem services for society. 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. Action taken now will avoid far greater costs to society in future, hence the urgent need for this strategy.

If we are to deliver the scale and pace of peatland restoration and management necessary to achieve our goals we need to provide coordination and focus across all sectors within the UK that can help bring about positive change for peatlands.

A UK peatland strategy will act to maintain dialogue across the four devolved countries which is crucial for:

- Continued knowledge exchange and skill sharing across all UK peatland partnerships.
- Minimisation of duplication of effort where resources are directed towards research, monitoring and developing best practice.
- Being able to maintain national accounting required by legislation enshrined in UK law such as habitat condition or GHG inventories.
- Maximising efficiency through partnership working to develop shared funding schemes for UK peatlands.

Part II. The UK Peatland Strategy

This strategy recognises there are different peatland types and pressures within the UK and seeks to provide a common goal across the four devolved administrations of England, Northern Ireland, Scotland and Wales. A dual approach is proposed whereby:

- The four countries seek to make early advances on the low cost opportunities, utilising existing resource and expertise available to deliver peatland restoration.
- The four countries put in place measures to help improve the options for long-term progress in the more challenging or costly areas.

Delivering the long term vision and aims of the strategy (Table 3) will require significant levels of collaborative working: something which the IUCN UK Peatland Programme partnership has already demonstrated is feasible and can continue to build upon the working 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 undertaken by the IUCN UK Peatland Programme [Commission of Inquiry on Peatlands](#) (2011). It takes forward the Ministerial action statement on UK peatlands¹⁷ from the four devolved administrations and embraces national peatland action strategies to provide a coordinated focus covering all three main peatland types, raised bogs, blanket bogs and fens in the UK. The strategy also makes connection with peatlands in the British Overseas Territories and makes provision for knowledge sharing with peatland initiatives in Europe and in other major peatland areas such as those in Southeast Asia.

Vision

The UK's peatland natural capital is protected and enhanced, peatlands are managed sustainably and are recognised for their intrinsic value and the public benefits they provide.

In support of achieving this vision, we set a new overarching goal of achieving 2 million hectares of peatland in good condition, under restoration agreements and being sustainably managed by 2040.

¹⁷ Joint letter from Defra, Welsh Government, Department of the Environment Northern Ireland and The Scottish Government (2013) Securing benefits from UK peatlands. <http://www.iucn-uk-peatlandprogramme.org/news-and-events/news/uk-environment-ministers-announce-action-peatlands>

Table 3 UK Peatland Strategy

AIM			
To provide a long-term framework for the conservation, restoration and sustainable management of UK peatlands using good practice methods across all three main peatland types, blanket bogs, lowland raised bogs and fens, in order to secure multiple benefits from enhanced biodiversity, water quality, water regulation, climate mitigation, cultural services and resilience in the face of climate change.			
GOALS	OBJECTIVES	OUTCOMES Timescales (2017-2040)	MILESTONES
<p>A. Conserve and enhance through restoration, the best and most readily recoverable peatlands</p> <p>Early conservation avoids expensive investments needed and greater risks of failure associated with repair of more severely degraded areas. Restore mire vegetation communities to areas where past management has resulted in a shift to other vegetation communities (e.g. heath)</p>	<p>1. Bring about the long-term protection, enhancement and sustainable management of peatlands in areas that support</p> <ul style="list-style-type: none"> i. semi-natural mire plant communities and ii. other semi-natural vegetation on peat soils (e.g. heath and low production forest plantations) through: <ul style="list-style-type: none"> 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 land management. d) Ensure the full long-term costs of potentially damaging activity is properly taken into account in decision making process 	<p>[95%] of UK peatlands supporting semi-natural vegetation are under favourable management for their peatland biodiversity and ecosystem functions</p> <p>Local, national and international protected area status confirmed for all qualifying peatlands (including World Heritage sites, Ramsar and EU Habitats Directives) and all sites under favourable condition. Cost savings are being made through avoiding the need for major interventions.</p> <p>Policies are in place for peatland protection and restoration in new developments and land management change.</p> <p>Environmental assessment processes are designed to assess full costs to carbon, water and biodiversity.</p>	<p>2020 Meet the IUCN UK Peatland Programme challenge: 1 million hectares of peatland in good condition, under restoration agreements and being sustainably managed</p> <p>Establish the current baseline and begin to define management plans</p> <p>2030 50% of the peatland resource is conserved in favourable condition.</p> <p>2040 Target [95%] is achieved.</p>

GOALS	OBJECTIVES	OUTCOMES Timescales (2017-2040)	MILESTONES
<p>B. Restore degraded areas to functioning peatland ecosystems</p> <p>Peatlands that are severely degraded can be restored and rehabilitated. Both an opportunistic <i>and</i> a targeted approach to restoration priorities can be applied in tandem. This will allow the UK to make the most of opportunities when they arise whilst actively encouraging action on priority sites.</p>	<p>2. Restore peatland ecosystem function and enhance biodiversity through the restoration and ongoing sustainable management of upland and lowland peatlands which no longer supporting semi-natural vegetation but which have;</p> <ul style="list-style-type: none"> a) remaining deep peat resource including mineral workings, deep drained improved, grasslands and closed canopy forestry plantations b) an adjacent semi natural peatland site which depends on the degraded area coming under restoration management. <p>3. Safeguard restorable peatland areas from development and land management activity that would undermine restoration potential.</p> <p>4. Optimise UK carbon efficiency through co-ordinating forest management, renewable energy development and peatland conservation through planning to ensure positive outcomes for all.</p>	<p>Majority [80%] of heavily degraded peatlands in the UK are under restoration management aimed at recovering long-term security of the ecosystem.</p> <p>Recognising that initial recovery halts losses but can begin to recover function across biodiversity and carbon sequestration.</p> <ul style="list-style-type: none"> 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. 	<p>2020 Meet the IUCN UK Peatland Programme challenge: 1 million hectares of peatland in good condition, under restoration agreements and being sustainably managed</p> <p>2030 Areas capable of restoration identified and given protection in development plans</p> <p>2040 Sites identified as priorities have restoration plans agreed and suitable funding routes identified</p>

GOALS	OBJECTIVES	OUTCOMES Timescales (2017-2040)	MILESTONES
<p>C. Applying land uses that are compatible with healthy peatlands</p> <p>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 traditional forms of land use. This includes minimal intervention where no action is required to maintain peatland habitat</p>	<p>5. Delivering sustainable management across the UKs peatlands will involve:</p> <ul style="list-style-type: none"> 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) Developing economically viable systems for supporting peatland management. <ul style="list-style-type: none"> 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 perverse incentives which can result in peatland damage. 	<p>Sustainable management practices adopted on [80%] of UK peatlands</p> <p>Healthy peatlands are delivering benefits for land managers and rural economies. Land managers are recognised for the wider societal services the healthy peatlands they manage deliver for society.</p>	<p>2020 Peatland carbon is incorporated into UK GHG inventory reporting and peatland management forms part of mitigation plans.</p> <p>2030 60% of UK peatlands under sustainable management</p> <p>2040 80% of UK peatlands under sustainable management</p>

GOALS	OBJECTIVES	OUTCOMES Timescales (2017-2040)	MILESTONES
<p>D. Adapting management of drained peatlands under intensive productive use</p> <p>Some existing land uses currently rely on maintaining drainage of peatlands. Negative environmental and socio-economic impacts resulting from this can be restricted by minimising drainage, limiting chemical inputs, changing cropping systems and soil tillage regimes.</p>	<p>6. Develop and introduce wetland agriculture systems to the UK</p> <ul style="list-style-type: none"> a) Trial new systems and new ways of working which 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. 	<p>The impact of greenhouse gas emissions from agricultural use of peat is reduced through a shift to more sustainable management.</p> <p>The distribution and extent of agricultural peat soils across the UK is maintained, through the introduction of new soil management regimes and cropping systems.</p>	<p>2020 Vision agreed for agricultural soils</p> <p>2030 Early opportunities are being delivered for agricultural peat soils to bring them under sustainable management regimes.</p> <p>2040 Vision for agricultural peat soils is delivered</p>

GOALS	OBJECTIVES	OUTCOMES Timescales (2017-2040)	MILESTONES
<p>E. Establish a formal framework to stimulate appropriate funding support, share experience, encourage best land management practice to support the above goals (A-D)</p>	<p>7. Establish funding support for:</p> <ul style="list-style-type: none"> a) Capital costs of restoration b) Ongoing management c) Landscape scale peatland partnerships, specifically as peatland management 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 	<p>Healthy peatlands have <i>measurable</i> ecosystem services value to society.</p> <ul style="list-style-type: none"> a) Peatlands and the services they provide have a measureable economic value which are recognised through funding support for their conservation and management. b) 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 and environmental c) Government recognised carbon market standards for peatland restoration are adopted in private sector. d) Innovative funding mechanisms which deliver private funding to support the delivery of capital costs for peatland restoration are established. 	<p>2020 Funding plan in place to resource the Peatland Strategy, comprised of post-Brexit UK public environmental funding, public benefit payments and private funding</p> <p>2030 Review public and private funding measures and address any shortfalls</p> <p>2040 Funding support is widely adopted across public and private sectors and is secured through a range of long-term programmes.</p>

GOALS	OBJECTIVES	OUTCOMES Timescales (2017-2040)	MILESTONES
<p>F. Peatlands values, both intrinsic and measurable, are communicated to a wide audience.</p> <p>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.</p>	<p>8. Communication instils public support for peatland conservation, restoration and sustainable management (Goals A-E):</p> <ul style="list-style-type: none"> a) Provide printed and digital resources to enable understanding of peatlands b) Share peatland stories with the media c) Showcase peatland restoration case studies. d) Disseminate key messages to stakeholders e) Present peatland science in an accessible format. 	<p>Peatlands are recognised for the benefits they provide and society is aware of both the benefits of healthy peatlands and impact of degradation.</p>	<p>2020 Peatland coverage in the media, which supports the goals of this strategy, is high (demonstrated through an <i>impact survey</i>)</p> <p>2030 Public attitudes survey demonstrates widespread knowledge of peatlands and support for public spending.</p> <p>2040 With a large proportion of the UK's peatlands in good condition or under conservation management, communications work is focussed on the benefits these habitats are delivering and the need to maintain conservation of these areas.</p>

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Approach to delivery

The UK peatland strategy sits alongside existing, and supports the development of new, national peatland plans and national peatland action plans. 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 focussed public and private funding aligned with these needs. Action plans will provide the eventual delivery of the strategy. It is recommended that each national plan addresses the priorities identified internationally for peatlands (Box 1).

Box 1 Ten global priorities identified for peatlands¹⁸

1. Identify occurrence and state of all peatlands.
2. Improve assessment of greenhouse gas emissions from peatlands.
3. Conserve all reasonably intact peatlands.
4. Prevent further degradation of already degraded peatlands including:
 - a. no further intensification of artificial drainage;
 - b. installing hazard monitoring and mitigation to avoid fire damage and soil erosion;
 - c. shift from agricultural practices that require drainage on peatland, to paludiculture;
5. Restore degraded peatlands by rewetting, and subsequent conservation and/or paludiculture.
6. Target financial resources to peatland conservation, restoration and better management.
7. Stimulate and apply existing and developing climate financing mechanisms such as the compliance market and the voluntary market.
8. Involve local communities at the earliest stage and support communities to overcome their opportunity costs and dependence on unsustainable peatland use.
9. Ensure that greenhouse gas (GHG) criteria are integrated in credible certification and subsidy schemes for products that are derived from drained peatlands. Integrate these into national procurement policies.
10. Share experiences and expertise on peatland conservation, restoration and better management among countries.

Implementation of this strategy will be co-ordinated and monitored through the umbrella partnership of the IUCN UK Peatland Programme who will provide a national framework, facilitate implementation and demonstrate solutions. This partnership will:

- Offer a platform for engaging and coordinating activity across a wide range of sectors including public bodies, land managers, NGOs, scientists and businesses.
- Provide a gateway for information about peatlands and progress towards the strategy objectives connecting with a network of peatland demonstration projects and scientific hubs across the UK and internationally.
- Continue to develop the business case to influence future policy direction to improve funding streams available for peatlands through future environmental grant schemes.
- Support the development and promotion of peatland restoration good practice building on the experience of previous peatland projects.
- Promote the benefits of peatlands for their climate change benefits, biodiversity and other ecosystem services to inform and educate the public.
- Guide the collective research agenda by highlighting knowledge gaps which can inform proposals for applied research. Deliver consensus based evidence for policy and practical peatland management incorporating best available scientific evidence.
- Report on progress against objectives and targets in the UK peatland strategy.

¹⁸ H. Joosten, M.-L. Tapio-Biström and S. Tol, "Peatlands - guidance for climate," FAO and Wetlands International, Rome, 2012.