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**Water**  
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# Policy Note

## Holding Water: Working with Nature to Ease Floods and Droughts

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Natural engineering works with the landscape to slow, store and filter river flows, benefitting communities and the ecosystem. It bridges multiple sets of expertise from science, engineering and social science, with knowledge from local communities. These practices could be taken up more widely in the UK and internationally to manage floods, droughts and pollution.



Off-line pond helps mitigate high flows storing water and sediment from run-off. Photo: Clare Benskin/EdenDTC

## Communities have important knowledge to share but we need more engineers who are interested in learning from the civil society

Rajendra Singh, founding member of the Flow Partnership and 2015 Stockholm Water Prize recipient

**All land owners and policy makers must recognise that problems of flooding and drought are due to the enhanced loss of water from the landscape.**

### Aims of natural flood management

- Targeting flows from torrential storm events that often lead to flooding or erosional events such as landslides.
- Work with natural processes such as the flow of water into ponds that slowly drain over time or planting of trees along a river prone to flooding to help reduce flow rates.
- Find ways that features in the landscape can be used to hold water and benefit the ecosystem, including wildlife.
- Natural engineering is an alternative not a replacement for 'hard' engineering techniques, and should be seen as complimentary.
- Engineers work directly with communities affected by flood, drought or water pollution.
- Rather than classifying it as a separate discipline natural engineering fits easily within traditional engineering approaches to flood management, and can be done via processes that already exist in local or national government.

### Management

Simple shifts in land management towards the retention of water within the landscape are fundamental to the future health of our catchments. Natural or nature-based solutions for flood reduction are catchment-based approaches that account for the wider environmental context and ecosystems they are part of.

### Balance

The engineering involved makes small changes in the landscape for flood reduction that also have ecological benefit. This creates an important ecological balance needed for flood, drought or pollution management.

### Collaboration

The features built by natural engineering are forms of infrastructure that must be maintained over time and that involve multiple collaborators. These include local authorities, government agencies, engineers, scientists, the private sector, farmers and communities that must work together to make it happen.



Living willow leaky barrier. Photo: Jennine Jonczyk

### Natural engineering approach

- If water flows are running too fast – slow them down – if it is causing serious erosion, store it for a period of time and recapture the sediment.
- Bring back the natural capacity of the landscape to filter water flow by spreading natural engineering features across the site.
- Ensure equal access to water for both the ecosystem and humans.

### Holding water

The UK's landscape has lost much of its natural water holding capacity as soils are highly degraded, which means lower water infiltration and storage capacity. By restoring this capacity, it is possible to prevent or reduce



'The ditch of the future' collects diverted run-off from the track and slows it down which encourages sediment deposition. Photo: Nick Barber/EdenDTC

flooding. Currently in much of the degraded landscape water is building up in the upper layers of the soil and making the land prone to water logging and generating run-off. Instead water should be going deeper into the soil and recharging the aquifers. Holding water in the landscape is not only about flooding but adaptation to future climate change. A simple approach to holding water back on farms led by farmers, could simplify policy, be cost-effective, remove red tape and empower land owners and communities.

### **Working with farmers and the local community**

In a typical farm or small catchment 2-10% of the landscape could be used as run-off storage and natural engineering features. In particular the 5% of the landscape near the ditch or channel is where attenuation features can be placed and buffer strips to trap and store sediment. If natural engineering solutions are to be taken up, communities must be empowered to take action. Nationally there is potential to coordinate both objectives and funding, joining up well targeted catchment based approaches. This requires putting mechanisms in place to coordinate actions.

### **How to store, slow and filter water**

There are numerous ways that natural engineering approaches can reduce flooding, benefit local ecology and help people adapt to climate change. While natural engineering based solutions to flood management are not a panacea for flood risk, they have great potential in helping communities to reduce floods, whether they live in rural or urban settings. By managing run-off and sediment using natural engineering features, it is also possible to bring back the land to good ecological status.

### **Examples of natural engineering for flood management:**

#### ***Woody debris***

Place woody debris in opportunistic locations. This could be felled trees placed strategically that slow the flow, push water onto the flood plain and trap coarse sediment in an actively eroding area.

### ***Roads***

Tracks and farm roads, when integrated into the landscape, can deliver contaminated flow to dam during large storm events. They can also act as sediment traps allowing farmers to simply move the sediment back into the land, rather than blocking flow downstream.

### ***Leaky dams***

Water trickles through the leaky dam then makes its way back to the source via the channel. It is not storing water, simply slowing down the flow and letting it travel through the landscape.

### ***The ditch of the future***

A ditch designed to act like a continuous set of ponds and sediment traps. By trapping sediment other ponds and wetlands downstream are protected as well as the river itself.

### ***Off-line storage ponds***

Provide additional flood storage during storm events and benefits to wildlife.

**If we want to get our lands across the world back into being productive, rejuvenated and restored it requires a combination of every person in the community**

Minni Jain, Director of Operations, the Flow Partnership

# Flooding, poor soil quality, drinking water problems and many other challenges in land management can all be remedied to some degree with catchment based solutions

Dr Marc Sutter, James Hutton Institute

## Looking forward

### Funding

EU funding schemes are pushing towards nature-based approaches to flood and drought management. Drawing in social money is another potential opportunity, which could include private investors and/or crowd source funding.

### Science

Observations and computer modelling provide the means for understanding how putting in multiple features in the landscape affects the entire catchment.

### Planning

Catchment-based approaches connect the rural to the urban. Cities could have their own catchment plans for flood mitigation as well as rural areas.

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This policy note on nature-based solutions for flood and drought is based on a workshop held at Newcastle University 14 August 2015 'Holding Water: Working with Nature to Ease Floods and Droughts' that featured presentations from Rajendra Singh and Minni Jain (Flow Partnership), Dr Paul Quinn, Dr Mark Wilkinson (Newcastle University), Dr Marc Sutter (James Hutton Institute) and Dr Michal Kravčik.

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