Upland Hydrology Group

Peak District Field Meeting Report

23rd July 2014

Woodhead Moor, on the northern edge of Bleaklow around Stable Clough

This note summarises some of the issues raised and conclusions reached on an Upland Hydrology Group field visit hosted by Moors for the Future and colleagues from the University of Manchester.

The site

The site we visited was severely eroded and had been subjected to high levels of industrial pollution. Prior to restoration works the bare peat was disappearing at a rate of something like 25 mm per year. On Black Hill, about three miles from the site, photographic evidence shows that a metre's depth of peat disappeared between 1971 and 2006.

Over the last ten years Moors for the Future, in collaboration with shooting and grazing interests, have blocked gullies with stone dams and stabilised the bare peat by removing sheep, spreading heather brash, adding lime and fertiliser, and seeding with amenity grasses. This has not resulted in restoration of active blanket bog, but rather has created a new habitat

The impact of moorland stabilisation

Sediment

Establishing vegetation cover on sites like this leads very quickly to a dramatic (hundred-fold) decrease in the amount of sediment being washed off the hill. This has benefits in terms of downstream ecology and helps maintain reservoir capacity.

Colour in water

It has been demonstrated that that highest levels of dissolved organic carbon (DOC) are found in water running off bare peat, and lowest levels on water running off or through sphagnum. To date however no significant and enduring change in levels of DOC has been demonstrated at Woodhead Moor. A long data run will be needed to show such a change because of seasonal and annual variations in levels of DOC and because of other effects such as a short-lived reduction in DOC following lime application. Water companies are principally interested in the frequency of DOC 'spikes' which exceed the capacity of water treatment works. To demonstrate a reduction in these spikes will need an even longer data run.

United Utilities' SCaMP programme has been able to demonstrate a small but statistically significant reduction in DOC eight years after restoration works. The equivocal and marginal impact of moorland stabilisation on water colour / DOC levels means that it may be difficult to justify the expense of catchment land management works on this basis alone.

Flood risk

Blocking gullies and re-establishing vegetation dramatically (and quickly – within a year or two) changes the hydrological regime in two ways: the new vegetation cover increases the roughness of the surface, and the dams creates more temporary water storage (although this increase in storage will have no impact if storm events occur when the catchment is already waterlogged).

Monitoring here and elsewhere has shown that in a small sub-catchment of 1-2ha the storm runoff lag time is increased by 20 mins (i.e. doubled) and the peak runoff volume is decreased by 30%. Modelling suggests that when these impacts are scaled up to a 10km^2 catchment storm peaks would be reduced by 8%.

The picture in terms of larger scale flood risk impact is still unclear. The way run-off from different sub-catchments is synchronised could either increase or decrease any flood risk benefit, and this will be influenced not only by catchment geography but also by the duration and nature of any particular storm event.

What happens next?

The amenity grasses which have been used to help stabilise the peat die off as the lime and fertiliser are washed away. Vegetation succession then results in the establishment of a range of moorland species including mosses, sedges, cotton grass and heather. All the interests represented on the field visit agreed that stabilisation of degraded sites is a no-regrets option. As the site's head game-keeper said: "The previous 'peat desert' was of no value to anyone".

How the site is managed following peat stabilisation depends on the benefits we want the site to deliver and on a number of external constraints. The benefits sought by different interests include biodiversity, carbon storage and sequestration, water quality and flood risk management, agriculture and shooting. In any event some form of land management will be required: leaving sites like this to develop 'naturally' would create problems and benefit no-one.

Constraints

- If the re-established vegetation is allowed to grow unchecked an increasing fuel load is created, resulting in greater risk of wildfire.
- Areas stabilised some years ago could now support grazing by sheep in the summer months. Adjacent areas (more recently stabilised) would however be damaged by grazing, and fencing would be both unsightly and expensive to install. Re-introduction of sheep would not be straightforward in any event as the hefted flocks which used to graze these moors were removed and dispersed some years ago.

Management to meet legal and regulatory requirements

- Given its status as an SSSI and Special Area of Conservation, there is a requirement to restore this site as an active blanket bog in favourable condition.
- This site has been designated as a Water Safeguard Zone in response to high colour levels in the water arriving at the Arnfield Water Treatment Works. There is a requirement therefore to protect drinking water supplies by reducing DOC levels.

- To comply with the Water Framework Directive water bodies downstream need to achieve good ecological status. Note however that high levels of DOC / colour in water may be 'natural' at a site like this, as this may well be symptomatic of a healthy river. WFD ambitions may therefore conflict with Water Safeguard Zone requirements.

Balancing the different options

One focus for our discussions during the field visit was the desirability of re-establishing sphagnum, which requires wet moorland with relatively high water tables. This will lead to further peat development, lower fire risk, better results for water quality and colour, and increased surface roughness to slow down peak flows. All parties agreed that wet moorlands would be a desirable outcome here: heather can grow through sphagnum and the moor can then support both sheep and grouse. Complete heather cover would be undesirable as this prevents sphagnum establishment or survival - sphagnum needs bare peat, moisture and light to grow. Grouse managers would like to see 50% heather cover, but more heather than this does not result in higher grouse numbers.

Long term management to maintain a balance between heather and sphagnum

Heather growth can be managed by burning, cutting, grazing or a mix of all three, but controlled burning of moorland has been the topic of much controversy amongst UHG members. The Heather and Grass Burning Code[1] (2007) suggests that there should be a

> "Strong presumption against burning … peat bog and wet heathland'[2]

and more recently the Natural England Uplands Evidence Review[3] concluded that burning has a negative impact on biodiversity (bog species), carbon storage and water quality.

These anti-burning sentiments may not be the end of the story. We heard about a recent study tour by members of the "Best Practice Burning Group"[4] which visited a range of peatlands across England. While the situation remains complex, and each site needs to be assessed in some detail before management measures can be selected, the group on the tour concluded that a balance of sphagnum and heather would meet a range of needs in many situations. And on some sites one of the best way to maintain this balance might be through burning.

Gully management

The deep gullies which are widespread across the Peak District and South Pennine moors began appearing 200 years ago principally as a result of aerial pollution. Gullying of this sort results in lower water tables in adjacent moorland.

Installing leaky stone dams in gullies is the most effective way of trapping sediment, while plastic dams are best for retaining water. Moors for the Future do not re-profile gullies, a technique used in other areas where moorland is being restored by blocking man-made grips. We saw the way vegetation is successfully growing on all but the steepest gully edges and discussed the option of raising dam levels by importing more stone once sediment has reached the top of the first dams and has stabilised. This would then further raise the water table in moorland adjacent to the gullies.

[1] http://www.naturalengland.org.uk/Images/heathergrassburningcode_tcm6-7795.pdf

[2] There has been much debate about the exact phrasing used in this part of the Code. Some argue that this section applies only to wet blanket bog or heath, i.e. areas that are wet on the surface year-round rather than all blanket bog/deep peat.

[3] The effects of managed burning on upland peatland biodiversity, carbon and water (NEER004) (May 2013) http://publications.naturalengland.org.uk/publication/5978072

[4] The Best Practice Burning Group is the stakeholder consultative body for the Heather and Grass Burning Code, Natural England's tier two guidance from the Upland Evidence Review, etc.

Clough woodland creation

Another management option which Moors for the Future and The National Trust are working on is planting mixed, native woodland in and around cloughs on the hillslopes below the blanket bog.

The National Trust have been awarded funds through the Woodland Grant Scheme will be used to fund planting of 450ha of clough woodland in sites across the High Peak Estate. WGS conditions require a minimum of 1,100 trees per ha, but up to 40% of each site can be left open to avoid damaging flushes, archaeological interests and particular species. Only the lower half of each clough will be planted in order to avoid areas of deeper peat and minimise visual impact.

Clough planting has its critics, especially amongst the farming community. The full range of impacts need to be monitored over coming years, including changes in predator populations, the effect on other wildlife and possible impact on adjacent bog habitats, as well as the implications for water quality and runoff.

Conclusions

Two key messages from the day:

- Long term planning and consistency in management is required if the peat on this sort of site is to be stabilised. Once a site has been stabilised a new management regime is then required. Land management incentives and payment schemes need to support a long term approach or there is risk that time and resources will be wasted.
- More evidence is needed to demonstrate the benefits and effectiveness of different management techniques. Without hard science and the support of different interests it will be impossible to secure the investment needed to deliver environmental and economic benefits.