Commission of Inquiry on Peatlands: The State of UK Peatlands Update

Summary

The report provides an update on the 2011 JNCC report, focusing on new information obtained since its publication in relation to mapping of peat soil extent, land cover, condition and change due to restoration efforts. The report also outlines our current understanding of trajectories of change following restoration activities.

Mapping the UK peat resource

Several major updates have been made to national peat maps for all of the UK countries except England. In Scotland, the existing James Hutton Institute (JHI) peat map has been revised with a modelled spatially explicit map of peat presence/absence, enabling the peat map to be combined with land cover data to support peat condition assessment. In Wales, the Welsh Government has supported the development of a completely new peat map, utilising detailed mapping data from the British Geological Survey (BGS) and Natural Resources Wales (NRW). In Northern Ireland, a new map has been produced by BGS based on their own mapping data, augmented by data from the Agri-Food and Biosciences Institute (AFBI) and the Northern Ireland Peat Survey data. In addition, BGS data have been used to map peat extent in the Isle of Man, and to support a new (provisional) estimate of peat extent in the Falkland Islands.

Peat areas reported in JNCC (2011) and updated/additional area estimates based on more recent mapping, where available, from the UK BEIS Inventory project (Evans et al., 2017[5]). Note that only true peats (not 'peaty soils') as per national definitions are included in the estimates, and that data are not available for separating deep from 'wasted' peats in any country other than England. Peat areas in other UK Overseas Territories and Crown Dependencies have not been quantified.

Country/administration	2011 (ha)	Updated (ha)	Change
Scotland	1,726,900	1,947,750	+220,850
England (deep)	495,828	495,828	-
England (wasted)	186,372	186,372	-
Wales	70,600	90,050	+19,450
Northern Ireland	206,400	242,622	+36,222
UK Total	**2,686,100**	**2,962,622**	**+276,522**
Isle of Man	No data	475	+475
Falkland Islands	No data	282,100	+282,100
Combined total	**Not available**	**3,245,197**	**+559,097**

Material adapted from the technical report by Artz *et al.,* (2019) Commission of Inquiry on Peatlands Update: State of UK Peatlands- an update

Overall, peat mapping activities since 2011 have expanded the estimated peat extent in the four UK countries to almost 3 million hectares, an increase of 276,500 ha over the 2011 estimate (see table). The estimated 282,000 ha of peat in the Falklands (larger than the total peat areas of either Wales or Northern Ireland) represents a substantial further addition to the estimated area of peat under UK jurisdiction.

Assessing peat condition

The assessment of peat condition in the 2011 JNCC report was largely based on land cover and habitat maps. These maps use different classification systems, are based on ground and/or satellite survey data collected at different times and cover all soil types so have only fairly coarse categories for peatland areas. Subsequent national-scale mapping activities have used aerial photography to disaggregate peatlands into different condition categories (England) or map drainage features (Wales, and in part for Scotland), while more detailed mapping has been undertaken in individual peatland regions such as Dartmoor and the South Pennines. Some of these more recent data were used in the recent development of the UK BEIS Emissions Inventory for Peatlands project (hereafter called the BEIS Inventory project), however inconsistencies between national and regional classification schemes, variations in the 'base year' in which surveys were taken, and in particular the absence of comparable repeat surveys still severely constrain the extent to which peat condition can be mapped and monitored at a national scale. There is still a need to create a national baseline map of condition for all peatland types across the whole UK that change can then be assessed against in future years. Even if a baseline for 1990 cannot be accurately reconstructed, an appropriate and nationally consistent effort to create an accurate 2020 baseline map would help future generations assess progress towards the 2040 target of the IUCN Peatland Strategy ("Two million hectares of peatland in good condition, under restoration or being sustainably managed by 2040").

The latest UK-wide update on trends in condition on peatland habitats was published in 2013 by the Joint Nature Conservation Committee[1]. This report suggests overall bad condition for all nine peatland habitat types under nature designation. Six of these habitats were considered to show an overall improving trend in condition status. The majority of improving habitats, however, are fen type habitats, which occupy a relatively small proportion of the total UK peatland habitat. The condition of most bog habitats, including that of blanket bog, was declining. However, such ground-based condition survey data place restrictions on consistent peatland assessment as there is a finite extent of peatland that can be reasonably assessed in a single year given financial limitation and repeat surveys themselves can cause a decline in local condition due to e.g. trampling. To increase the extent of monitoring and reduce ecological pressure on the ground, several recent and ongoing initiatives have sought to make greater use of Earth Observation (EO) data.

Other relevant developments in the use of EO data include the use of Sentinel 1 radar data for i) crop mapping, which could in future be used to assess and monitor lowland areas under arable agriculture, ii) monitoring of near-surface soil moisture, as a proxy for drainage impacts or the resilience of restored areas during extreme climatic events, and iii) monitoring the vertical movement of peatlands using interferometry[2], as a measure of peat growth or subsidence, and also an indicator of hydrological functioning. As noted above, aerial photography data have already been used to map peat condition and ditch occurrence, although such approaches are laborious, partly subjective and expensive to repeat. Finally, there has been substantial growth in the use of Unmanned Aerial Vehicles (UAVs) for peat assessment. Given the limited extent and labour costs of UAV mapping it is unlikely that they can be used for national-scale assessments, however they represent a valuable tool for monitoring ecological change at the scale of individual restoration projects and such data have the potential to be used to train larger scale models to improve accuracy of EO outputs. A detailed and in-depth accurate assessment could be made of a variety of peatland areas, which could then be used to interpret satellite data to extrapolate out over all the peatland areas to a broader but slightly less accurate assessment of peat condition. The ecology, processes and threats to peatlands in the UK's Crown Dependencies and Overseas Territories, including the Falklands, are poorly described and understood and will require fundamental effort on the ground to establish appropriate baseline data.

Extent of restoration to date

The most recent UK-wide assessment of peat restoration activity, for the BEIS Inventory project, covered the period 1990 to 2013, and was based on a collation of information from 409 individual projects. This assessment gave an estimate that around 110,000 ha of peatland has been subject to some form of restoration intervention, of which 73,200 ha included active re-wetting, while the remainder involved other forms of peatland management such as grazing reduction or scrub removal that may be contributing to 'passive' re-wetting (e.g. by lowering evapotranspiration losses).

[1] Joint Nature Conservation Committee. 2013. Habitat Conservation Status Reports - 3rd UK Habitats Directive Reporting 2013 [online]. Available: http://archive.jncc.gov.uk/page-6563

[2] Interferometric synthetic aperture radar (InSAR) uses two or more SAR images to generate maps of surface deformation/digital elevation, by utilising the phase differences in the waves returning to the satellite. It can measure up to millimetre changes across a defined time period.

An additional 1 million ha of peatland has been included in some form of UK agri-environment scheme, but the evidence that this led to any significant or sustained changes in peatland condition is weak at best, and these areas cannot therefore be considered to have been 'restored'. Relative to total peat areas, the largest proportional areas of reported peatland re-wetting have been in England and Wales. These activities have mainly occurred on upland bog, although some re-wetting of cropland and intensive grassland has also taken place. In addition, there were small net reductions in the extent of forestry on peat in England and Wales from 1990 to 2013. Due to some incompatibilities between the data sources between 1990 and 2013 for forestry, it is unknown how much planting occurred relative to restoration activities during this period. There have been reductions in the extent of industrial peat extraction, of around 7,900 ha, most of which has been in Northern Ireland and England.

Since 2013, there has been a step change in the rate of restoration management in Scotland. Under the Scottish Government's Peatland Action funding, a further total of ca. 19,000 ha has been restored between 2013-2019 in Scotland. There are additional projects out with Peatland Action, but we were not able to locate data on their extent. There have also been further projects in Wales, England and Northern Ireland, but it has not been possible to compile these data for this report. Data on restoration activities in the UK's Crown Dependencies and Overseas Territories are generally lacking, but the areas involved are thought to be small. In the Falklands, around 60 ha of peatland have been restored or protected in the last five years (2014-2019), and work to increase this area by Falklands Conservation, the Antarctic Research Trust, and private landowners is ongoing.

It is important to emphasise that current knowledge of both the extent and effectiveness of UK peatland restoration activities is incomplete. The assessment of restoration activities described above was heavily reliant on information provided by individual projects, which did not follow consistent reporting protocols, was rarely spatially explicit, and was almost entirely based on reporting of actions (e.g. km of ditches blocked) rather than measured outcomes (e.g. ha of peat over which water tables were raised compared against unrestored controls). Furthermore, very substantial peat restoration has occurred in the five years since 2013 via funding mechanisms such as the Scottish Government's Peatland Action Fund, Welsh Sustainable Management Scheme and a number of major EU LIFE programmes. More recent grant schemes including the Defra Peat Restoration Fund will deliver additional peat restoration within the next few years.

At present the lack of a consistent, objective approach to reporting or quantifying restoration outcomes, together with the absence of a robust satellite-based procedure for monitoring peat condition change, severely limits our capacity to report on the extent, effectiveness or therefore the overall benefits (such as GHG emissions reductions, amongst other ecosystem services) of peat restoration activities supported by these substantial and continuing investments.

Restoration goals and gaps

Restoration goals vary, from mitigating losses of carbon to a desire to full ecosystem restoration to as natural a state as possible. Consequently, there are no standard targets or standard methodologies to assess effectiveness. There is also currently no agreed method on how to report on the extent of the restored area and this needs to be clarified for national reporting in future. There is high resistance to restoring areas of forestry on peat even when these are uneconomic; and despite efforts to have trees' in the right places', there have been cases of a direct policy conflict of the peatland restoration targets and the woodland planting targets. Agriculturally-used peatlands are often seen as not being candidates for restoration as the income foregone is considered too high in relation to the value of the potential payments for ecosystem services in a restored state. This needs to be further clarified (e.g. hidden subsidies such as pumping costs), however in the interim, measures to at least reduce emissions from agricultural peatlands through altered water management should be explored. Grouse moors often present similar economic issues when assessed for restoration potential. Restoration goals can also get confused in that some habitats on deep peat are designated for the degraded habitat that now exist on top of the soils.

The vast majority of monitoring efforts address hydrological functioning or vegetation composition as indicators of success. There are only a small handful of reports on the recovery of terrestrial and aquatic fauna to date, a major data gap amongst global efforts to improve species monitoring. There is now a significant body of evidence that shows mostly beneficial impacts of peatland restoration. Where negative effects were observed, these were generally transient (disturbance) effects. However, if there is potentially a short-term negative effect on an ecosystem service, this can reduce the willingness of stakeholders to invest in projects which aim to protect the landscape in the longer term. Very few studies to date have reported the longer-term trajectory of restoration efforts, in many cases this is in part due to the limited duration of the restoration funding and compounded further by due to the short-term nature of funding for research and monitoring. The costs of peatland restoration are often not reported and hence there is still a relative lack of data, reducing the opportunity to assess cost effectiveness. Monitoring costs are generally not included in restoration funding, and therefore this lack of funding for research and monitoring is further hampering efforts to understand the potential benefits of restoration.

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Finally, the effect of nitrogen pollution and climatic change on the future success of peatland restoration remains to be examined. Wildfire incidence appear to be increasing in UK peatlands. Such fires not only destroy any carbon benefit accrued in the vegetation (and sometimes in deeper peat layers), but it is also unknown whether there are any longer-term impacts of wildfire that may adversely affect the condition of the UKs peatlands as a whole or limit the success of peatland restoration effort.

Recommendations

- There is still a need to create a national baseline map of condition for all peatland types across the whole UK that change can then be assessed against in future years.
- A major obstacle in measuring success is the lack of a common definition of a target state, and the lack of a common framework for monitoring and reporting. In terms of vegetation monitoring, the Common Standards Monitoring framework is the only common standard that can be applied at present, however it is generally only used for designated site monitoring. It does, however, use a standardised method to score degradation factors as part of the wider site condition assessment methodology. This lack of a common framework requires to be addressed.
- Currently there is no monitoring framework in place in relation to international obligations regarding restoration (Aichi 15) targets or the UK's obligations to report GHG emissions under the UNFCCC and Kyoto Protocol. Biodiversity and wider condition monitoring are still limited to only having a framework for monitoring for designated areas, but reporting intervals are limited and are consistently being missed. There is therefore still no robust estimate of how much of the UK peatland resource is in good condition, poor condition, and/or deteriorating due to climate change. A wider UK peatland monitoring framework that dovetails with international procedures and requirements should address these critical issues.
- Reporting on extent of 'restored' peatland. Methodologies to prove the extent of successful rewetting need to be developed to ensure a common (and possibly mandatory, in the case of publicly funded projects) future reporting protocol can be developed for national level reporting. Collation of these data may require a decision on an appropriate centralised body at UK or Devolved Administration level for data handling.
- Cost of peatland restoration needs to be reported better, using standardised methods. A better estimate of the cost of restoration in the light of the recommended targets by the Committee on Climate Change would enable better projections of overall cost and thereby allow better alignment of future policy instruments.
- Consider mapping benefits to multiple ecosystem services even if these cannot yet be fully quantified or monetised. A common scalar could be developed for the systematic assessment of the various potential ecosystem service impacts and this would enable a critical comparison of inter-site restoration success.
- Raise the profile of the (substantive) peatlands in the UK's Crown Dependencies and Overseas Territories and support their work to better describe and understand their ecology, processes, threats and practical restoration.
- Restoration grant aid should fund a level of on-site monitoring appropriate to the uncertainty of the outcome. Monitoring should take place in the restoration area and also in a comparable reference site in the same region that represents a suitable target state for the restoration site. Reference sites do not need to be fully 'natural' or 'pristine' but could be (for example) intact designated nearby peatland sites at similar altitude and slope, assessed as being in good condition under statutory condition assessments. Reference sites should not contain any unrestored impacts (e.g. unblocked drains). This ground monitoring should be complemented by collating remote sensed indicators of vegetation and moisture conditions from the same sites for the monitoring years. Monitoring funding should be maintained long-term so that periodic (e.g. every few years), updated assessments can be made over many years, gradually building knowledge on long term responses of peatland sites to restoration management, as compared to suitable reference sites.
- Future policy development in Climate Change, Biodiversity, Planning and Agricultural arenas, especially post the (currently still ongoing) Brexit process, should explicitly regard the specific need of peatland restoration and conservation goals, given their importance for greenhouse gas emissions mitigation and in delivering UN Sustainable Development Goal 15.

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