Position Statement

Trees and flood risk

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WOODLAND
TRUST

Trees and flood risk

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The Trust's view

- Trees and woods can contribute to flood risk management while also providing many other benefits including reducing agricultural diffuse pollution in waterbodies, cooling rivers and streams, providing valuable habitat, absorbing carbon, improving air quality and reducing the urban heat island effect. They increase the resilience of our country – its towns, cities and countryside.

- We recognise that trees and woodland alone are unlikely to prevent all flooding in a given area but they can play a vital role in reducing some flood risk, alongside other natural flood risk management (NFM) measures and/or as a complement to traditional flood risk management schemes.

- There is insufficient integration of NFM measures into the flood risk management plans and programmes currently being devised and delivered. More needs to be done to champion these measures and ensure their potential is fully realised by those charged with flood risk management in this country.

- We have sufficient evidence and understanding of the way in which trees can slow and reduce the flow of flood water to support an immediate increase in the delivery of woodland creation and tree planting schemes in carefully selected key areas.

The Trust will

- Continue to work through existing partnerships and build new ones with communities, landowners and others, to deliver tree planting and woodland creation as part of NFM schemes in rural and urban areas, and explore how existing and novel funding mechanisms can support delivery.

- Lobby for the Government to require flood risk management authorities to assess the potential for NFM, including tree planting and woodland creation, and integrate these measures in their plans and programmes. Plus, demand that the hydraulic models used by engineers to design flood schemes consider land use and management as part of a catchment-based approach for all water management.

- Support the Environment Agency's Working with Natural Processes research programme which will develop the evidence base, provide technical guidance and tools aimed at flood and coastal risk management authorities and promote the establishment of further research in 'catchment labs'.

- Continue to call for the release of Forest Research opportunity mapping showing where trees and woods are most likely to reduce flood risk in England, in order to help stimulate the delivery of more projects.

- Encourage the Government to do more to incentivise woodland creation and tree planting in rural areas and tree planting in our towns and cities in order to deliver more resilient landscapes.

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Background

Trees and woods can reduce flood risk in the following ways:

- Water penetrates more quickly and more deeply into soils under and around trees (higher infiltration rates) leading to less surface run-off and greater water storage within soils.

- Trees, shrubs and deadwood along streamsides and on floodplains act as a drag on flood waters, holding back water and slowing the flow at times of flooding.

- Trees protect soil from erosion and reduce sediment run-off into waterbodies, which in turn helps the efficient passage of flood waters downstream.

- The canopy of trees slows the speed at which rain reaches the ground, with some rain also evaporating into the atmosphere (especially in spring and summer in the case of native broadleaf trees).

Trees and woods are most likely to have a positive impact on floods from rivers (fluvial) and surface water flooding.

In order to deliver useful impact on flood risk, woods and trees could be planted: in upland areas where they can slow the flow in the headwaters of rivers and streams – especially in 'flashy' catchments which respond quickly to rainfall; on floodplains, where the increased 'roughness' slows the passage of floodwaters downstream; alongside rivers and streams where they can trap sediment and prevent bankside erosion; across fields, as part of hedgerows for example, where they increase infiltration and disrupt the surface water flows; and in our towns and cities, especially as part of sustainable urban drainage approaches.

There will also be areas where it is important to avoid planting trees since slowing the flow could lead to peak flows from one stream meeting peak flows from another stream at the same time – resynchronisng flows – leading to an increased overall flood peak in specific locations. It may also be necessary to avoid planting upstream from bridges and culverts which are vulnerable to blockage by woody debris, and downstream locally from communities and infrastructure that could be adversely impacted by water backing up.

It is impossible to generalise regarding the benefit that trees and woods can make in terms of reduced flows. To derive specific figures requires a detailed knowledge of a particular catchment and the way in which rivers, streams and surface water flows are likely to respond to particular weather events. It will also depend on the nature of the flood risk, the location and scale of planting, the type and design of woodland and the way in which it is managed.

Based on current evidence, trees and woods are most likely to have a positive impact on flood risk in smaller catchments (of less than $100km^2$) where there is scope to create woodland at a sufficient scale and in the right places. Larger catchments are subject to a wider range of factors influencing flood risk and less likely to offer the very large scale changes that would be necessary to make a difference. Most of the evidence comes from catchment hydrology models. These have shown that the impact woodland has on flood flows can range from zero to 40-50 per cent (where the headwaters of catchments less than $10km^2$ are completely afforested). The ability of woodland to reduce flood flows also appears to decline as the scale of the flood event increases, although it can still have a significant effect on relatively large floods.

It is likely that communities will gain maximum benefit from the implementation of a variety of natural flood risk management measures, in addition to woodland creation, such as the installation of woody debris dams, re-creating meanders in rivers, reconnecting rivers to their floodplains, and the use of bunds and offline storage areas to hold back water. It may also be the case that woodland creation is best deployed in conjunction with the installation or improvement of traditional flood defences. The optimum combination of measures is likely to require the input of specialist flood risk professionals and the use of hydrological models, informed by the views of local communities, landowners, farmers and land managers.