

The Restoration Game

How landscape restoration reduces flooding, improves water quality and combats climate change

Professor Richard Brazier

Key findings and recommendations:

- Flagship landscape restoration programme in Devon has increased water retention by a third.
- Restored grasslands can store five times more water and twice the amount of carbon as intensively managed grasslands.
- South West projects are templates for a coordinated national landscape restoration programme to reduce flooding and improve water quality.
- Policymakers have opportunity to put weight behind a new, holistic land management strategy that will ultimately cut expenditure.
- Temporary annual water rate rises – of pence not pounds – can fund restoration projects and lead to lower bills in the long run.
- We must incentivise farmers to change their behaviour with financial rewards for increasing the capacity of their land to store water and carbon, and improving water quality and biodiversity.
- Rule changes on crop cultivation on steep slopes and in areas liable to flooding and soil erosion urgently needed.
- Correct land management negates the need for dredging in the medium to long term.

Innovative landscape restoration programmes in South West England are succeeding in increasing water storage capacity to minimise flood risk, improving water quality to meet strict EU directives and increasing carbon retention in soils to cut emissions, new studies show.

Natural Environment Research Council-funded research by the University of Exeter, in partnership with government, the water industry and environmental organisations, has provided policymakers with a blueprint for a coordinated national landscape restoration programme.

Preliminary trials on Exmoor led by Professor Richard Brazier has shown that restoration of peat bogs has allowed the moorland to store a third more rainfall, significantly reducing the amount of water that enters the River Exe, which acts as a crucial buffer against downstream flooding. This higher water storage capacity also mitigates the worst effects of drought in extreme dry periods.

The Mires-on-the Moors project is reversing a flawed policy stretching back to the 19th and 20th centuries that ordered the digging of drainage ditches to increase agricultural productivity. The strategy only served to increase water flows downstream and damage water quality.

South West Water is funding the £2.2m work to restore 2,000 hectares of peat bog on Exmoor between 2010 and 2015 with support from the Environment Agency, Exmoor National Park Authority and Natural England.

As stipulated by Ofwat, the University of Exeter is four years into evaluating the success of the scheme. Professor Brazier's team are monitoring water levels, water quality and carbon storage at two experimental sites on Exmoor.

The team has installed monitoring equipment, which relays data from 200 sites every 15 minutes to record changes in water table levels. And they are tracking improvements in water quality and greenhouse gas releases from the peat.

Data has revealed significant improvements in water quality. The highest concentrations of dissolved organic carbon, which contributes to water discolouration, have been reduced by up to 50 per cent, which both cuts the cost of water treatment and increases the moorland's carbon retention.

A separate project, in conjunction with Devon Wildlife Trust and the EA, has

In the news

The BBC featured Professor Brazier's research in a television news piece on how Exmoor peat bogs are being restored to their natural state to help soak up water and prevent it running off into rivers and causing flooding further downstream. View the clip [here](#) or read the online news piece [here](#).

demonstrated the value in restoring lowland, unimproved grasslands known as Culm grasslands, or Rhôs pastures. In the 1950s these grasslands covered 40,000 ha of Devon and Cornwall but only 10 per cent remain.

These forgotten parcels of land support one of the ten most endangered species in the EU (a butterfly, The Marsh Brown Fritillary), can hold significant amounts of water, yield high water quality and store significant stock of soil carbon.

Under the Working Wetlands project, Professor Brazier's team has monitored six sites across the grasslands to quantify how they respond to rainfall when compared to neighbouring, intensively managed grasslands.

Early results show that Culm grasslands can store up to five times as much water as intensively managed grasslands, attenuating downstream flooding, and twice the amount of soil carbon. Water quality was vastly improved, suggesting that Culm sites can act as natural filters

to provide clean water downstream.

The project has demonstrated multiple hidden benefits of not farming the land as intensively, some of which could provide landowners with an income to offset any income foregone by a reduction in farming intensity.

Comments and implications

Professor Richard Brazier said: "Our approach is to advocate the construction of more resilient landscapes, which are better able to withstand climatic extremes - both floods and droughts - and deliver a wide range of environmental benefits to society.

"We need a new, holistic strategy for land management across the UK that does not fall into the trap of only improving resilience in one area to the detriment of all others. It is single-issue decision-making – for example a focus on increasing food production post-WWII – that has landed us with a legacy of damage to the landscape that we are now paying for.

"It would be a mistake therefore to embark on an expensive and environmentally damaging annual dredging programme in response to the recent floods. Dredging is a palliative treatment, which fails to tackle the problem of soil erosion at source.

"What our research has shown is that landscape restoration, if properly monitored, can be deployed to mitigate a range of environmental problems,

including flooding, soil erosion, diffuse water pollution and loss of carbon from the landscape.

“We propose a coordinated national programme of landscape restoration, which uses the South West projects as templates and builds the necessary local partnerships around them to deliver more resilient landscapes.

“In order to unite all the relevant parties and stakeholders, science is absolutely crucial to evaluate the effectiveness of landscape restoration and to avoid wasting potentially millions of taxpayers’ money on doing the wrong thing, as has happened in the past.”

The cost of landscape restoration programmes could be funded by minimal, temporary water rate rises, which would result in lower bills in the long run, Professor Brazier argues. South West Water secured permission from Ofwat to add a 50p levy per household per year to deliver its five-year, £4.5m Upstream Thinking initiative, of which the Mires-on-the-Moors project is a part.

Professor Brazier believes farmers should be incentivised to change their behaviour and recognise the impact downstream of leaving vulnerable soils bare, which increases soil and water runoff.

He said: “Farmers often ignore government rules on soil management. Single-farm payments to farmers could reward water storage, water quality and carbon storage as well as biodiversity. In fact income to farmers storing more carbon in their soils will soon be

At Westminster

Exeter MP Ben Bradshaw cited Professor Brazier’s research in a recent parliamentary debate at Westminster Hall on the impact of flooding in South West England. He called on the Select Committee on Environment, Food and Rural Affairs to invite Professor Brazier to give evidence to the Committee for its report on the lessons that could be learned from the extreme weather events. The Hansard report is available [here](#).

available when the Carbon Code, supported by the IUCN UK Peatland Programme, is rolled out as part of efforts to promote peatland restoration across the country.

“We also need stricter regulation on cultivation of maize, kale and winter cereal crops on steep slopes and those areas identified as major sources of flooding and soil erosion. For this to work, diversifying farmers’ incomes is key.

“The need for landscape restoration is clear. Flooding will always happen in areas such as the Somerset Levels but the scale of such floods can be made manageable by the way in which we treat the soil and farm the land.

“There need not be significant loss of income to farmers, or loss of productivity to UK PLC. If holistic approaches to restoring landscapes are taken, it will become the norm that some landowners produce food more intensively where it is environmentally appropriate, while others produce less food and more environmental benefits – and receive equal financial reward for these more diverse services to society.”

Professor Richard Brazier

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