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**Natural Flood Management ('NFM')** is a form of Nature-based Solution designed specifically to reduce flood hydrographs, and the risk that vulnerable floodplain properties are flooded. With this method of flood mitigation we use only natural materials (no steel or concrete) to emulate natural processes



*The critical question over recent years has been '**How well do these NFM features reduce river peakflow during major flood events (those events that flood places where people live and work)?** To answer this question we need to monitor how NFM features function during flood events. This needs to be combined with accurate stream discharge measurements on the streams where the monitored intervention is located.*

NFM measures are very varied, and include:

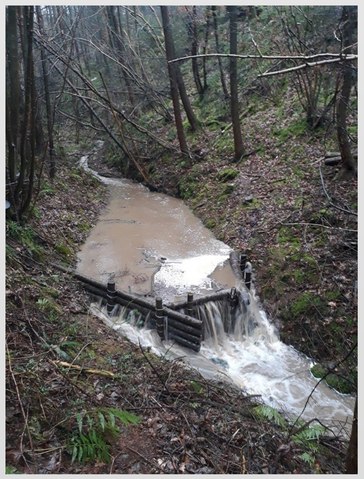
- Woodland planting to enhance wet-canopy evaporation (also called 'interception loss')
- Bunds and walls on hillslopes to capture large volumes of water but only in major floods (eg peatland dams top left)
- Measures to increase soil permeability in particular locations (including by regenerative agriculture, tree planting and hedges)
- Capturing flood water behind in-stream barriers (eg left) – ideally where it may be diverted into floodplain storage features for the duration of the flood event
- Enhancing the amount of water that floodplains can store during major events
- Routing water away from homes and businesses by introducing shallow valleys, sometimes called swales

**https://bit.ly/3Q9k1CI**

Scan the QR-code to see one of these monitoring stations in flood. The yellow device in the foreground is checking the structure's calibration

In addition to monitoring (eg at Lowther beaver pond No. 1 left) so that we might analyse the real behaviour of our introduced features, we also need to undertake numerical modelling of the small streams that enter our housing areas and the large rivers that can give downstream flooding. Such computer modelling is needed to evaluate the flood mitigation effects at much larger scales than our monitored trials.

*Nature-based Solutions such as NFM are a relatively new approach, so we have much to learn about their function and optimal design. Poor design or insufficient NFM deployment will mean that people are unprotected and worse still falsely think they do not need to protect their families with so called 'Property Level Protection'. So learning about NFM science is critical for life and livelihoods. One way to learn about NFM is to build a 'Physical Model' of a drainage area to learn how introduced features may work, or are ineffectual or are counterproductive.*



*Very often to get sufficient effect to help people – many interventions of the same type and multiple-types have to be introduced in the same locality*

**https://bit.ly/3hP7EfJ**

Scan the QR-code to see different types of hillslope storage feature combined with enhanced woodland planting being trialled to help reduce flood risk in one community in Kendal town, Cumbria. The video is a virtual flythrough from 3D drone mapping by Lancaster University

We need to be aware that some of the interventions we trial may have dis-benefits for people and/or the natural environment, even though they are nature-based. For example, if woody dams we introduce in headwater channels (eg left at Flimby, West Cumbria) were to collapse (a natural process!) to then block culverts – this could lead to flooding of our homes.

The LEGO® model that @FestivalBugs encourages you to interact with is such a Physical Model.

Using this model (noting all models are a gross simplification of reality!!) what do you understand about the way in-channel leaky dams work? How should they be designed? What are the risks? Is it a good idea for those properties to be located where they are? Would you build more properties in this area? Could differently designed properties cope better with flood waters?