

Photo: Janina Holubecki

Making Space for Water has shown that the benefits of moorland restoration come not from the ability of peatlands to store water, in fact high water tables mean the potential for storage is low, but from the slower flow of water over vegetated surfaces. This reduces the rate of transfer of water downstream and significantly reduces flood peaks.

– Professor Martin Evans

Making Space for Water

Taming the flood through moorland regeneration

The challenge

Moorland areas, such as those in the **Peak District**, have high **water tables** and cannot store a lot of extra water when it rains. Over the last thousand years, these areas have been eroded by human activity and climate changes. The erosion has caused extensive gully systems to form on the moorlands, which increase the connectivity of rainwater pathways. Runoff from rainfall events can then rapidly travel downstream. During a storm or prolonged period of rainfall, the presence of gullies increases the likelihood of flooding downstream, potentially causing considerable damage and economic hardship in the affected communities.

Our research

The Upper Derwent **catchment** within the Peak District National Park is a moorland landscape that has been subject to erosion. As a result, it produces typically sudden, dramatic increases in the amount of water flowing off the landscape during storms, which can lead to '**flash flooding**' downstream. Over recent decades, the restoration of this moorland landscape has become a conservation priority. **Moorland restoration** has the potential to reduce the chance of flooding by changing the manner in which rainwater is released downstream, thus reducing its impact on areas at risk of flooding.

Since 2010 The University of Manchester has been involved in the £1 million 'Making Space for Water' project funded by Defra. This has involved an intensive monitoring campaign – designed to find out if the revegetation of bare moorland, together with the damming of gullies, can modify stream flow responses to large amounts of rainfall.

Flood management via moorland restoration is an alternative to downstream '**hard engineering**' measures such as levees, which alter the natural state of the landscape. By using moorland restoration, the Moors for the Future Partnership, in collaboration with the Environment Agency, have tackled the problem of flooding at its source, using natural resources wherever possible.

The programme tested the hypothesis that moorland restoration would alter the way in which rainwater flows off the landscape. The team carried out an intensive investigation at key research catchments to look at the links between restoration and runoff production, the amount of runoff produced, and the timing of its delivery.



Photo: Emma Shuttleworth

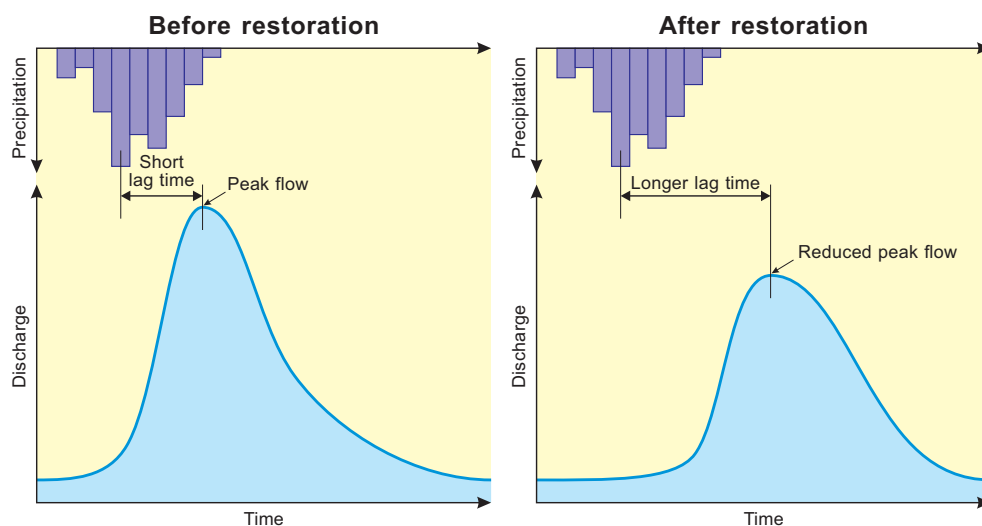
**By making the most of
our natural resources,
we can address the
issue of flooding
at its source.**

– Dr Emma Shuttleworth

Current findings

Making Space for Water has shown that moorland restoration can have a substantial impact on the flow of water during storms. In transforming the moorland from bare **peat** to a vegetated surface (thereby increasing the **surface roughness**) restoration has slowed the flow of water entering streams. On restored moorland, this has resulted in a 35% reduction in peak stream flow during storms and a 28 minute increase in the time between the points of maximum rainfall and maximum stream flow ('hydrological lag time'). This can be observed on the theoretical diagram below.

By slowing the flow of water through the landscape, restoration delays the release of water from catchments during storms – thereby alleviating the chance of flooding downstream. Ongoing modelling work will attempt to relate these results to larger catchment areas, for the future application of restoration techniques.



Key people/Project partners

Members of the Upland Environments Research Unit (UpERU) at the University of Manchester (Professor Tim Allott, Professor Martin Evans, Professor Clive Agnew and Dr Emma Shuttleworth) directed the monitoring campaign, and worked in collaboration with colleagues from Durham University, the Moors for the Future Partnership, the Peak District National Park Authority, the National Trust, Natural England, the Environment Agency, and Defra.

Further information

<http://www.moorsforthefuture.org.uk/making-space-water-2>

<http://www.seed.manchester.ac.uk/subjects/geography/research/research-groups/eprg/our-research/spotlights/making-space-for-water/>