PROTECT-NFM

Optimising Natural Flood Management in Headwater Catchments to Protect Downstream Communities

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Partners

Moors for the Future Partnership
Environment Agency
CH2M
IUCN
National Trust
NRW
Risk Management Solutions
SEPA
United Utilities

What is NFM?

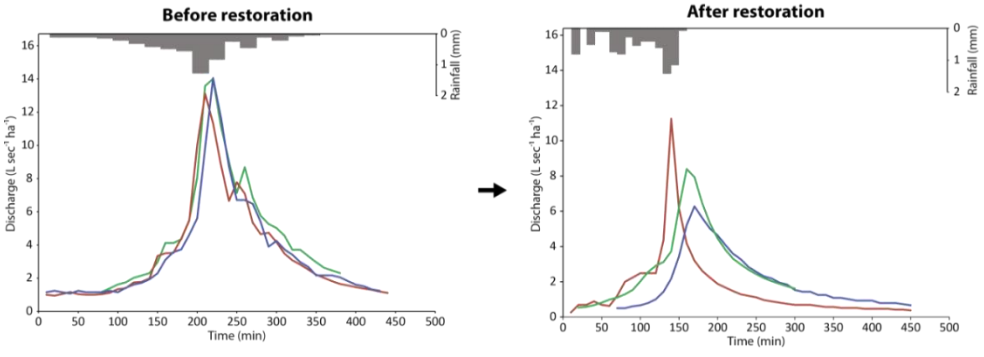
Natural Flood Management (NFM) seeks to restore catchment and river processes that have been adversely affected by human intervention. NFM can help **reduce the frequency and severity of flooding**, as well as delivering other environmental, social and economic benefits like carbon sequestration, improved water quality, increased biodiversity and climate adaptation. It has the potential to provide **environmentally sensitive** ways to reduce flood risk and protect areas where hard flood defences are not feasible.

The science

Land use change interventions through upland restoration works has the potential to reduce flood risk in downstream communities by slowing water movements in the landscape and reducing the volume of storm discharge at peak flow. Restoration measures such as bare peat re-vegetation and gully blocking roughens the ground's surface, which **slows the flow of water** across the hillslope. Findings from our previous and ongoing work have demonstrated that these measures significantly delays and reduces the magnitude of flood peaks during rain storms in headwater catchments and can reduce flood risk downstream.

Sphagnum planting on revegetated, previously bare site

Stone gully blocks



Demonstrating NFM Impacts

The effects of NFM are well understood in principle, but demonstrating NFM impacts in large catchments has been difficult due to a wide range of other factors which can influence flow, such as variations in rainfall and land-use. Smaller headwater catchments are more easily characterised and instrumented, and therefore offer a **unique opportunity** to generate long-term observational data for upscaling to larger catchments through computer-simulation of catchment parameters and well-understood hydrological models. Our recent work demonstrates that numerical simulations of observation data through rigorous calibration of model parameters can be effective in identifying the underlying processes driving hydrological response-to-intervention types in catchments.

Adding value through partnerships

This project team are working with partners **Moors for the Future Partnership** and **Greater Manchester, Merseyside and Cheshire Environment Agency** who have funded existing NFM work in the southern Pennines to undertake a series of field experiments. These experiments will assess the potential impact of various forms of **gully blocking**, **restoration of *Sphagnum* cover** on moorlands, and establishment of upland **woodlands** on hillslope runoff production and channel flow. The data will then be used to develop user-friendly, open-source **computer simulations** to optimise combinations of interventions, which will be shared with practitioners.

We are working with our project partners (Environment Agency, Natural Resources Wales, Scottish Environmental Protection Agency, International Union the Conservation for Nature) to investigate how the project's findings can be **applied to elsewhere in the UK**.

The team will work with its range of project partners across England, Wales and Scotland including regulators, land managers and industry to **develop guidelines** to optimise future implementation of NFM measures in headwater catchments across upland Britain.

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