Blanket peatland restoration leads to reduced storm runoff from headwater systems

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Making Space for Water

Recently, there has been considerable interest in the extent to which blanket peat restoration in headwater systems can help regulate flood flows to downstream areas.

Landscape-scale restoration through the re-vegetation of bare peat and the blocking of erosion gullies is becoming increasingly extensive in the Peak District and other areas of upland Britain.

These practices have the potential to significantly alter hydrological functioning of degraded blanket peat through changes in catchment storage and storm flow runoff generation processes. However, there has been almost no research on stream flow responses in restored erosion impacted systems.

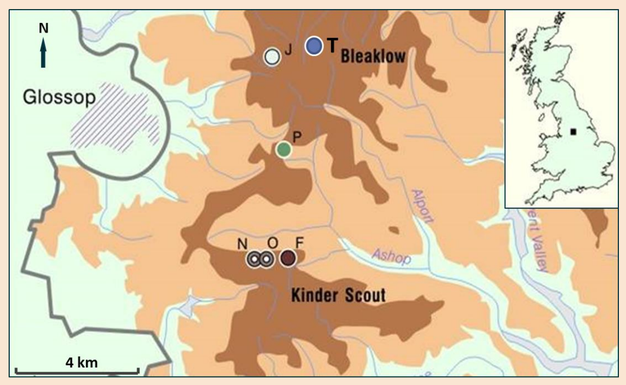
Making Space for Water (MS4W) is one of three projects that were provided with DEFRA grant funding in 2009 under the Multi-Objective Flood Management Demonstration Scheme. It is a major five-year experiment designed to evaluate the hydrological changes associated with peatland restoration by re-vegetation and gully blocking.

The main experiment takes the form of a before-after-control-impact (BACI) study of degraded peatland micro-catchments on Kinder Scout, Peak District National Park (UK), using recently re-vegetated (2011) (O), and re-vegetated (2011) and gully-blocked (2011/12) (N) micro-catchments, compared to an untreated bare control (F).

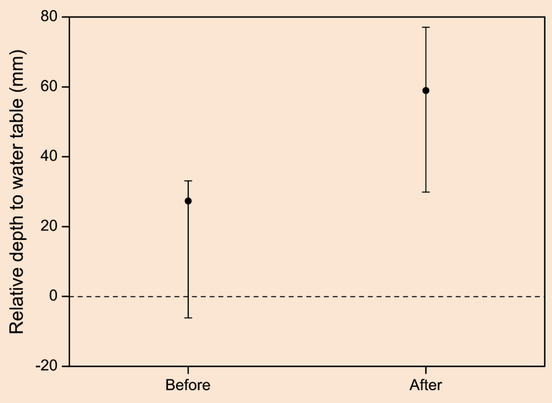
This is supplemented by data from additional reference sites which are used for 'space for time' comparisons: intact blanket peat (P), 'late-stage' (2003) re-vegetation (J), and further bare peat and restored sites on the Bleaklow Plateau (T).

This poster presents some of the key results from the project.

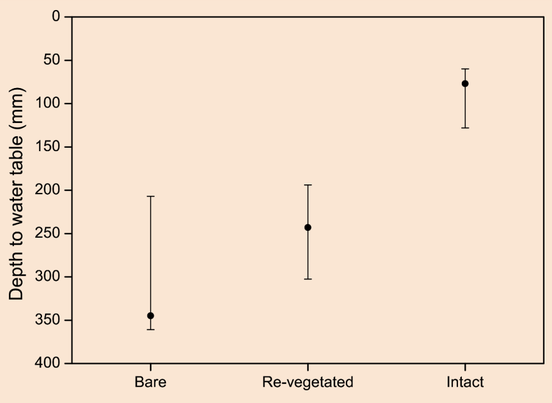
Tim Allott will also be discussing some of our findings in the *Peatland Science: The Benefits of Peatland Restoration* session in the Village Hall at 11.45 on Friday.



Water Tables

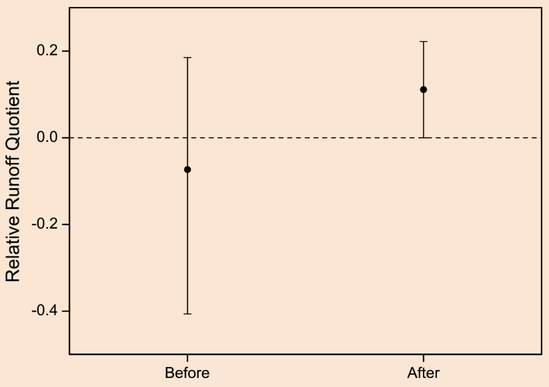


Three years after re-vegetation on Kinder, **water tables had risen** 35 mm relative to the bare control.

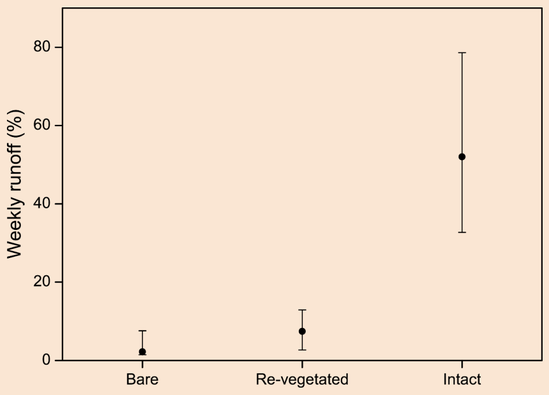


Eight years post-restoration on Bleaklow, water tables were 102 mm closer to the surface at a re-vegetated site compared to the bare site.

Overland Flow Production



Three years after re-vegetation on Kinder, **overland flow production increased** by 18% on interfluve surfaces, relative to the bare control.



Seven years post-restoration on Bleaklow, a re-vegetated site was producing double the overland flow of the bare site, but this is still low compared to the intact site.

Key Findings

Catchments become wetter following re-vegetation; water tables are raised and overland flow increases.

However, this does not affect within storm storage (no change in percentage runoff).

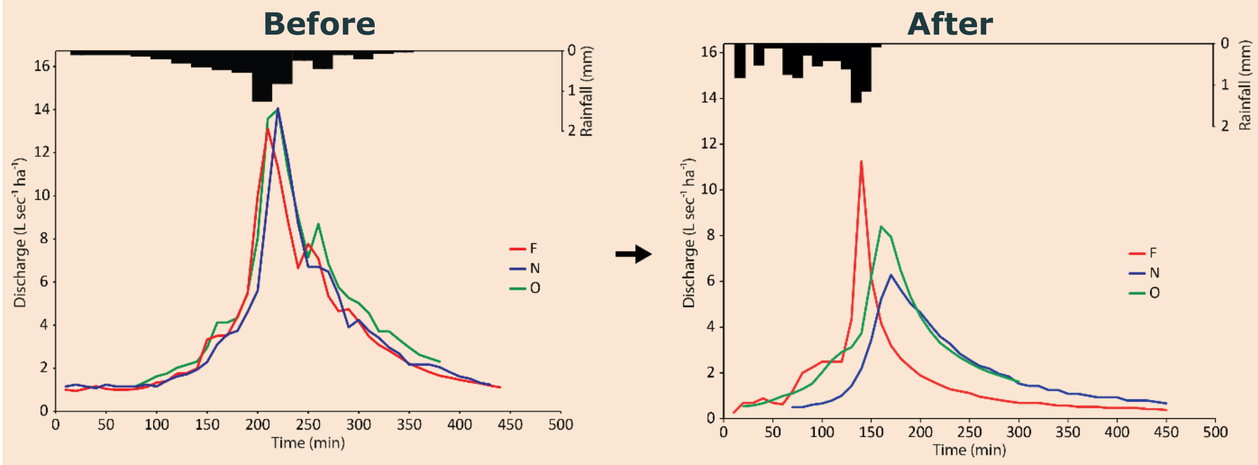
Restoration by gully blocking and re-vegetation reduce peak discharge by 37%, and increase lag times by 267%.

Re-vegetation alone can reduce peak discharge by up to 8% and increase lag times by 67%.

This is consistent with **re-vegetation and gully blocking increasing surface roughness**, reducing the speed of overland flow and within channel stormflow.

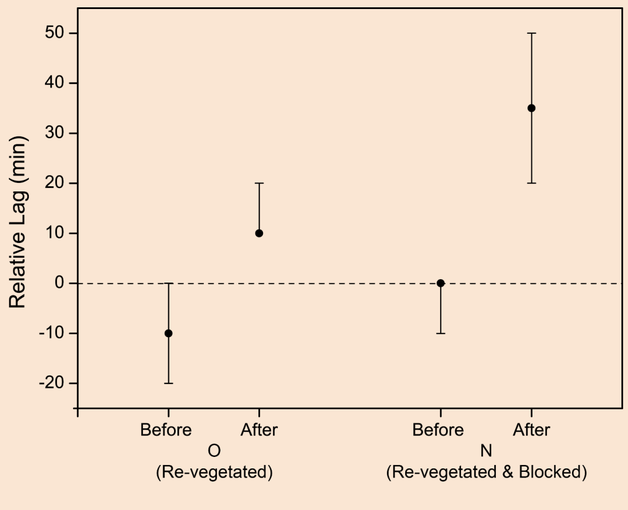
Peat restoration by re-vegetation and gully blocking has benefits for downstream flood risk reduction by 'slowing the flow' of water in peatland headwater catchments.

Storm-flow characteristics



Hydrographs produced in bare peat catchments are flashy, characterised by short lag times and high peak discharges.

Following restoration, lag times increased and peak discharges were reduced.

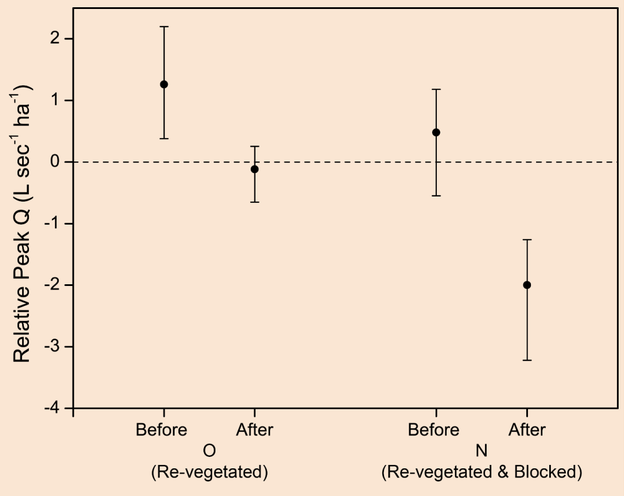


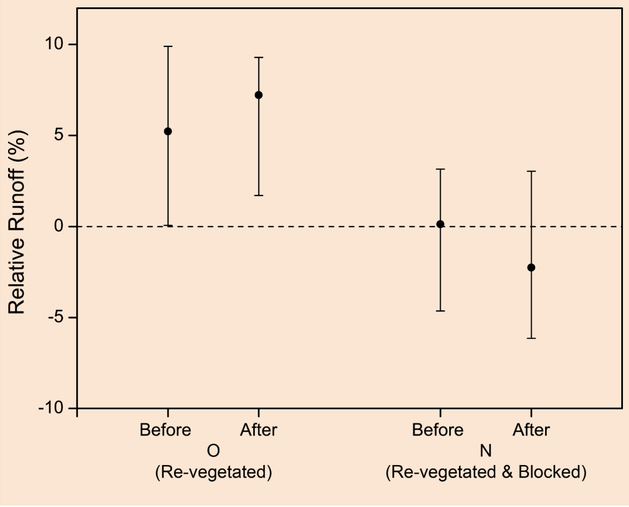
Three years after re-vegetation, **lag times increased** by 67% relative to the bare control.

With additional gully blocking, lag times increased by 267% relative to the bare control.

Three years after re-vegetation, **peak storm discharge decreased** by 8% relative to the bare control.

With additional gully blocking, peak storm discharge decreased by 37% relative to the bare control.





Three years after restoration, there was **no significant change in percentage runoff** (i.e. the proportion of rainfall that becomes stormflow) at either of the treatment sites.