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The Impact of a Network of Leaky Woody Dams on Flood Flows Using Observations and Modelling

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Calls to forest the uplands to mitigate floods in the UK, combined with EU directives for natural flood management, have raised interest in the impact of forests on flooding. However, the role of forests as a natural flood management technique remains highly controversial, owing to a distinct lack of robust evidence into its effectiveness in reducing the flood peak. Here we will show the opportunity to use existing or new forested areas which are combined with networks of woody debris dams. The dams also enhance the use of local floodplain areas in forested zones to attenuate flood floods.

Woody debris dams are essentially a form of Leaky that slows and stores flow during large events. Leaky dams are a runoff attenuation feature constructed from felled trees that are anchored to the floodplain perpendicular to the channel. The impacts of leaky dams are quantified through field monitoring and the development of a NFM modelling tool. The impacts of leaky dams are replicated in SHETRAN using flow resistance as a proxy, to assess the flood mitigation impact at the full catchment scale. Additionally, a NFM combination approach is simulated to assess the extent of forest cover and leaky dams required for optimum flood alleviation. A combination of 40% forest cover and leaky dams on 50% of the catchment's reaches (based on Strahler stream order) achieved an estimated reduction of 15% peak discharge.