

Natural Flood Management

A Summary Report for The Wildlife Trusts and RSA Insurance, an Intact Company



RSA



an [intact] company

The **Wildlife**
Trusts



Foreword from The Wildlife Trusts

The Wildlife Trusts are experts in natural flood management. For decades we have been delivering solutions to slow the flow of water through catchments, helping to reduce flood risk for homes and businesses in our communities and local areas. As of 2024, across the UK we have over 150 different schemes. Many of these schemes are being delivered in partnership with farmers, landowners and local authorities across rural and urban areas.

We know that the work we do is becoming ever more critical in a changing climate; we need to see a lot more of it, because we will not succeed in tackling rising flood risk – projected to double in the next 25 years – without throwing everything we have at the rising threat. While there remains high interest in natural flood management, investment is not yet flowing. Just 1% of the most recent flood budget for England was allocated to natural solutions.

The evidence of the potential for natural flood management in different places is well advanced. But we know less about the wider benefits that it delivers to people, nature and the climate. Understanding this is important to make a comprehensive economic case for natural flood management, in part to inform the investment decisions by businesses – including insurance companies.

We were delighted to work with RSA Insurance, an Intact Company, and Stantec to deliver this new research, focussing on quantifying the full benefits of a selection of Wildlife Trust natural flood management schemes. The economic and social benefits are becoming crystal clear, whether we're looking at woodland planting, river re-wiggling or the affects of beavers in the landscape. This report considers the effects on communities of our schemes, and what lessons we can learn from the wider literature on natural flood management. We make several key recommendations to Government to mainstream, standardise, and support.

We received amazing support from our advisory group for this report, and look forward to working together to continue to make the case for natural flood management, so that everyone who can benefit from it, can.



Craig Bennett
Chief Executive,
The Wildlife Trusts



FLOODED WALKWAY © MATTHEW ROBERTS

Foreword from RSA, an Intact Company

Climate change is one of the defining trends of this century for insurers. Climate-related events caused £253bn (USD \$320bn) in losses globally in 2024, a third higher than the previous year. In the UK, one in six properties could be at risk of flooding by 2050 as the threat increases due to climate change. Two-thirds of England is reliant on infrastructure at risk of flooding.

RSA Insurance, an Intact Company, has been on the frontline of extreme weather events alongside our customers for decades and sees the devastation they can cause. Our teams are often on the ground within the first few hours of a flood, helping people, business owners, and communities recover and rebuild. Intact has invested heavily in building resilient communities since its inception in 2009, funding over a hundred climate resilience projects from coast-to-coast in Canada. All these actions are aligned to our global purpose to help people, businesses and society prosper in good times and be resilient in bad times.

Insurance plays a crucial role in helping people prepare for the growing threat of flooding. Reducing the financial, environmental, and social impacts of climate change is vital to creating a sustainable future. That's why we're committed to sharing our knowledge, tools, learnings, and best practice with the communities we protect and operate in and investing in projects that develop practical solutions to flooding.

A growing threat needs investment in innovative solutions and collaboration between the private, public and not-for-profit sectors to make the biggest impact.

I'm delighted that this report is being published through our partnership with the Wildlife Trusts, after over a year of thorough research. The benefits of natural flood management are clear, and the report highlights the opportunity to implement these approaches on a larger scale. If we do this successfully, we can have a meaningful impact on building communities that are more resilient to the impacts of climate change – one of the greatest challenges of our generation.



Ken Norgrove
CEO of UK & International,
RSA Insurance, an Intact Company.

By reducing the peak of high flows in urban and rural areas,
Natural Flood Management
techniques successfully reduce the impacts of flooding, whilst
providing additional benefits for people, nature and climate.

Introduction

One in six houses across the UK is currently at risk of flooding¹. Climate change is leading to more frequent and heavier rainfall, and this is expected to be more severe in the future, alongside a likely increase in winter rainfall. Current land management practices such as soil compaction, and ever more hard surfaces in our landscapes, means water is not being held back and absorbed into the land as it should, leading to greater flooding of homes and businesses. Alongside the devastating impacts that flooding has on people, it is the UK's most expensive natural hazard, costing approximately £2.2 billion annually. This is projected to rise by a range of 19-49% by the 2050s².

The latest UK Climate Change Risk Assessment (Sayers et al., 2020)³ showed that flood defences alone will not manage current or future flood risk: combinations of different types of flood prevention and protection measures are needed across the UK. A key part of the solution is to understand the role that natural processes in the wider landscape can play when using Natural Flood Management (NFM) techniques. A wide range of evidence has shown that Natural Flood Management schemes, which utilise nature to hold back more water in the landscape, are proven to reduce peak flows during flood events, which in turn reduces damage to homes and businesses. Yet currently much of the evidence relates to schemes installed in smaller catchments, with only a few larger scale catchment schemes with long term datasets.

Beyond flood alleviation, Natural Flood Management has been shown to provide measurable co-benefits such as improved biodiversity, mental health, carbon sequestration and better water quality.

The Royal Society of Wildlife Trusts commissioned, in partnership with RSA Insurance, an Intact Company, research with two main objectives:

- To assess the full range of benefits from NFM schemes already implemented or in progress by local Wildlife Trusts.
- To synthesise existing literature on the societal net benefits of NFM, with a particular focus on implications for decision-makers, including insurance providers.

1 From all sources including flooding from rivers, surface water and coastal flooding.
2 <https://www.ukclimaterisk.org/wp-content/uploads/2020/07/Future-Flooding-Main-Report-Sayers-1.pdf>
3 Sayers, P.B, Horrit, M.S, Carr, S, Kay, A, Mauz, J, Lamb, R, & Penning-Rowse, E. (2020). Third UK Climate Change Risk Assessment (CCRA3) Future flood risk.UK Climate Change Risk Assessment. <https://www.ukclimaterisk.org/publications/projections-of-future-flood-risk/>

This research reviewed 10 Natural Flood Management schemes created by Wildlife Trusts in various sized river catchments to assess the cost-benefit ratio of the schemes and contribute to the evidence base around the effectiveness of this nature-based solution.

This research found that Natural Flood Management schemes have positive cost-benefit ratios that increase when taking into account multiple benefits. A review of a small number of Wildlife Trust schemes, with limited data, highlighted a range of additional environmental and social benefits beyond flood risk management."

Mike Morris
Technical Director, Stantec



What is Natural Flood Management?

Natural Flood Management (NFM) measures are nature-based solutions that mitigate the impacts of flooding by reducing downstream peak water flow levels in streams and rivers and bring social and environmental benefits. Natural Flood Management activities can reduce the impacts on communities from river, surface or sewer flooding. They can effectively slow the flow of water in both rural and urban settings, and include:

- Planting of trees, hedgerows and woodland: to capture rainwater before it hits the ground, slow overland flow and increase water storage below ground
- Reintroducing beavers: a native species that helps to store water in the landscape through building dams, digging channels and other activities
- Creating ponds and wetlands: to collect water and hold it in wet periods
- Restoring peat bogs: which can hold vast amounts of water, with additional carbon benefits
- Soils and grassland management: improving soil structure so that rainfall can penetrate the ground surface; rough, tussocky grasslands are more effective at storing water than intensively managed grasslands
- Constructing leaky dams or log diverters: to release water slowly and to move water out onto floodplains rather than build up in a river
- Restoring rivers: re-engineering or modifying a river course to restore its natural meandering shape or to improve its ecological health to help prevent high flow events
- Sustainable Drainage Schemes: activities to increase water infiltration in urban areas such as depaving (removing hard surfaces), installing ponds and bioswales (a shallow, man-made ditch)



The Wildlife Trusts' Natural Flood Management schemes

Ten Wildlife Trust schemes were sited across the country and focused on different Natural Flood Management techniques including beaver management, wetland creation, river restoration and urban solutions. Wildlife Trust staff collaborated with local communities and stakeholders to work to reduce flood risk on properties and the local area.

Although based on a small sample, average total benefits of Wildlife Trust Natural Flood Management schemes were estimated at £4:£1 over 10 years rising to £10:£1 over 30 years.

Alongside the economic valuation of the Wildlife Trusts' schemes, a survey was undertaken of communities located near the selected Natural Flood Management schemes to investigate their impacts on local people. The sampled communities are concerned about climate change and the impacts climate change is currently having on their community (96% of respondents, n=345). They felt that flooding has increased in the past five years and are concerned about the future impacts of flooding. More than 85% of respondents with access to their local Natural Flood Management scheme felt that they encouraged physical health and exercise, while 92% felt that they were good spaces for positive mental well-being and provided opportunities to see nature.



The Upper Sherbourne

Warwickshire Wildlife Trust

On several occasions over the last two decades approximately 20 properties and multiple local roads in Allesley, a western suburb of Coventry, have flooded as a result of surface water and overtopping of the River Sherbourne. Hydrological assessments, optioneering and business case developments concluded that the cost of hard engineering measures did not deliver the return on investment needed, and as a result an alternative approach including property-level protection, enhancements to drains, and a nature-based solutions scheme was developed. Warwickshire Wildlife Trust has been delivering a Natural Flood Management scheme in the Upper Sherbourne catchment since 2018, funded by the Environment Agency in collaboration with Coventry City Council. The research analysed data for Regulation Ecosystem Services (flood regulation, air quality and carbon reduction), Cultural Services (mental health and volunteering) and Supporting Services (biodiversity). The valuation of these services shows a financial return over 10 years of up to £0.66m and after 10 years of £1.56m.

Limb Brook

Sheffield and Rotherham Wildlife Trust

The completed Limb Brook scheme looked at a suite of Natural Flood Management techniques across the whole Limb catchment, which runs off the Peak District moors into Sheffield. The scheme included wetland expansion, created 20 attenuation ponds, installed 50+ leaky dams, de-culverted streams and planted hedging.

Data collection by Sheffield Hallam University considered hydrological design and monitoring of water flows, and Sheffield and Rotherham Wildlife Trust's citizen science scheme created over 2,000 images of the various techniques at different times of the year.

This research analysed the data considering Regulation Ecosystem Services (flood regulation, air quality and carbon reduction), Cultural Services (mental health, education and volunteering) and Supporting Services (biodiversity). The valuation of these services shows a combined benefit over 30-years of more than £2m.

Protecting Gloucester and Cheltenham

Gloucestershire Wildlife Trust

A pioneering programme, Gloucester and Cheltenham Waterscapes, is designed to tackle flood risk and support nature's recovery. Gloucestershire Wildlife Trust is bringing its experience in Natural Flood Management and community empowerment to support communities make the urban areas of Gloucester and Cheltenham more resilient to flood events and more connected to nature. The programme is creating showcase rain gardens, wild driveways and bus stops, green verges, attenuation ponds and scrapes.

The programme is a collaboration with the Environment Agency, Gloucestershire County Council, Cheltenham Borough Council, Wildfowl and Wetlands Trust and Severn Rivers Trust. It is currently funded by RSA Insurance, an Intact Company, with a contribution from the Environment Agency and partners bringing in additional funding.

With Gloucester and Cheltenham Waterscapes assessing that a total of 50 homes will directly benefit from a decreased risk of flooding, the research analysed the total aggregated valued benefits when considering climate change. This showed that over 10 year and 30 year scenarios, the scheme provides economic value of £2.99m to £9.1m respectively.

River Otter

Devon Wildlife Trust

Since 2017, a family of wild Eurasian beavers have been living approximately 300 metres upstream of a flood-prone village in the River Otter catchment in Devon. This family of beavers has constructed a series of beaver dams, including one dam spanning 60 metres, which have enabled a complex floodplain wetland to develop. Devon Wildlife Trust is supporting the relevant landowners to make space for this beaver wetland to develop.

Data collection included hydrological data, spanning both before (since 2009) and after the beavers' arrival. University of Exeter analysis of this data showed that downstream peak flows have been attenuated by the presence of beaver dams. A key finding from the multi-site study linked above is that beaver dams can attenuate flood flows by an average of 30%, even during wet (high flow) conditions.

Whilst economic valuation techniques for biodiversity are the focus of much debate and ongoing research, analysis from this research scheme suggests a valuation of biodiversity associated with the site of nearly £1.5m per year alongside significant water quality and physical health benefits.

“Flooding is a massive impact for the local community, irrespective of the damage - the inconvenience is significant. Being flooded out, like in 2007, completely wrecks people's lives, with their whole lives in a skip outside because their property is flooded out.”

Friends of Naunton Park Community Group



Funding for Natural Flood Management

Public funding for Natural Flood Management remains a small proportion of overall flood risk mitigation. The largest current public fund in England is the Environment Agency's £25m Natural Flood Management Programme, which is less than 1% of the total flood and coastal erosion risk management budget for the next 12-month period. Whilst a blended financial approach to Natural Flood Management can be highly successful in meeting project objectives (especially for multiple beneficiaries for flood

risk mitigation, or the provision of multiple benefits), current private investment is very limited. A number of barriers and challenges exist for investors engaging with Natural Flood Management schemes, including a lack of certainty in any market. Unless these are removed, and confidence is increased, perhaps through increased public funding, private investment will remain limited. Our recommendations below highlight key areas for removing barriers to investment.

Recommendation for future action

This research has highlighted that Natural Flood Management provides multiple, quantifiable benefits to society. To enhance the success and scalability of Natural Flood Management schemes, greater consistency and standardisation in scheme development, monitoring, and data collection is crucial. This would provide a clearer understanding of the potential benefits and costs of Natural Flood Management and also boost investor confidence (public, private, and philanthropic). If these challenges are addressed, these schemes have the potential to attract much greater public and private investment, paving the way for more widespread implementation and further societal benefits.

To ensure these benefits are seen in the future, we would recommend:

- Natural solutions are prioritised:** Current evidence highlights the success of Natural Flood Management implementation for flood risk management and multiple other benefits for people, climate and nature. Whilst Natural Flood Management is unlikely to be the single solution to flood risk management in the majority of catchments or scenarios, it is not prioritised as a critical element in the decision-making process for flood risk mitigation in England. Until such time that natural solutions are considered as a priority, and funded accordingly, it will remain an "add-on" to hard engineering schemes.
- Government support:** A government-led framework, including support for private finance markets and improved data collection, is essential for increasing Natural Flood Management investment. This could include the creation of a natural capital assessment tool framework, updates to funding processes and guidance on ecosystem service "stacking" (combining a range of revenue streams by delivering different ecosystem services on the same parcel of land).
- Private sector opportunities:** The private sector, including financial institutions and insurers, can play a more active role in Natural Flood Management investment by engaging with blended finance models and recognising the broader economic and environmental benefits of Natural Flood Management. Private investors are particularly interested in schemes that align with their sustainability goals and offer clear, measurable benefits. Prudential Regulation Authority rules amendments to allow for a proportion of nature-based investments under Solvency UK could allow for greater investment.

Responsible body
Defra, Environment Agency

Responsible Body
Treasury, Defra

Responsible body
Defra, Environment Agency, Lead Local Flood Authorities, Regional Flood and Coastal Committees

- Improved data and standardisation:** A standardised approach to scheme design, monitoring and valuation is needed to increase investor confidence. This includes the development of clear Natural Flood Management design standards and comprehensive datasets on Natural Flood Management outcomes.

Responsible body
Defra, Environment Agency

About this research

The aim of this research was to investigate, using real-world examples, the full spectrum of benefits from Natural Flood Management – especially those related to people, climate and nature. Over the past decade, substantial efforts have been made to quantify and map the potential of Natural Flood Management, including the Environment Agency's National Strategic NFM Opportunity Maps (England only) and research from the UK Climate Change Risk Assessment. While these efforts have advanced our understanding of Natural Flood Management's spatial potential, less research has focused on the valuation of benefits and how the costs and benefits related to Natural Flood Management change when all of its benefits are considered. This research gap is particularly important for informing future investment decisions, for public sector funds and private sector engagement and financing, where the lack of quantitative data on Natural Flood Management's flood alleviation and other benefits makes return on investment difficult to measure.

To address these gaps, research was commissioned in partnership between RSA Insurance, an Intact Company and The Wildlife Trusts and delivered through Stantec. The research had two main objectives:

- To assess the full range of benefits from Natural Flood Management schemes already implemented or in progress by Wildlife Trusts in England and Wales (see list in **Table 1** below).
- To synthesise existing literature on the societal net benefits of Natural Flood Management, with a particular focus on implications for decision-makers, including insurance providers.

To achieve these objectives, the research employed a three-pronged approach:

“Very happy to have beavers and Natural Flood Management in area. Do a great natural job at controlling flooding and increasing biodiversity at the same time.”

River Otter Survey Respondent

- Literature review: The project gathered existing evidence on the societal, environmental and economic benefits of Natural Flood Management, including private finance engagement. This involved reviewing both peer-reviewed and grey literature to better understand how Natural Flood Management can be measured and financed, and how it aligns with broader ecosystem service objectives.
- Community Impact Assessments and stakeholder engagement: In collaboration with a group of Wildlife Trusts, the project evaluated the effects of Natural Flood Management schemes on local communities, including changes in mental and physical health, well-being and perceptions of flood risk.
- Site-level quantification of benefits: The project conducted detailed assessments of completed or ongoing Natural Flood Management schemes led by a group of Wildlife Trusts, measuring their impact on ecosystem services such as water flows, biodiversity and carbon storage. These findings were reviewed for their potential to scale nationally.

This summary report is accompanied by a technical report, which contains the detailed analysis and findings of the research, alongside recommendations for further action on Natural Flood Management.

Site Name	Wildlife Trust	Rural/ Urban Type	NFM Techniques
Upper Sherbourne, Warwickshire	Warwickshire Wildlife Trust	Rural	Leaky dams, retention pools
Upper Aire Catchment, Yorkshire	Yorkshire Wildlife Trust	Rural	Leaky dams, riparian fencing, bank restoration
Limb Brook, Sheffield	Sheffield & Rotherham Wildlife Trust	Urban	Leaky dams, attenuation ponds, bog creation
Gloucester and Cheltenham Waterscapes	Gloucestershire Wildlife Trust	Urban	Rain gardens, green verges, attenuation ponds
Barossa, Wishmoor Bottom, Surrey	Surrey Wildlife Trust	Rural	Optioneering for leaky dams, ponds
River Otter Beavers, Devon	Devon Wildlife Trust	Rural	Reintroducing beavers, wetlands
Milkwelburn Wood, Durham	Durham Wildlife Trust	Rural	Leaky dams, bypass channel
North Devon Natural Solutions, Devon	Devon Wildlife Trust	Rural	Leaky dam
Derwent Living Forest, Derbyshire	Derbyshire Wildlife Trust	Rural	Woodland restoration, wetland restoration, leaky barriers
Wilder Lugg, Radnorshire	Radnorshire WT	Rural	Agricultural reversion, woodland restoration

Table 1: Wildlife Trust Natural Flood Management Schemes

We are facing climate and ecological emergencies, and the two are inextricably linked — we cannot solve one crisis without tackling the other. The Wildlife Trusts is on a mission to restore a **third of the UK's land and seas** for nature by 2030 — not only in celebration of the value of nature, but also because people are part of, and entirely dependent on, nature.

We believe **everyone, everywhere, should have access to nature** and the joy and health benefits it brings. No matter where you are in the UK, there is a Wildlife Trust **empowering people to take action for nature** and standing up for wildlife and wild places. Each Wildlife Trust is an independent, grassroots, community-powered charity formed by people getting together to make a positive difference for wildlife, climate and future generations. Together we care for 2,300 diverse and beautiful nature reserves and work with others to manage their land for nature, too.

The Wildlife Trusts

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