

Working with nature to build resilience to flooding and drought

4th December 2023

This briefing is on behalf of nature coalition Wildlife and Countryside Link ([Link](#)).

Context

In the UK, we face an endless cycle of droughts and floods, with devastating consequences for people and nature. As climate changes, the risk and severity of these flood and drought events is increasing. This is worsened by a lack of preparedness and insufficient resilience.

Most of England is classed as water stressed, and water demand is expected to exceed supply in parts of the country within the next 20 years.^{1 2} The Government's own Plan for Water reports that 15% of all rivers and 27% of all groundwater sources in England are already over-abstracted, leading to unnaturally low flows that harm wildlife and increase the concentration of pollutants.³

The record-breaking 2022 summer heatwave, and the drought which started months before, saw millions of people facing water restrictions, abnormally low river flows, fish deaths, algal blooms, and some ponds and river stretches drying out entirely.^{4 5 6} The impacts are still being felt, and some parts of the country remain in drought over a year later.⁷ Changing climate and

¹ <https://www.gov.uk/government/publications/water-stressed-areas-2021-classification>

² <https://www.nao.org.uk/wp-content/uploads/2020/03/Water-supply-and-demand-management-Summary.pdf>

³ <https://www.gov.uk/government/publications/plan-for-water-our-integrated-plan-for-delivering-clean-and-plentiful-water/plan-for-water-our-integrated-plan-for-delivering-clean-and-plentiful-water>

⁴ '2022 water levels and river flow rates (England) in the context of the last 21 years'. (August 2022). Wildlife and Countryside Link.

https://www.wcl.org.uk/docs/assets/uploads/WCL_Water_Level_River_Flow_2022_Briefing_August_2022.pdf

⁵ 'Environment Agency takes action to rescue fish during dry weather'. (August 2022).

<https://environmentagency.blog.gov.uk/2022/08/11/environment-agency-takes-action-to-rescue-fish-during-dry-weather/>

⁶ 'Source of River Thames dries out 'for first time' during drought'. (August 2022).

<https://www.theguardian.com/environment/2022/aug/04/source-of-river-thames-dries-out-for-first-time-during-drought>

⁷ <https://deframedia.blog.gov.uk/2023/08/09/drought-explained/> (August 2023).

less rainfall in cooler months mean that we are increasingly experiencing prolonged winter droughts that last into spring and summer.

Within the same period, we have also witnessed catastrophic flooding. In autumn 2023, flooding associated with Storm Babet and Storm Ciaran has resulted in hundreds of thousands of pounds worth of damage, environmental destruction, and tragically, loss of life.^{8 9}

The constant flood/drought cycle means that the impacts of these events work synergistically. For example, with devastating effects on water quality. Flood waters wash excess nutrients, chemicals, sewage and plastics into the waterways; drought then lowers water flows, and increases the concentration of pollutants, heightening impacts for both wildlife and human health.

As acknowledged in the Government's National Adaptation Programme (NAP) strategy, climate change is predicted to significantly alter rainfall patterns in the UK, increasing the severity of extreme rainfall events and the frequency of droughts.^{10 11} The 2022 Climate Change Risk Assessment Report identifies both flooding and drought among the most significant risks associated with climate change, bringing severe economic, social and environmental implications.¹²

Yet the UK is not sufficiently adapted to these risks. The 2023 Climate Change Committee report identifies that the Second National Adaptation Programme did not adequately prepare the UK for adapting to climate change, meaning that UK cities, communities, infrastructure, economy and ecosystems are unprepared for climate risks.¹³ The Third National Adaptation Programme, published in July 2023, is still under consideration.

⁸ Met Office. (2023). 'Storm Babet'.

https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/weather/learn-about/uk-past-events/interesting/2023/2023_08_storm_babet.pdf

⁹ Environment Agency. (2023). 'Press release: Prepare for Storm Ciaran'.

<https://www.gov.uk/government/news/prepare-for-storm-ciaran>

¹⁰ <https://www.independent.co.uk/news/uk/environment-agency-government-wales-england-met-office-b2440388.html>

¹¹ Met Office. 'UK and Global Extreme Weather Events'.

<https://www.metoffice.gov.uk/research/climate/understanding-climate/uk-and-global-extreme-events-drought#:~:text=As%20global%20temperatures%20rise%2C%20there,determine%20future%20UK%20drought%20risk.>

¹² <https://assets.publishing.service.gov.uk/media/61e54d8f8fa8f505985ef3c7/climate-change-risk-assessment-2022.pdf>

¹³ <https://www.theccc.org.uk/publication/progress-in-adapting-to-climate-change-2023-report-to-parliament/#:~:text=The%20second%20National%20Adaptation%20Programme%20has%20not%20adequately%20prepared%20the,%2C%20infrastructure%2C%20economy%20and%20ecosystems>

The solution

We need to work with nature at catchment scales to build resilience to both drought and flooding, slowing the flow of water and keeping more of it in the environment to help buffer against the impacts of extreme weather. This should be achieved through delivering Natural Flood Management (NFM), and Nature-Based Solutions (NBS). This should be supported with rigorous controls on abstraction, through both permitting and enforcement routes, in order to further limit impacts on waterbodies and wildlife.

NFM and NBS work with nature and natural processes to reduce the risk of flooding and drought by protecting and restoring the natural functions of catchments, floodplains, and water systems.

Restoring freshwater systems and marine habitats such as rivers, wetlands, floodplains, salt marshes and peatlands to their natural state will enable them to retain more water. This will protect them and the wider landscape from drying out in times of drought, and reduce flooding downstream during periods of heavy rainfall through slowing and reducing run-off.^{14 15 16} This will also deliver multiple wider benefits for people and nature, including reducing run-off from overloading sewers, creating more habitat for biodiversity, improving farm resilience, ensuring greater access to quality green and blue spaces, and helping to engage local communities in the natural environment and water management.

The creation of new habitat and landscape features such as ponds and wetlands will help store water during heavy rainfall to prevent river channels from overflowing, and will retain water in the landscape during times of drought.¹⁷ Saltmarsh reduces the wave power of incoming tides, which can cut flood defence costs, and reduce the impacts of flooding for coastal communities and businesses.¹⁸ Tree planting and other revegetation can also help to slow and dissipate surface water, and help to bind soils together to reduce vulnerability to erosion in flood and drought events. In-channel features such as leaky dams can help slow the flow of water within

¹⁴ Alderson et al. (2019) Restoration of blanket peat moorland delays stormflow from hillslopes and reduces peak discharge. Journal of Hydrology X <https://www.sciencedirect.com/science/article/pii/S2589915518300063>

¹⁵ <https://www.unep.org/news-and-stories/story/wetlands-limit-impact-floods-drought-cyclones>

¹⁶ <https://www.therrc.co.uk/why-restore>

¹⁷ Nicholson, A. R. et al. (2020). The potential of runoff attenuation features as a Natural Flood Management approach. Journal of Flood Risk Management, Vol 13, e12565.

<https://onlinelibrary.wiley.com/doi/full/10.1111/jfr3.12565>

¹⁸

<https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/saltmarshfloodmitigationinenglandandwales/naturalcapital/2022>

the watercourse.¹⁹ Increasing the health and permeability of soils through nature-friendly agricultural practices, and restoring and reconnecting rivers with their floodplains, will also help store water in the environment and decrease surface run-off.²⁰

Benefits of working with nature

Nature and catchment-based solutions are often cheaper to implement than traditional concrete solutions. A 2021 study by the Institute for Sustainable Development found that nature-based infrastructure can be up to 50% cheaper and can provide 28% better value for money than traditional 'grey' infrastructure.²¹ These approaches can also deliver multiple wider benefits for people and nature, compared with traditional 'grey' solutions.

For example, restored peatland and wetland habitats will also help capture carbon, provide quality habitat for wildlife, improve water quality, and increase access to quality natural spaces for people.^{22 23 24} Nature-friendly farming to increase soil health will also improve yields and reduce erosion and loss of nutrients. In 2021, a comparative study of traditional 'grey' hard engineered flood defences and large-scale nature-based solutions in Belgium showed similar flood security, more ecosystem service benefits, higher biodiversity values, and lower costs associated with nature-based solutions compared to the technical alternative.²⁵

There is a shortage of expertise and knowledge on how and where to create NFM. Therefore, by driving forward more NFM at a larger scale, there is also an opportunity to upskill local communities and provide green jobs.²⁶

The multiple benefits delivered by working with nature also creates opportunities for blended finance, by drawing in private investors or gaining income from buyers of ecosystem services. This further increases taxpayer value for money.

The use of nature and catchment-based solutions to tackle flooding and drought will also support the delivery of Government's environmental commitments, including the

¹⁹ Gurnell, A. et al. (2019). Trees and wood: working with natural river processes. *Water and Environment Journal*, Vol 33, 342–352. <https://onlinelibrary.wiley.com/doi/10.1111/wej.12426>

²⁰ Mudgal, S. et al. (2014). Soil and water in a changing environment: final report 27 June 2014. EUR-OP. <https://op.europa.eu/en/publication-detail/-/publication/56bd4606-4f06-49f6-bced-d6cdd5cb0503/language-en>

²¹ <https://www.iisd.org/articles/nature-based-infrastructure>

²² <https://www.wwt.org.uk/our-work/why-wetlands/>

²³ [Peatland Benefits | IUCN UK Peatland Programme \(iucn-uk-peatlandprogramme.org\)](https://www.iucn-uk-peatlandprogramme.org/)

²⁴ <https://www.wwt.org.uk/uploads/documents/2023-01-30/wwt-blue-carbon-route-map-2023.pdf>

²⁵ <https://link.springer.com/article/10.1007/s13280-021-01548-4>

²⁶ <https://www.wwt.org.uk/uploads/documents/2023-11-22/wwt-flood-protection-network-route-map-221123.pdf>

Environmental Improvement Plan, the Plan for Water, net zero, and the legally-binding Environment Act target to halt the decline of nature by 2030.

As a 2020 Parliamentary POSTNote acknowledges, ‘these co-benefits may be significant enough to justify investment in natural flood management even where the flood mitigation benefits alone do not’.²⁷

Action needed

Government must drive greater uptake and use of NBS and NFM to tackle flooding and drought, unlocking barriers to their use across sectors. This should include:

- Setting a clear, strategic regulatory framework that will drive all regulators towards facilitating the uptake and use of NBS and NFM, and provide investors with the framework and incentive to invest in NBS and climate adaptation.
- Setting clear, comprehensive national guidance to ensure consistent, high quality NBS and NFM are delivered.
- Adequately funding regulators and local authorities to ensure they have sufficient expertise, training and resources to facilitate NBS and NFM projects.
- Greater provision of funding for NBS and NFM projects, for example, through the flood grant-in-aid fund.

Agriculture

On-farm measures such as soil management are critical to both flood and drought resilience. Over 75% of land in England is farmed, and so the opportunity for farmers and land managers to implement catchment and nature-based solutions is significant.

Farmers should be better rewarded under ELMs for working with nature to restore the health of soils, floodplains and wetlands, provided with the financial support and necessary advice to deliver catchment sensitive farming.²⁸

Government must also ensure that protections for water and soil from cross-compliance rules continue. For example, river buffers will help protect water quality from soil and chemicals run-off during floods, will build capacity for river levels to expand safely during rainfall, and provide

²⁷ <https://researchbriefings.files.parliament.uk/documents/POST-PN-0623/POST-PN-0623.pdf>

²⁸ Wildlife and Countryside Link. (2023). ‘Nature 2030 Minifesto: Freshwater.’
https://www.wcl.org.uk/assets/uploads/img/files/Nature_2030_Freshwater_Minifesto_August_2023_1.pdf

space for trees and other vegetation to be planted to reinforce riverbanks and provide shade that will keep waters cool during heatwaves.

Water industry

Current barriers to the use of catchment and nature-based solutions by the water industry must be unlocked through the Price Review process, with Ofwat embedding environmental resilience at the heart of decision-making processes through greater use of natural capital accounting.²⁹ Water company and regional water resource management plans must prioritise meeting the needs of the environment first, and be supported in preferentially using catchment and nature-based solutions wherever possible.³⁰

Water industry Drainage and Wastewater Management Plans (DWMPs) should be utilised to unlock and implement more NBS for both flood and drought resilience in urban areas, delivering Sustainable Drainage Solutions (SuDS) at catchment scale.

Complementing traditional approaches

Natural solutions to build resilience to flooding and drought should be delivered strategically and complementarily alongside traditional approaches. For example, in urban areas where natural solutions may not be possible or appropriate, NFM can be deployed upstream to alleviate stress on traditional flood defences downstream and to increase their longevity. NFM will also reduce negative impacts of traditional infrastructure, for example if placed downstream to help slow the flow of diverted flood water from an engineered flood defence.

In addition to working with nature, greater investment from the water industry to maintain and improve company assets and infrastructure is also required. Ofwat's 2022-2023 water company performance report shows that the industry is falling behind on leakage reduction targets and other actions within water resources management plans, and that companies are continuing to underspend on their investment programmes.³¹ In combination with historic underinvestment, this undermines resilience to water scarcity. For example, no new reservoirs have been built in water-stressed southern England since 1976, and we currently lose nearly 20% of water supply to leaks – equivalent to 2.4 billion litres per day across England's nine major water companies.³²

29

https://www.wcl.org.uk/docs/assets/uploads/WCL_Blueprint_for_Water_PR24_Environmental_Manifesto_September_2021.pdf

³⁰ <https://www.wcl.org.uk/regional-water-resources-planning-why-it-is-important.asp>

³¹ Ofwat. (2023). Water Company Performance Report 2022-2023. <https://www.ofwat.gov.uk/publication/water-company-performance-report-2022-23/>

³² <https://www.telegraph.co.uk/news/2022/08/04/water-executive-promises-halve-leaks-2050/>

Government and Ofwat must direct the water industry to invest sufficiently in water infrastructure, and must take enforcement action when these obligations are not met.

Government must also drive action to reduce water demand and increase water efficiency. We currently face a water deficit of 4 billion litres per day by 2050³³ but have one of the highest rates of water usage in Europe, putting pressure on the natural environment.³⁴ To address this, both businesses and domestic water use must be reduced through tighter efficiency requirements for new developments and water saving retrofits. Government must also remove restrictions limiting water meter rollout, to enable universal metering across England.

Working with nature: examples

Hesketh Out Marsh, Lancashire

The RSPB, the Environment Agency and Natural England created this 180-ha wildlife-rich saltmarsh to perform natural flood management. The restored marsh helps protect the local sea wall and absorbs water from high tides, cutting flood risk for 1050 ha of land from 1 in 50 years to 1 in 200 years. The new marsh has attracted a wide variety of wading birds, including avocets, little egrets, redshank, teal and wigeon.

Wicken Fen, Cambridgeshire

On this site the National Trust restored arable land to lowland fen, creating a flood storage area capable of dealing with a 1 in 20 year flood event. This is estimated to protect 53 houses and 50 ha of farmland from flooding, providing flood protection benefits of £35/ha/y, as well as gains of £482/ha/y in nature-based recreation and £51/ha/y in climate mitigation.

Two Valleys, West Somerset

WWT and the Environment Agency have used natural flood management to reduce flood risk around the Monksilver and Doniford stream catchments. This project 'Two Valleys: Slow the Flow' uses low-cost interventions including leaky dams, tree planting, wet woodlands and ponds to work with the landscape to hold more water upstream, and slow the flow downstream. This protects communities from flooding whilst also improving biodiversity, water quality, and carbon capture.

³³ <https://www.gov.uk/government/publications/meeting-our-future-water-needs-a-national-framework-for-water-resources>

³⁴ <https://www.theguardian.com/environment/2022/aug/06/britain-drought-measures-hosepipe-bans-beavers-warer-butts>

The Wyre Catchment Natural Flood Management (NFM) Project, Lancashire

The Wyre NFM Project will use nature-based solutions to reduce flood risk in the Wyre Catchment, implementing more than 1,000 targeted measures to store, slow and intercept flood water. Modelling has shown that NFM features may reduce flood frequency for 120 properties and secure large cost-savings for local stakeholders and businesses. The project's innovative blended finance model will combine public and private upfront investment with long-term revenue from payments for ecosystem services including flood risk reduction, carbon sequestration and biodiversity gain. The project is being led by the Rivers Trust, the Wyre Rivers Trust, Triodos Bank UK, the Environment Agency, United Utilities, Flood Re, Co-Op Insurance and the Esmée Fairbairn Foundation.

Wildlife and Countryside Link (Link) is the largest nature coalition in England, bringing together 82 organisations to use their joint voice for the protection of the natural world and animals.

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