



Scaling up Nature-based Solutions in England's National Climate Change Adaptation Programme

Policy Brief
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Executive Summary

- **A wide range of nature-based solutions (NbS) help communities and businesses cost-effectively adapt to climate change**, from saltmarshes protecting our coasts to trees and green roofs soaking up floodwater and cooling our cities.
- **NbS can help to address all of the eight highest priority climate risks in the UK** and its overseas territories, and 33 out of the 34 risks where more action is urgently needed, while delivering multiple benefits for people, nature and the economy.
- **NbS were under-represented** in the second National Adaptation Programme and there is a danger that opportunities to deploy NbS for adaptation will be missed, compromising our resilience to climate change impacts.
- **Scaling up NbS is a priority for England's third National Adaptation Programme.** A wide range of NbS should be implemented, backed by strong and consistent policies, well-targeted funding, high quality standards and a robust monitoring system.
- **NbS should be designed in partnership with local communities and informed by high quality interdisciplinary research**, to maximise benefits for biodiversity and people locally.

NbS for climate change adaptation

Nature-based solutions involve working with nature to tackle societal challenges, with benefits for both people and biodiversity. A wide range of NbS can be used to help communities and industries adapt to the impacts of climate change, often tackling multiple hazards simultaneously¹ (Figure 1).

NbS can help to address all of the eight highest priority climate risks in the UK and its overseas territories (Table 1), and 33 out of the 34 risks where more action is needed.²

NATURE-BASED SOLUTIONS FOR CLIMATE CHANGE ADAPTATION

Coastal flooding and erosion	Inland flooding and erosion	Water supply and quality	Heatwaves	Food security
Coastal & marine <ul style="list-style-type: none"> Managed realignment (saltmarsh) Sand dunes Seagrass meadows Kelp forests Coldwater reefs Coral reefs* Mangroves* 	Natural flood management (NFM) <ul style="list-style-type: none"> Rural woodlands Leaky dams / bunds Floodplain reconnection, river restoration Peatland restoration 			Marine protected areas, seagrass, kelp, etc.
	Green and blue infrastructure <ul style="list-style-type: none"> Sustainable drainage (SuDS), Green roofs / walls Urban trees and green spaces 			
	Agro-ecology <ul style="list-style-type: none"> Agro-forestry, hedgerows, buffer strips Cover crops, minimum tillage, soil organic matter, crop diversity etc 			

*UK Overseas Territories

High quality sustainable drainage systems, like this one at Woodberry Down, capture stormwater and allow it to infiltrate naturally into the ground, replenishing groundwater supplies while providing attractive green space for recreation and habitat for wildlife. Photo: Susdrain.



Table 1: NbS can contribute to all eight of the highest priority climate risks from the UK's third Climate Change Risk Assessment (CCRA3)³

	Priority climate risk (from CCRA3)	How NbS can contribute
1	Risks to the viability and diversity of habitats and species	NbS support or enhance biodiversity and ecosystem health, which underpins resilience
2	Risks to soil health from flooding and droughts	Agro-ecological methods (e.g. cover crops, hedgerows and agroforestry) improve soil structure, drainage, infiltration and water storage
3	Risks to carbon stored in ecosystems	Protection and restoration of peatlands and other ecosystems
4	Risks to farming and forestry from heat stress, drought, flooding, fire, pests, diseases & invasive species	Agro-ecological methods (e.g. cover crops, buffer strips, hedgerows, agroforestry, species-rich field margins, agroforestry and crop diversity) increase resilience
5	Risk of collapse of supply chains for food, goods and vital services	Agro-ecological methods can improve food and water security globally. NFM can reduce flood and erosion risks to infrastructure.
6	Risks to people and the economy from power system failure	NbS can protect power stations from flooding and coastal erosion, and protect cooling water supplies.
7	Risks to human health and productivity from overheating	Green roofs and walls, green spaces and trees can cool buildings and reduce energy demand for air conditioning
8	Risks to the UK from climate change impacts overseas	NbS can help all nations adapt to climate risks, reducing geopolitical and supply chain risks to the UK



Multiple benefits of NbS

Conventional engineered options for climate adaptation (such as dams, sea walls or air-conditioning) are often energy-intensive and may have adverse impacts on biodiversity. In contrast, NbS offer multiple additional benefits for people, nature and the economy.

BENEFITS FROM NBS INCLUDE:

- 1. Carbon storage and sequestration** - NbS protect and enhance the carbon stored in soils and vegetation, and sometimes enable reductions in greenhouse gas emissions from other sources such as fertilisers and fossil fuels, helping to address the causes of climate change.
- 2. Biodiversity and ecosystem health** - NbS are explicitly designed to deliver benefits for biodiversity, which underpins the health and resilience of ecosystems and the flow of benefits from nature to people.
- 3. Air quality** - Trees, hedgerows and green walls can help to filter out air pollution.
- 4. Health** - Access to nature-rich green and blue spaces has been proven to deliver significant benefits for human health and well-being⁴.
- 5. Jobs and the economy** - NbS can create jobs, support new businesses such as eco-tourism, help to regenerate deprived urban areas, save money for the NHS by improving public health, save energy costs by keeping buildings cool, and reduce the costs of flood damage.⁴

In addition, NbS can often also be cheaper to implement and maintain than engineered options, and when all their multiple benefits are taken into account, they usually have higher benefit:cost ratios.^{2,5} They can be used as standalone solutions or as part of a hybrid system that includes engineered options, which may be necessary in some cases to provide full protection against extreme events such as large floods.

To maximise benefits and address any trade-offs, NbS need to be well-designed and managed at the landscape scale through stakeholder partnerships that include local communities, businesses and farmers. The aim is to deliver the most appropriate and effective interventions in the right locations, following guidelines based on the best evidence from science and practice.



A photograph of a river flowing through a dense forest. The water is calm and reflects the surrounding greenery. The banks are lined with various trees and plants, including some with bright pink and yellow flowers. The scene is peaceful and natural.

Recommendations for scaling up NbS in the third National Adaptation Plan

Evidence on the effectiveness of NbS is growing⁶, but deployment is hindered by barriers related to information, finance, governance and regulation. The third National Adaptation Plan presents an opportunity to set a strong policy framework for rapidly scaling up delivery of high quality NbS. The recommendations below can help to transform the role of NbS in UK climate policy, to simultaneously contribute to climate resilience, net zero goals and nature recovery while also strengthening our economy, creating green jobs, improving health and well-being and reducing social inequality.

1. Integrate a wider range of NbS into the third National Adaptation Plan

The second National Adaptation Plan (NAP) for England recognised a limited range of NbS (urban trees, natural flood management, saltmarsh and peatland restoration) but there are opportunities to include a far wider range of NbS in the third NAP. Key options include:

- **Green roofs and walls** could play a vital role in flood reduction and urban cooling if supported through local planning policy, such as via the new Urban Greening Factor developed as part of the [Green Infrastructure Standards](#).
- **Sustainable Drainage Systems (SuDS)** will be able to play a much greater role when they become [mandatory for new developments](#) in England, following consultations and an impact assessment later this year. There is also an opportunity to highlight the role of SuDS and natural flood management for enhancing water supply through promoting infiltration and groundwater recharge, which was not recognised in the second NAP.
- **Vegetation for slope stabilisation** is being investigated in Wales and there is scope to also consider this in England, in line with CCRA3 recommendations.
- **Agroforestry** previously faced a funding gap in England, which could be addressed through the new Environmental Land Management Scheme (ELMS) agroforestry standard, due in 2024.
- **Nature-based agriculture** to protect and regenerate soils and provide climate resilience received little attention in NAP2. However, the new ELMS standards for soil management could help to address this, together with proposed future standards for hedgerows, farm woodland, integrated pest management, water body buffers and organic agriculture.
- **Natural regeneration of woodland** can be cheaper than tree-planting, avoids the need for plastic tree guards, and results in a more biologically diverse structure and composition which can be more resilient and provide greater benefits (e.g. for flood protection) in the long term.
- **Rewilding** can create a diverse mosaic of natural grassland, woodland and scrub that supports livestock and pollinators while also reducing flood and erosion risk, regenerating soil and promoting eco-tourism.
- **Seagrass meadows, kelp beds and cold water reefs** can reduce coastal flood and erosion risk.
- **In the UK Overseas Territories, coral reefs and mangroves** can help provide storm protection and fish production, and **cloud forests** are important for water security.

In addition, some of the NbS that were mentioned in the second NAP require more policy support and funding to scale up deployment on the ground.

- **Managed realignment** of coasts, with creation of protective saltmarshes, is falling short of targets set in the Shoreline Management Plans² and the CCC has recommended that these plans become statutory to ensure they are implemented and monitored.⁷
- **Natural flood management** faces high funding and regulatory barriers,⁸ and continued support is needed for the Environment Agency's successful work to address these via a catchment-based approach working with stakeholders and landowners.⁷
- **Peatland restoration** rates need to increase and proposed bans on burning and extraction in the [England Peat Action Plan](#) need to be strengthened and brought forward, closing the loopholes which allow peat sales to professional gardeners and continued burning of peatland under license (e.g. on steep slopes).⁷



2. Mainstream NbS by developing coherent policies across all sectors

To deliver multiple benefits and minimise trade-offs between objectives, Government departments need to work together to set a common vision and harmonise policy.

- **Set up a cross-departmental working group** (including Defra, DESNZ, HMT, DLUHC, DfT and DHSC) to promote the delivery of high quality NbS by developing a shared vision, targets and action plans.
- **Strengthen recognition of NbS as essential climate adaptation infrastructure.** Good progress has been made through enabling the National Infrastructure Bank to class NbS as infrastructure, unlocking more investment options. The National Infrastructure Strategy could include more support and funding for a broader range of NbS, including urban green infrastructure and coastal habitat restoration.
- **Integrate NbS for adaptation into national nature recovery plans** and set strong environmental policies to support healthy, resilient and well-connected ecosystems. Pressures on ecosystems need to be reduced, and NbS connected into ecological networks, so that current and future NbS will be resilient to future change.
- **Planning policy must provide stronger protection for ecosystems.** Reforms to the planning system through the Levelling-up and Regeneration Bill need to ensure that the new Environmental Outcome Reports and National Development Management policies strengthen rather than weaken existing planning protection, including in Investment Zones and Freeports.⁴ DLUHC should add an expectation in the NPPF that Local Plans and Design Guides support delivery of Local Nature Recovery Strategies and Natural England's Green Infrastructure Standards, including by safeguarding land designated for future delivery of Nature Recovery Networks.
- **The National Planning Policy Framework (NPPF) could encourage a participatory landscape approach** to integrate NbS delivery into local plans and policies, to deliver a diverse portfolio of the right NbS in the right places while balancing multiple objectives.
- **The Retained EU Law Bill** (as of 8/5/23) currently gives ministers powers to revoke all existing environmental protection legislation, undermining the integrity and resilience of NbS. This must be strengthened through the inclusion of an environmental non-regression safeguard and reintroduction of parliamentary scrutiny for changes to legislation.
- **Protect the resilience of commercial fisheries** by restoring coastal marine habitats (including seagrass and saltmarsh), through bans on bottom trawling, enforcement of science-based fishing quotas, stronger protection of Marine Protected Areas to provide nursery areas to threatened commercial wild fish stocks, and stronger action to monitor and enforce the reduction of sewage discharges into UK rivers and seas.
- **Ensure that regulations support scaling up of good quality NbS** by negotiating affordable and streamlined licensing systems for NbS such as seagrass restoration, beneficial use of dredging material for coastal restoration, leaky dams and flood storage ponds in pre-approved locations, provided they comply with good practice guidelines. This should include implementation of the suggestions in the 2020 Environment Agency review of barriers to natural flood management.
- **Promote synergies between NbS for adaptation and mitigation.** Net Zero policies should support protection, restoration and connection of a wide range of habitats including native grassland and woodland, heathland, wetlands, peatland and coastal habitats, to provide climate adaptation services as well as carbon sequestration. Natural England are working to derive more robust carbon storage and sequestration metrics for these habitats.
- **Promote synergies between food security and other objectives** through supporting agroecology and agroforestry, which deliver adaptation services on farmland without compromising food production, and raising awareness of the need for dietary change and reduced food waste to free up land for NbS.

3. Fund high quality NbS for climate adaptation

More finance for NbS is needed to address the [£5.6bn funding gap](#) for nature recovery in the UK, including through novel mechanisms that recognise the multiple market and non-market benefits of NbS. There are opportunities to channel private sector funding to a wider range of high quality NbS with benefits for climate adaptation, rather than just tree-planting for carbon sequestration.

- **Monitor uptake of ELMS NbS options** for improving the climate resilience of agriculture, and adjust funding incentives if necessary to ensure wider take-up.
- **Reform funding and procurement mechanisms so that they recognise the wider benefits of NbS.** It should be mandatory to consider NbS alongside conventional engineered options, and to take into account their wider benefits, when allocating funding such as for flood risk management projects. Where wider benefits cannot be meaningfully monetised, funding for high quality NbS could be ring-fenced.
- **Develop blended finance options** that use public funding to leverage private funding.
- **Continue to support the development of a clear framework for stacking and bundling multiple benefits** (carbon, biodiversity, natural flood management, water quality), and showing how different schemes can work together (ELMS, BNG, carbon finance, nutrient neutrality).
- **Continue to support the development of robust and effective mechanisms for distributing costs and benefits** that clearly identify the providers and beneficiaries of NbS (e.g. property owners whose flood risk is reduced) and their responsibilities.
- **Increase funding for research, demonstration, and long-term monitoring.** This is needed to build the evidence base on NbS costs and social-ecological effectiveness, and will help to unlock more funding from both the public and private sectors by providing consistent performance metrics that can justify investment.
- **Fund knowledge exchange networks, professional advisory services and information hubs.** This is particularly important for agroforestry and agroecology where lack of information for farmers is a major barrier.
- **Provide enough funding to enable delivery and regulatory bodies to oversee the scaling up of high quality NbS.** Natural England and the Environment Agency are chronically under-funded.
- **End perverse subsidies** for activities with adverse impacts on nature and climate (e.g. fossil fuel extraction).



4. Set standards for high quality and resilient NbS and manage them adaptively to respond to change

Clear standards are needed to ensure that NbS delivered are high quality, multifunctional, and resilient to climate change.

- **Encourage adoption of the four NbS guidelines** and the more detailed [IUCN Standard](#) to ensure that NbS deliver real long term benefits for both people and nature, including through participatory design and delivery.
- **Support a minimum standard for green roofs** in planning policy, equivalent to 'Biodiverse Green Roofs' as defined in the [2021 GRO code](#). These are drought-resistant and deliver effective cooling and drainage, in contrast to the widely used thin sedum mats which have few benefits.
- **Adopt the [Revised Technical Standards for SuDS](#)** to ensure that high quality open, vegetated systems with benefits for water quality, biodiversity and amenity are delivered rather than basic underground pipes and tanks.
- **Support the agroforestry standard** in ELMS to help farmers understand what constitutes good practice, and the hedgerow standard that includes incentives for less frequent trimming.
- **Design NbS to be compatible with a 2°C increase in average global temperatures** by selecting appropriate sites, using a diverse mix of suitable species, planning to enhance ecosystem connectivity and using adaptive management to respond to change.
- **Plan NbS to deliver measurable benefits for biodiversity** through enhancing the health, diversity and connectivity of ecosystems and their habitats and species. Encourage use of diverse native species, and explore options for rewilding or natural regeneration to enhance benefits for biodiversity. Stronger guidelines are needed to avoid harmful trade-offs, e.g. not planting trees on species-rich grassland, heathland or peaty soil.
- **Support practitioner and researcher knowledge-sharing networks to spread good practice** and provide solid evidence of efficacy and benefits of NbS, such as the proposed agroforestry network.



5. Measure and monitor NbS delivery and outcomes

- **The National Adaptation Programme should set SMART (Specific, Measurable, Achievable, Relevant and Time-bound) objectives** for scaling up high quality NbS, with rigorous monitoring and evaluation processes to evaluate progress.
- **Government needs to provide clear, robust frameworks for monitoring, reporting and verification** that give NbS providers and funders clarity on what counts as a successful NbS. Uncertainty is holding back investment and delivery. Suitable science-based indicators and metrics are needed to assess the deployment, quality and outcomes of NbS for adaptation, along with co-benefits.
- **Improve the monitoring of biodiversity impacts**, which are rarely measured or are done so inadequately.
- **Urgently develop a soil health programme and associated indicators.** The Environmental Improvement Plan aims to publish a baseline map of soil health for England by 2028 and bring at least 40% of England's agricultural soil into sustainable management by 2028, but indicators are not yet developed.
- **Industry confidence can be improved by identifying science-based standards and calculators that are supported by government** and are compatible with ELMS and other regulations.

References

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For More Information

This policy brief is based on updated recommendations from this report, which contains further details and full supporting references: Smith, A. and Chausson, A. (2021) [Nature-based Solutions in UK Climate Adaptation Policy](#). Report by the Nature-based Solutions Initiative for WWF-UK and RSPB.



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