



Peatland Action Project: Tayside Experience and Cairngorms Demonstration

Following an invitation passed on by Cath Lloyd of the Tayside Biodiversity Partnership, I was fortunate to be able to join others to look at a demonstration of peatland restoration on Camock Hill between Ballater and Corgarff on 17th November, 2015. The invitation was extended by Stephen Corcoran from the Cairngorms National Park Authority (CNPA), who is currently its Peatland Action Restoration Officer and is helping to deliver the Peatland Action Project as part of [Scotland's National Peatland Plan](#).

Peatland is increasingly recognised as an import store for carbon and for helping to remove carbon dioxide from our atmosphere which would otherwise absorb infrared radiation and contribute to raising global temperatures. Loss of peat is a global problem in different forms; fires have raged in Indonesia where forests are set alight by companies aiming to convert natural forest with its biodiversity into a monoculture to produce palm oil. From July 2015, fires burned down into peat under the forest and continued to smoulder after the fires above had been extinguished. Months of widespread fires and smog killed 19 people, gave rise to an estimated 500,000 cases of respiratory problems (Guardian News 11.11.15) and released an estimated 1 billion tons of carbon dioxide (Scientific American, 22.10.15).

We can help Indonesian people and their peatland and forests which support orangutan and other forest inhabitants by not buying products made from palm oil. There are many alternatives as shown on the internet; a useful list can be downloaded [here](#).

Our National Peatland Plan informs us that as much as 80% of the UK's peatland landscape has been damaged; "it is estimated that 70% of our blanket bog and 90% of our raised bog area has been damaged to some degree." Stephen is responsible for providing advice and guidance on peatland restoration and assisting in putting together applications for grant from the Scottish Government's allocation for peatland restoration. At our assembly point on the Old Military Road leading towards Corgarff, Stephen informed our group of other projects in the Cairngorms he has been involved in.

Also present was Andrew Coleman from Highland Conservation who is leading on the practical side of the Candacraig project. Our group also included two consultants who had experience in assessment and management of peatland projects, an estate manager who came to see how the project might be applicable on some of the estates he manages and Hayley Wizwell, Natural Heritage Officer for the CNPA. Hayley was interested in finding out how the practices being used in this project might be applied to mitigate impacts on areas of peatland affected by planning development. The exchange of information, experience and ideas between everyone present was stimulating and very useful.

Carrying out these projects comes with challenges. The time when work can be carried out may be limited by the nesting and fledging period on grouse moors and by the stalking season for red deer. Work is often limited to the end of autumn and start of winter, which may be cut short by the early arrival of snow. Winter makes work impossible and the effective time to carry out a project may be possible only in a period of about six weeks during a year.

Before we set off for Camock Hills in our 4x4s, I am going to examine the efforts of a much older project to set current projects in context and to look at some projects in Tayside. In the early 1980s, work started on damming the ditches on [Blawhorn Moss National Nature Reserve](#) in West Lothian. The cutting of ditches on peat bogs to lower water levels to try to dry out the peat has been a common practice on many raised bogs and may be seen on blanket bogs. At Blawhorn, plastic pile sheeting was driven into the ditches to raise the water levels in the bog to encourage the growth of sphagnum moss. This approach was successful and improvements were sustained by successive projects in following years to raise water levels in the bog. This management has been praised as one of the most successful examples of raised bog restoration.

An example of raised bog restoration in Tayside is Portmoak Moss at Loch Leven, which has suffered extensive peat extraction over many years and was planted up in the 1960s. The [local community](#) has taken a great interest in their raised bog, working closely with the Woodland Trust, owners of the site, and Andrew McBride, SNH's Peatland Action Project Manager. In a similar approach to Blawhorn, plastic pile sheeting was driven into ditches to raise water levels in the bog. Members of the local community measured the rise in water levels, which offered encouragement for further work. Further successes were achieved, but problems remained in the lack of wetting over the entire surface of the bog. Further work was undertaken in 2014; scrub and tree regeneration was flailed and mulched, tree stumps were reduced and the bog surface was levelled to fill in most of the ditches.



Portmoak Moss, 27th October, 2012

These two photographs are taken from opposite sides at the bog surface and compare the condition before and after restoration. Bog pools were formed in the process of recent work, sometimes using the previously dammed ditches, but removing their linear form which had stretched over much of the bog surface. Sphagnum species were present in 2012, but were confined to hollows. Wavy Hair-grass, *Deschampsia flexuosa*, was dominant to co-dominant over most of the surface, reflecting the drier areas as seen in the first photograph. Heather, *Calluna vulgaris*, was regenerating, but Cross-leaved Heath, *Erica tetralix*, was very occasional and Hare's-tail Cottongrass, *Eriophorum vaginatum*, was restricted; these two latter species are more typical of bog plant communities.



Portmoak Moss, 24th January, 2015

Challenges on blanket bogs are similar and different. For the weary hill walker, the long trek home over the rises and falls of peat hags on blanket bogs is an unwelcome experience. On Ben Lawers National Nature Reserve, the National Trust for Scotland mapped the areas of bare peat and hags on its property. Two sites were treated with the aid of grant by re-profiling hags and trying different methods for restoring vegetation on bare peat. These included a mulch with heather clippings, other plants with seed, moss and combined with geotextile retainers and planting. The moss, *Hylocomium splendens*, from the heather mulch, appeared to be the most effective regeneration on the bare peat by the end of the first year's growth. Within the reserve the Coire Odhar site is grazed by sheep, but at a lower density than the surrounding hill; the fenced off slopes of Meall nan Tarmachan are not grazed. The effect of grazing on regeneration between the two sites is being monitored.

There was a cold, bracing breeze that welcomed us as we stepped out of the warmth of the 4x4s on to Camock Hill. Exposure at around 670m at this elevation is severe throughout winter and at other times during the year. The mosaic of muirburn patches below gives way to dwarf heath leading up to this altitude. On our walk to the work site, Stephen pointed out a saddle bog in the distance marked by erosion and run-off, typical of other bogs in the area.



Camock Hill hag re-profiling

Our first view of recent work was re-profiling of hags to cover bare peat with adjacent vegetation. Had I not been told, I would have passed this by without paying further notice as there was very little evidence of disturbance. In an area of wetter peat, a peat dam had been formed to stem the loss of water and reduce erosion and the loss of peat.



Camock Hill hag re-profiling and peat dam

Further on we came to a deep gully where two 6 tonne excavators were working. Generally, smaller excavators are used in this type of work as we saw, but sometimes larger, heavier ones are used. Care has to be taken not to damage bog vegetation by tracking; damage can be avoided using bog mats. During our discussion we agreed that in some cases some compression may be helpful to reduce the height water has to travel up through the peat to wet the vegetation.



Top of erosion gully through blanket bog vegetation

The gully which had formed in the peat appeared to be entirely natural and a considerable collapse must have taken place. Vegetation had colonised some of the bare peat along the bottom of the gully, but elsewhere bare peat was present along the bottom and on the sides of the gully.



Twins!

The two excavators worked very well in tandem. The next photograph shows one of the excavators on the top of the bank which had been graded. Vegetation was being taken from the rear of the bank in large turves using the bucket of the excavator, which also tamped them down after laying them in place on the face of the bare peat. This action can be undertaken with one swing of the arm of the excavator, which can achieve 360° rotation.



Top of re-profiled bank with translocated vegetation

The large turves are taken from borrow pits at dispersed distances to avoid causing erosion. After the peat and its vegetation have been removed, the edges of the borrow-pit are raked in with the teeth of the bucket of the excavator to cover any bare peat. This can lead to the formation of shallow pools on the bog surface, which can be beneficial for invertebrates and attract high-level waders and other birds.

The two excavators were continuously in action, the operators watched and worked assiduously to ensure the removal and the translocation of turves were carried out sensitively and accurately. Good progress was being achieved; about a kilometre in length

each day. The bank we watched from was where the excavators had been earlier that morning. The final photograph in this section was taken from this location and shows the results of a reinstated borrow pit.



Removing turf



Tamping down turf which has been laid in place

Removal of vegetation must ensure only the minimal amount of peat is disturbed and any peat removed during re-profiling must be incorporated below translocated vegetation. Inevitably some bare peat remains on slopes which are too steep for re-profiling or on surfaces where vegetation has become exposed by erosion and replacement by immediately translocated vegetation is impractical.



Borrow-pit with reinstated vegetation

The restoration procedure on these slopes or on large areas of bare peat is to incorporate a mulch of heather and grass clippings with a high bryophyte content which is cut and gathered by a forager. Sphagnum is included in the mulch and this is essential to allow peat formation to be re-initiated. While the cuttings may be gathered from close to the site where they are required, there is often a difficulty in transporting large quantities of material to sites. Andrew explained that a helicopter lift is the most effective method, but that it is also expensive and prone to delays when weather is unsuitable for helicopter flight. The same procedure was employed at Ben Lawers, also using a helicopter, which was delayed by poor weather and there was a push to spread the mulch before the arrival of snow.

Andrew had probed the depth of peat in the area of restoration before the start of work and found a range of 0.2 to 3.0 metres. Stephen said the area of restoration covers 130 hectares. Working on an annual loss of 2cm cover from bare peat, he calculated that an estimated 2,137 tonnes of carbon would have been lost annually from the site. With a mean accumulation rate of 2mm of boreal peat depth annually and probably less in the more extreme conditions on Camock Hill, the annual loss of bare peat in any location will exceed a bogs ability to replace it. Stephen estimates that once the restored peatland on Camock Hill reverts to peat formation within the next 5 to 10 years around 70 tonnes of equivalent carbon dioxide will be laid down annually.

We were not able to see the restoration process described above, but Stephen kindly provided a number of photographs from another of his project sites to illustrate this. These were taken at Allt a'Mharcaidh, Inshriach Forest, Strathspey, where 4 hectares of bare peat had been spread with a sphagnum-rich mulch in December 2014. Results have been encouraging, with better results on the southern half of the site. New growth was achieved just 6 months after completion, as shown in the following photographs.



Inshriach Forest prior to September 2014



Inshriach Forest at completion in December 2014



Establishment 6 months after treatment



Detail of establishment showing capitular growth of sphagnum, particularly to the right

The importance of peatland is recognised in Scottish Planning Policy. The benefit of restoration to reduce greenhouse gas emissions is part of a wider strategy. Some methods are pioneering, but monitoring is demonstrating effectiveness and longer running projects have demonstrated considerable success. Peatland restoration has other benefits like flooding control, improving water quality and providing more opportunities for biodiversity.

Our visit was made just prior to the start of the United Nations Climate Change Conference in Paris. The UN Copenhagen Climate Change Conference in 2009 failed to agree targets to control the rise of global temperatures but, in the short time following, the pressing need to limit the damage from climate change had become undeniable. The success of the Paris Agreement is a great step forward and while it is not perfect and will not be without its difficulties, its aims can be achieved by hard work and determination. Progress in reducing emissions and undertaking appropriate steps will be monitored and reported. I have quoted or paraphrased outcomes from the Agreement of particular relevance to our interest.

Article 4

1. Signatories to the Agreement “aim to reach global peaking of greenhouse gas emissions as soon as possible”... “and to undertake rapid reductions thereafter in accordance with best available science, so as to achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century.”

2. Each country is to identify its contributions and maintain them towards the aim.

Article 5

1. Signatories are to “take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases” and to be set out as follows in the UN Framework Convention on Climate Change; to “Promote sustainable management, and promote and cooperate in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems.”

Article 13

7. (a) Signatories are to provide regularly “A national inventory report of anthropogenic emissions by sources and removals by sinks of greenhouse gases, prepared using good

practice methodologies accepted by the Intergovernmental Panel on Climate Change and agreed upon by the Conference of the Parties serving as the meeting of the Parties to the Paris Agreement.” The full Agreement can be downloaded [here](#) .

An unusually balmy December followed our visit and severe flooding in Yorkshire and Lancashire after Cumbria. Cumbria was hit again and there was also flooding in the Scottish Borders, Aberdeenshire and Tayside. I waited on publication of the statistics for December from the Met Office to finish this article. During this time I watched the level on the River Tay at Luncarty rise to the same level it had reached during the big floods in 1993; the river level remained high and then exceeded the 1993 level in January. Severe flood events in the UK are increasing in frequency and at least locally are more prolonged.

The provisional statistics from the Met Office issued on 5th January, 2016 confirm that last December broke records for rainfall and temperature. This was the wettest December (and for any calendar month) on record dating back to 1910, the start of digitised records. “The UK mean temperature for December is record breaking at 7.9 °C, which is 4.1 °C above the long-term average. The previous record was 6.9 °C in 1934. The temperatures for December 2015 were closer to those normally experienced during April or May. ”

2015 as a whole was unusually wet for Scotland, Wales and North West England; the second-wettest since 1910 for Scotland, only 2011 was wetter. “It has been the wettest December on record for Scotland (351 mm), and for Wales (359 mm) and the 2nd wettest for Northern Ireland with 221 mm, just behind 1919 which recorded 224 mm.”

The benefit of the Candacraig and other projects compared to recent weather events is striking. Peat bogs, forests and other forms of permanent vegetation lock up not only greenhouse gases but also considerable quantities of water which can be taken out of atmospheric circulation. Restoration of bogs towards their full holding capacity, the conservation and creation of wetlands and sustainable management of our forests and grasslands would contribute enormously to global water retention.

The UK is taking steps in the right direction to start reversing the degradation of our peatlands. SNH has several pages on its [website](#) with useful information and videos of peatland restoration demonstrating a range of different methods.

Andrew McBride provided the following for this article on these projects: “Through the Peatland Action Project we have been able to kickstart peatland restoration in Scotland. Through the use of simple and innovative techniques we are able to restore areas that we would not have otherwise been able to do. By locking up the Carbon in the peatland we are ensuring that peatlands are not making an undue contribution to climate change.”

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Alistair Godfrey, for the Tayside Biodiversity Partnership’s Farmland & Upland Working Group, 17.1.16.