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GLENSAUGH
Climate-Positive Farming Initiative

Achieving Multi-Purpose Nature-Based Solutions
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Natural Flood Management in the Uplands

Employing 'leaky barriers' and riparian tree planting to achieve multiple benefits

A ‘leaky’ solution to flooding?

Flooding often originates in uplands, where rainfall in a catchment is heaviest and most prolonged, and under climate change, flooding is likely to become more acute. The uplands are therefore key areas for tackling flooding. Natural Flood Management (NFM) can complement traditional engineering approaches and can potentially offer many benefits in terms of cost, reduced visual impact, water quality and habitat creation.

NFM works with natural features in landscapes to slow and store floodwater. One approach is using wood to partially block streams, mimicking natural wood accumulations. These ‘leaky barriers’ temporarily store water and then leak it away quickly to provide storage for the next flood.

However, there is uncertainty about how effective NFM, using features like leaky barriers, is in the uplands where potential floodplain storage is more limited. This motivated the design, placement, and monitoring of wooden leaky barriers in an experimental trial on the Cairn Burn, at Glensaugh.

How have we designed the leaky barriers?

A key design aspect was to site the seven leaky barriers where there were existing floodplain pockets. These pockets already store some water during flood events when water naturally spills out of the stream. With the barriers we wanted to: (1) more frequently spill stream water into these pockets and (2) increase the volume and duration of water storage.

To construct the barriers, we used locally sourced timbers that had fallen in storms at Glensaugh farm. Working with a local contractor, we placed the barriers carefully both across the stream and over in areas of the floodplain that naturally collect and channel water flow. By doing this, we hope to maximise the effects of the structures beyond just blocking the stream.

Another novel aspect of these barriers is that they are designed to work in combination with trees. A variety of native tree species have been planted along the stream margins and valley sides. It is hoped this will increase the roughness of the floodplain further slowing the flow and, when mature, providing material to naturally bolster the leaky barriers.

In future we intend to plant willow behind each leaky barrier. This will help to sustain the leaky barriers as ‘living barriers’ after the timbers rot away.

What are we monitoring and hoping to achieve?

We will use regular water level measurements to assess the performance of the leaky barriers. In particular, we will examine how the barriers reduce and slow down floods and the volumes stored for different events. We are also interested to see any changes in groundwater levels in response to the barriers, as this could improve low flows during droughts.

We are also monitoring changes in the floodplain and channel topography using drones and ground surveys as this helps to understand how leaky barriers can manage sediment and affect their performance for tackling flooding.

We hope the research will produce new and useful knowledge to help build better leaky barriers in future and act as a demonstration site for stakeholders.