PROTECT NFM Newsletter

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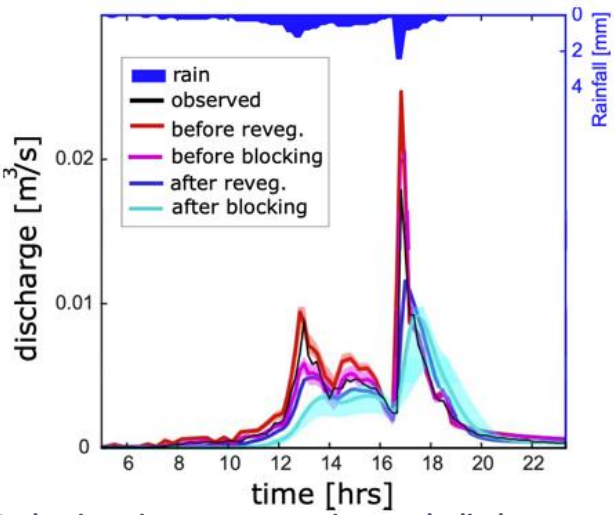
An incredibly dry March has been succeeded by a very wet April so a year on from the interventions on the Stalybridge site we are collecting good data on the NFM behaviour of peat and stone dams. We are also making excellent progress on modelling and data analysis as reported in this newsletter. On Kinder Scout the growth of the sphagnum planted into our experimental catchment continues apace with over 50% cover in flowlines. It is really very impressive and continues to slow the flow from the catchments as reported in our recent poster at the COP Climate Expo conference. The project has been extended to the end of July 2022 to take account of Covid impacts so fieldwork will continue into Autumn 2021. We have some campaign work planned for this summer but our focus will gradually shift to data analysis over the coming months.

NEW PAPER SHOWING NFM BENEFITS OF PEAT RESTORATION

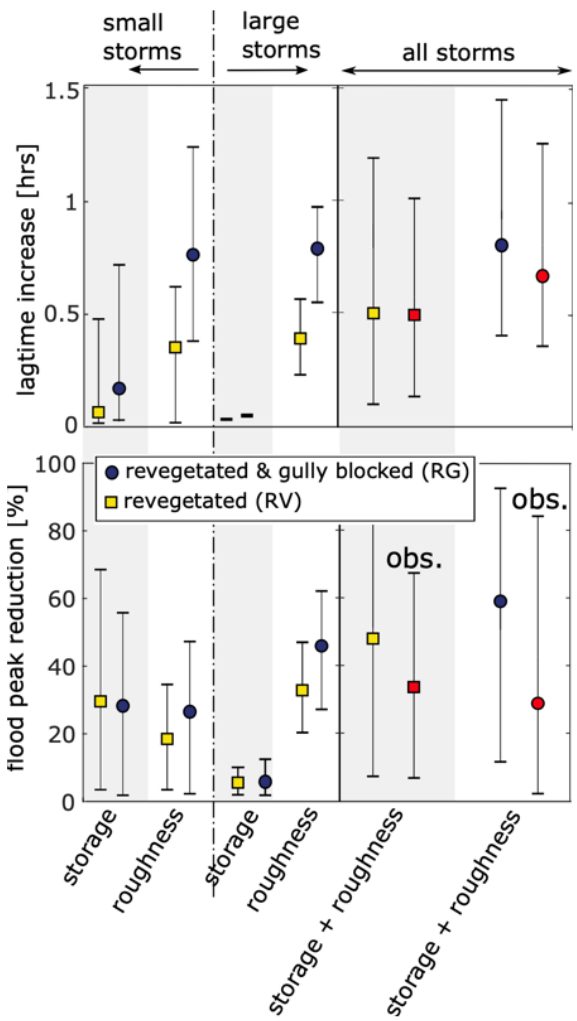
We have a new journal article in Water Resources Research based on the work of the modelling team. The paper, led by Salim Goudarzi, further highlights the NFM benefits of blanket peat restoration.

The journal article, Blanket-peat restoration: numerical study of the underlying processes delivering Natural Flood Management benefits, discusses the findings of a rigorously calibrated numerical rainfall-runoff model (TOPMODEL). We have used data from the Before-After-Control-Intervention (BACI) experiment detailed in one of our previous papers to reproduce and identify the underlying processes delivering observed NFM benefits under different blanket peat restoration interventions (revegetation and gully blocking). We show that in both scenarios, increased lag times and reduced flood peaks following restoration are almost entirely due to surface roughness attenuating the speed of the floodwave by thickening overland flow. This was conceptualised as 'kinematic storage' and both intervention scenarios had comparable significance in increasing this storage.

The paper is open access so is free to read online and download.



Reductions in post-restoration peak discharge and increases in lag time reproduced by the calibrated TOPMODEL



Relative importance of storage and roughness parameters in driving the post-restoration catchment response in TOPMODEL

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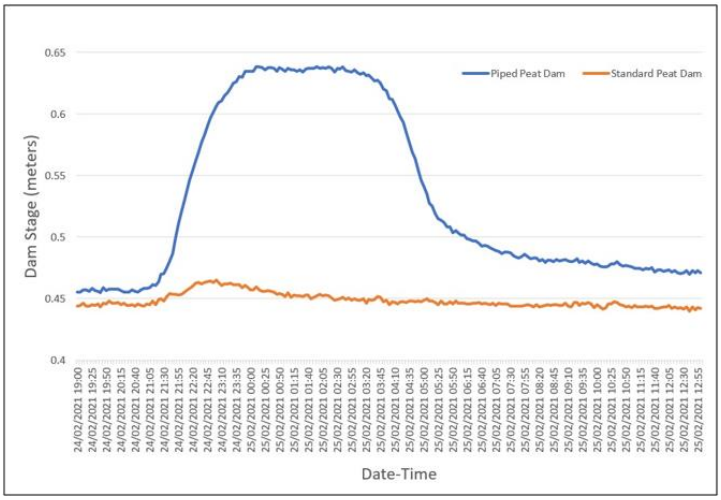
WOODLAND PLANTING AND PERMEAMETRY WORK

Our woodland sites represent different stages of tree growth (mature, mid-aged and young). Each site is paired with an adjacent control site to establish baseline conditions. Monitoring of water table depth at all sites is ongoing using automatic loggers and ad-hoc manual measurements. The University of Leeds team are currently taking cores to assess soil permeability in their labs. Similar measurements and cores have been taken from six gullies at some of our peatland sites, at different depths and distances from the gully edge. We are awaiting results from the analysis and will report back with our preliminary findings soon.

IN THE PIPELINE: COMPARING THE EFFECTIVENESS OF PEAT DAMS

At our Stalybridge site, experimental catchments E and F sit next to each other. In March 2020, 6 standard peat dams were installed in the main gully of catchment F, and 10 piped-peat dams were installed up the main gully in catchment E. This February we began to monitor the stage of the pools that have built up behind some of these dams, in the bottom, middle, top of each reach. This will help us to understand how these different interventions function during storm events. The graph below shows the first storm to pass through after we began monitoring. It shows how much more variable the storage behind the piped-peat dams is (blue line), filling up by 18cm, compared to 2cm in the standard peat dams (orange line) – much as we would expect it to! Our next steps will be to investigate the effect of this dynamic storage on the downstream discharge.

Piped peat dam at catchment E



Piped peat dam (blue) and standard peat dam (orange) stage change during a storm

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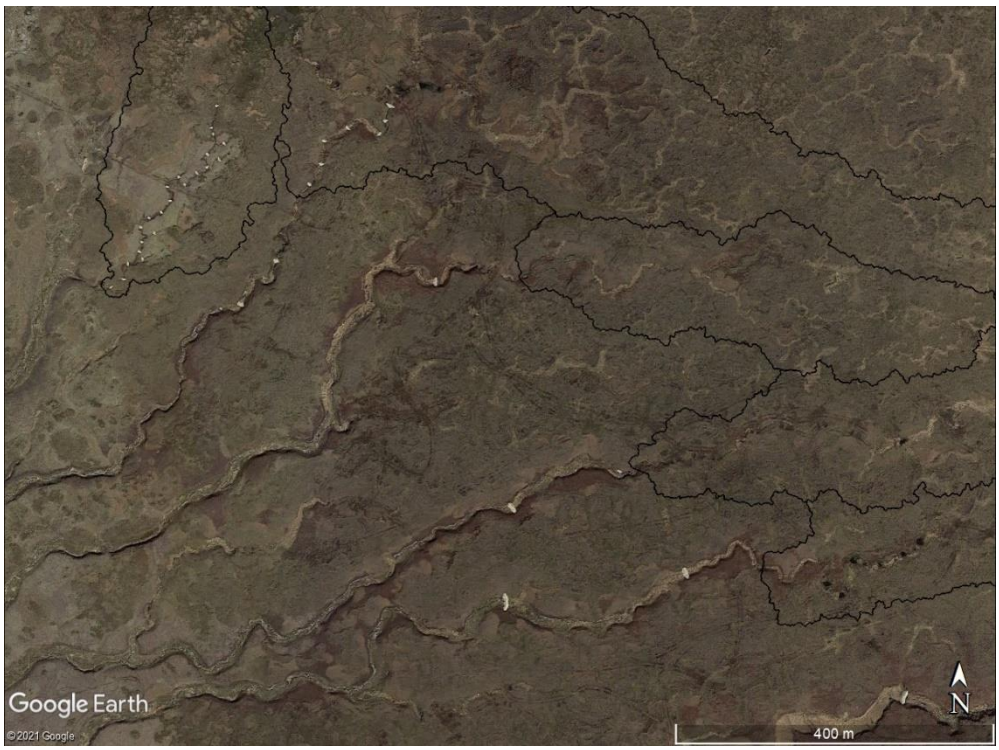
NFM FROM SPACE



Google seem to time their image acquisitions to perfection when it comes to Stalybridge Moor. In 2018 they captured the wildfire burn scar immediately after it had (mostly) been put out, and now we can see that just days following the installation of NFM interventions, a satellite captured another view of the moors. The result? Hundreds of NFM interventions are visible on Google maps imagery! Stone dams can be seen as white specks in gully systems (top left) and peat dams can be identified by the dark pools that build up behind them (bottom right). Click here and zoom in to see what you can spot on Google Maps.

MALENA JOINS THE TEAM

In early May, we welcomed Malena Duroux to the Manchester team. Melena is a first year Manchester undergraduate who has been supported to work on the project as an intern. She's helping with data handling and analysis, and if/when Covid-19 regulation permits, she'll play a role in the delivery of our public engagement programme. Malena has an interest in atmospheric physics in relation to global warming and the application of science in mitigating the impacts of climate change on rural communities.

CONFERENCE ACTIVITY

CLIMATE EXPO 17-21 MAY 2021
A FUSION OF SCIENCE AND POLICY
ADVANCING A RESILIENT, ZERO-CARBON WORLD

Martin Evans gave a virtual poster presentation on 'Natural flood management benefits of landscape scale peatland restoration' in the *Nature-based Solution* session at the COP26 Universities Network Climate ExpO. This was a great opportunity to share some of the key findings from the project with a wider audience. You can still register free of charge to view the poster and see Martin's presentation here.