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The potential efficacy of Nature-based solutions for flood mitigation in agricultural settings

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Nature-based Solutions (NbS) for flooding aim to reduce flood hazard and provide many wider environmental benefits. The focus is to enhance the retention capacity of aquifers, soil, and aquatic and water dependent ecosystems with a view to improving their status. They are multi-functional measures that can protect water resources and address water-related challenges. This is achieved by restoring or maintaining ecosystems as well as natural features and characteristics of water bodies using natural means and processes. Measures typically involves slowing or storing flood water to attenuate flood runoff with a catchment-based approach. It covers a spectrum of techniques from full-scale river restoration to smaller scale land management measures such as the strategic placement of large woody debris in channels.

Here we report on a field-scale experimental flood NbS located in Co. Wexford. We reconnected the channel to its floodplain by lowering the bank to an elevation 0f 50 cm above bank-full height. This would permit high flows to enter the floodplain and flow 200 m towards a second measure, a bund. The bund is a low (<80 cm) compacted, arcuate earthen structure located in the downstream corner of the pasture field. A 30 cm drainage pipe was installed halfway up the bund and was assumed to have a maximum flow rate of 250 l/s. This helps to temporarily store the overbank flow and slow its re-entry to the channel.

Water level instruments measured flow data over 3 years. Data indicates significant temporary storage and a reduction in peak flow downstream. These low-cost measures do not impact agricultural productivity. They are a potentially rapid, low-cos, adaptation measure that will attenuate catchment-scale runoff if installed in multiple riparian locations in catchment contributing areas.