

Stemming the flow

The role of trees and
woodland in flood protection



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Record floods in 2007 and 2013/14 had a devastating impact on homes, businesses and essential services in England. The most obvious effects are the physical damage to property and the disruption to transport, business and people’s work. This carries real and significant economic costs. However flooding also brings misery for thousands of people – stress and anxiety, homes and treasured possessions ruined, families relocated whilst damage is repaired, and sadly, on occasions, lives lost.

- Around one in six properties in England is at risk of flooding.
- More than 2.4 million properties are at risk of flooding from rivers or the sea. Around 3.8 million properties are susceptible to surface water flooding.
- In 2007 around 55,000 properties were flooded and 13 people died. The winter of 2013 to 2014 was the wettest on record with over 7,800 homes and nearly 3,000 commercial properties flooded¹.
- The insurance cost of the 2007 floods was around £3 billion, with other substantial costs to government, businesses and individuals. Annual flood damage costs are in the region of £1.1 billion and could rise to £27 billion by 2080.
- The effects on people’s health and welfare can be significant with huge social and welfare problems that continue over long periods, well beyond the flooding.
- Climate projections suggest we can expect a greater frequency of ‘extreme’ weather events, with more frequent and severe flooding.

Managing on less?

Despite commitments relating to the 2014 flooding, central government funding for flood defences will

be cut in real terms in coming years². While central government funding will focus on high priority schemes which deliver significant benefits, partnerships between local government and the private sector will be expected to meet the shortfall through *Flood and Coastal Resilience Partnership Funding*³ for projects which are locally important.

The lead local flood authorities (LLFAs) are required to produce local flood risk management strategies to manage local flood risks caused by surface water runoff, groundwater and watercourses that are not main rivers. Tackling local flood risk will require innovative and cost effective solutions if the level of protection is to be maintained and extended.

Natural approaches to flood risk offer significant benefits to those seeking to manage flood risk and the communities they are trying to protect.

Changing land use

Changes in land use in rural and urban areas have contributed to an increased risk of flooding. In rural areas improved field drainage, removal of hedges and changes in cropping, have increased runoff from fields. On farmland, encouraging water to infiltrate in to soils lessens the amount of overland flow, reducing flash flooding.

The growth of urban areas and the increase in hard surfaces – for instance through the paving over of front gardens to provide parking – has resulted in an increase in surface water runoff and the number of properties at risk from flash flooding. In urban areas absorbent surfaces help reduce the amount of surface water runoff and flooding.

“Trees planted in the right places can do much to help with flooding before it happens.”

Lord De Mauley,
Parliamentary Under Secretary of State
for natural environment and science

Natural solutions

Man-made flood defences – engineered embankments, flood walls and temporary structures – are an essential part of the fight against flooding. However the importance of natural processes in flood defence is increasingly recognised. When combined with other flood defences, trees provide a sustainable and low maintenance solution to lessening the risk of flooding as well as delivering other environmental and economic benefits.

Planting trees can be effective in increasing water infiltration, and reducing and slowing runoff on farmland – water infiltration can be 60 times higher within tree shelterbelts than adjoining farmland.

Research suggests that targeted tree planting in the upper catchment might lead to reductions in local peak flood flows of up to 40 per cent⁴. When combined, these

What can be done?

Evidence and experience strongly suggest that trees and green space should have a place among flood protection measures being considered and delivered by risk management authorities. Local authorities should ensure land management is a central part of the adaptation strategy in response to climate change.

Trees offer cost effective benefits in terms of flood risk as well as having the potential to provide additional multiple benefits such as improved water quality and habitats for wildlife.

1. Developing Local Flood Risk Management Strategies

Lead Local Flood authorities should ensure that full consideration is given to natural solutions in developing local flood risk management strategies (and any required flood risk management plans) for their area.

There should be a clear picture of where land management changes could help manage flood risk. This might include use of published flood opportunity maps for woodland creation to manage flood risk.

Local authorities should be aware of the role that land management and trees in particular could play. They should work with the regional flood and coastal committees to ensure local levy funding is used to support natural approaches to flood risk reduction where possible.

2. Resilience to climate change

Trees and green space should be at the heart of flood risk and climate adaptation strategies. Trees and green space could play a critical role in adaptation to climate change in addition to

Surface water run-off: Dr Richard Smith



local reductions could lead to lower flood risk further down the catchment.

Woodland located on floodplains can mitigate large flood events by absorbing and delaying their progress downstream. The 'Slowing the Flow'⁵ project around Pickering in North Yorkshire is providing valuable insights into how natural processes can be used to reduce flood risk to a town prone to flooding. Creating strategically-placed floodplain woodland could help alleviate major floods downstream.

Interception by trees can be critical in reducing the pressure on the drainage system and lowering the risk of surface water flooding. Research has shown that trees can reduce surface water runoff by up to 80 per cent compared to asphalt⁶. When combined with other measures as part of sustainable urban drainage schemes, trees have a major role to play in reducing potential flood risk arising from new developments.

River Clun: WTPL/Phil Formby



reducing flood risk. This includes mitigating the impacts of urban heat island effect and poor air quality on public health, and improving the energy efficiency of buildings.

3. Maximise the benefits of woods and trees to society

Recognising the economic and social value of these benefits is essential to ensuring the right level of investment in protection and expansion of trees and woodland. Woods and trees deliver a wide range of benefits to society, reducing flood risk, supporting healthy lifestyles and encouraging inward investment.

4. Putting trees at the heart of planning

Planning departments should ensure that planning protects existing woodland and work with developers to ensure trees are included as part of sustainable urban drainage proposals. Planning policy should recognise woodland as a key component of water flow solutions in documents like green infrastructure plans and tree strategies.

National planning legislation and local planning control should ensure we protect ancient woodland and retain and expand as much other woodland as possible for the benefits it provides.



5. Engaging communities

Local authorities should encourage and support communities to consider natural approaches to flood risk reduction.

Advice and support

The Woodland Trust offers advice and support with regard to woodland creation to support flood mitigation. We work in partnership with many local authorities across the country. Please visit our website woodlandtrust.org.uk/plant-trees, email paadmin@woodlandtrust.org.uk or call 08452 935564 to arrange an informal meeting.

¹<https://www.gov.uk/government/news/uk-floods-2014-government-response>

²*Flood defence spending in England - Commons Library Standard Note*. Published 12 February 2014. Available at: <http://www.parliament.uk/briefing-papers/SN05755/flood-defence-spending-in-england>. [Accessed 22nd April 2014]

³<https://www.gov.uk/government/publications/flood-and-coastal-resilience-partnership-funding>

⁴The Woodland Trust, The Pontbren Project – A farmer-led approach to sustainable land management in the uplands

⁵Slowing the Flow at Pickering, Forest Research. Available at: <http://www.forestry.gov.uk/website/forestresearch.nsf/ByUnique/INFD-7YML5R>. [Accessed 22nd April 2014]

⁶D. Armson, P. Stringer, A. R. Ennos (2011) The Effect of Trees and Grass upon Temperatures and Surface Water Runoff in Urban Areas, University of Manchester, Faculty of Life sciences



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