No Drought About It: Farming Agroecologically for Climate Resilience

Soil Association


Picture: Belmont Estate
Cover photo: Belmont Estate

Contents

Authors: Hannah Blitzer, Maddy Potter Wood

Executive Summary

Climate change is visibly undermining the resilience of UK farming, with farmers facing unprecedented challenges to their livelihoods and food production systems.

It is increasingly difficult for farm businesses to produce healthy, sustainable, and nutritious food for society. The wider food chain is also vulnerable to climate-induced shocks due to long supply chains and imports from the most climate-vulnerable countries.

The food and farming system needs to build its capacity to cope with the worst impacts of heat, drought and flooding and maintain the UK's food security.

Yet, policy does not currently support landscape-scale and sectoral resilience. Historically, large-scale industrial farming with its focus on short-term production gains has been favoured. However, this has come at the expense of adaptation actions that improve farmers' ability to cope with a range of stressors – from extreme weather to supply chain shocks.

No Drought About it: Farming Agroecologically for Climate Resilience makes the case for governments across the UK to prioritise agroecological approaches - including organic farming systems - in policy, as affordable, cost-effective, and profitable ways to embed climate resilience on farms. It calls for system transformation through a joined-up approach that delivers both nature-based solutions and infrastructure, supports practices such as whole-farm planning and knowledge exchange, and leverages public and private investment to sustain long-term profitability and production.

This report identifies that policies for climate mitigation and adaptation are vital to support the creation of a resilient food and farming system.

It assesses agroecological farming systems, supported by case studies and policy updates from across the UK, to strengthen environmental and economic resilience in farm businesses. This needs to go beyond the current focus on water availability and flood protection, though these will play a vital role. The report highlights four practices as priority areas for investment to promote on-farm adaptation to climate change and build resilience: **soils, livestock, agroforestry,** and **inputs**.

The report concludes by recommending a Ten-Point Plan for Building Climate Resilience:

1. **Develop a national resilience plan for farming**
2. **Strengthen soil protections**
3. **Scale up production and consumption of climate-friendly foods**
4. **Reduce industrial livestock production**
5. **Reduce reliance on synthetic inputs**
6. **Scale up agroforestry**
7. **Improve monitoring and baselining to track progress**
8. **Make supply chains fairer for British producers**
9. **Make private markets work for climate resilience**
10. **Invest in the right technology, infrastructure, and renewables for resilience.**

Together, these proposals offer a coherent framework to advance the transition to agroecology, helping farmers create a more resilient future.

Many farmers are already adopting agroecological and organic practices, but the interconnected components of this Ten-Point Plan for Building Resilience will support broader systems transformation. As this report outlines in detail, public and private investment, alongside whole-farm planning, advice, and knowledge exchange, will improve resilience in the farming sector.

Government policy must support and align with these objectives to guide the transition. Only with coherent policies and a long-term vision can the farming sector build the resilience needed to meet the challenges ahead.

Picture: Heart of BS13

1. Introduction

Our society must adapt to cope with the impacts of climate change. Building resilience across livelihoods, economies and the environment is essential for anticipating, responding to and adapting to a changing climate.

This is especially true for our food system. Yet the UK farming sector faces severe and unprecedented challenges. Extreme weather, economic and geopolitical uncertainty, and unfair supply chains make whole farm resilience to climate change a complex challenge. For a secure and thriving food system which can withstand the stress of climate change, we need system transformation.

The compounding nature of these pressures now exposes farm businesses to risks that are broader and more unpredictable than ever before. 2025 was the warmest and driest year on record, following a record-breaking wet winter in 2023-24.[1] A whopping 80% of farmers are at risk of leaving the sector as extreme climatic events disrupt cash flow and production.[2]

Short-term fixes, such as building more reservoirs or hard flood defences, will have a role but will not be enough to build resilience in isolation. Successfully adapting to a changing climate will mean taking a whole-systems approach at both the farm and catchment levels. This includes choosing cropping patterns that place less pressure on water supplies, alongside working with farmers in upper catchments to store water appropriately.

Consumers are already facing food price inflation driven by extreme weather[3], as heatwaves, drought, and flooding increasingly disrupt both imports and staple British crops. Recent climate inflation projection modelling indicates that, under high-emissions scenarios, UK consumers could face 34% increases in overall food prices by 2050 due to climate change.[4] Both inflationary increases in individual products are likely to exceed these figures by 2050.[5]

Policy has historically prioritised short-term increases in production to deliver food security, undermining resilience. Yet agroecological practices, including organic farming, are essential to the solution to the climate and nature crises. **These nature-based solutions increase the ability of farming systems to cope with extreme stress, while promoting stronger community connections and localised food systems that can adapt to changing market conditions**.[6]

What is climate resilience, and why is it vital for farmers?

Building climate resilience means increasing the ability of a system to deal with, learn from and transform in the face of current and future climate risks.

For resilience to be effective, it must be built in at all levels, from individuals and their livelihoods to businesses and economies, as well as ecosystems.[7] A resilient agricultural system and its social, economic, and ecological components will continue to function throughout climate variability, disruption, and hazardous events.[8 9] While food system resilience has many dimensions, this report focuses on farm-level resilience.

Adaptation is central to this process. It refers to the practical changes made on the farm to manage new conditions and strengthen the farm's ability to withstand and recover from stress. Adaptation measures that promote healthy and diverse ecosystems are essential.[10] As seen with pollinators, resilient fruit production depends on farms that enable insects to adapt and thrive in a changing climate.

Building resilience, therefore, means farming in ways that help ecosystems thrive, enabling farmers to continue producing food under increasing climate stress.

The current food system encourages unsustainable production and consumption of meat and animal products from intensive livestock systems. This undermines resilience, driving disproportionate land use for feed, harming public health and inhibiting nature recovery, as well as contributing to poor animal welfare[11], air and water pollution[12 13], and overreliance on antibiotics.[14] **Agroecology provides a holistic alternative** that supports a just transition to a resilient food system from farm to fork, with broad environmental, economic and social gains. It prioritises the production of whole foods, such as beans and pulses, and supports extensive livestock farming, enabling dietary shifts towards less and better meat.

In this report, we outline why agroecological and organic practices must be prioritised in government policy as affordable, cost-effective, and profitable ways to embed climate resilience on farms.

Only a small number of national climate change plans recognise the key role agroecology plays in climate adaptation.

The UK is not among them.[15] Despite the UK recently acknowledging the need for better evidence on agroecological farming in its Carbon Budget and Growth Delivery Plan commitments to reduce synthetic fertilisers and improve soil structure, it is unclear how this evidence base will be built or practically implemented for climate action.[16 17] UK approaches to climate risks, including for agriculture, are inadequate.[18] Weak links between the Third National Adaptation Programme and land use compound these issues.[19] For example, England's Environmental Land Management Schemes are the primary vehicle for farming and land use adaptation; however, five years on, they are still not fully operational.

As this report demonstrates, UK climate risks are severe, and policy frameworks are too siloed to deliver the scale of adaptation required. However, adaptation is only one part of the equation. Climate change and nature are inextricably linked. Rising greenhouse gas emissions drive climate change, in turn driving biodiversity loss. Yet nature-based solutions are key to mitigating emissions.[20] To ensure adaptation remains feasible, we must also rapidly cut emissions, halt biodiversity loss, and promote nature recovery.

Climate resilience, therefore, requires both mitigation and adaptation actions across public, private and community actors.[21] Reducing emissions now through regenerative, systems-driven practices like agroecology minimises the level of adaptation needed to sustain a healthy food system. Failure to do so will limit the ability of both farmers and rural communities to cope with climate change.

Farmers need the right resources, as well as new infrastructure, to adapt to climate change and volatile geopolitical conditions. Alongside nature-based solutions, farmers may need access to appropriate water storage, data, and land management skills to mitigate vulnerability. Strategic policy measures and financial investment linked to long-term outcomes, supported by accessible advice and guidance, are vital to enable this agroecological transition. Similarly, fairer supply chains are necessary to facilitate agroecological adaptation.[22]

To help guide the just transition towards climate-resilient food production, this report outlines four priority areas where scaling agroecological farming practices delivers multiple wins for production, food security, public health, the environment, the economy and the future of farming.

Picture: Shillingford

2.
The challenge and the evidence

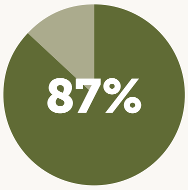
Climate change is increasingly threatening the UK's food system. In 2025, the UK experienced its warmest spring and summer on record[23], triggering early harvesting and severe yield reductions.

Some farmers reported up to an 80% decline in grass production for their livestock[24], and cereal and oilseed harvests declined by 22% in 2024.[25] The UK's food system is highly vulnerable to extreme weather events, production levels are volatile, and exposure to extreme weather will only increase.

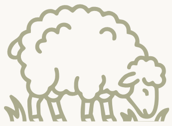
Climate change impacts vary across regions but are interconnected. Stressors can interact to compound into feedback loops that cascade into multiple impacts across sectors.[26] Rising temperatures and summer droughts reduce livestock welfare and productivity[27], while heatwaves disrupt essential ecosystem services, including pollination and natural pest control.[28][29] Flooding is also a significant concern, with more than half of the UK's highest-quality agricultural land considered at risk.[30] Extreme winter rainfall has already caused substantial losses of key crops, including brassicas[31] and potatoes[32], and disrupted vegetable production.[33] Domestically, vegetable production is concentrated in fragile peatlands known as the Fens, which are rapidly degrading and further contributing to climate change.

Without urgent intervention, these risks will accelerate. Projections suggest that by 2070, UK summers could be up to 60% drier and winters 30% wetter, increasing the frequency of intense heat, drought, and flooding events.[34] Meanwhile, the need to transform agricultural practices for climate mitigation purposes cannot be overlooked. Agriculture contributes significantly to the UK's greenhouse gas emissions, including nitrous oxide and methane, and current fertiliser use and intensive livestock systems risk amplifying climate impacts.[35]

The climate challenge in numbers



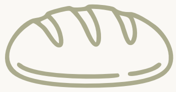
87% of farmers report productivity impacted by extreme weather[36]



80% decline in grass yields for animal forage on some farms in 2025[37]

22% fall in cereal and oilseed harvests in 2024[38]

£361 increase in average household food bills due to climate change between 2022 and 2023[39]



34% projected rise in food prices by 2050 under high emission scenarios[40]

The climate change impact on global production is simultaneously harming UK food security. Climate-related shocks are already impacting costs across global supply chains, which are passed on to consumers' wallets and plates.[41] The UK is heavily reliant on food imports, particularly for horticulture.[42] This leaves UK food security highly vulnerable to both domestic production volatility and global supply chain disruptions.[43] By 2050, it's projected that 72% of UK fruit and vegetable imports from key countries such as Spain and Morocco will face extreme water stress. Consumers are already experiencing the impacts of "droughtflation" and "floodflation", where extreme weather events in exposed regions are hitting local price tags.[44] Without intervention, this will continue to increase. The combined effect of domestic yield fluctuations and global supply shocks is driving prices higher, a trend that will disproportionately affect low-income households under high-emission scenarios.[45 46]

Despite these challenges, strategies for adaptation, including for adaptive infrastructure, remain underdeveloped. Farmers are insufficiently supported or incentivised to adopt climate-resilient practices, with pauses to initiatives such as the Sustainable Farming Incentive (SFI) in England further limiting opportunities to scale up adaptation.

Effective adaptation requires integrated, systemic approaches that enhance resilience across soil, crops, livestock, and ecosystem services. Investments in resilience have the potential to offer strong economic returns while supporting biodiversity and public health outcomes.[47 48] However, **adaptation alone is insufficient**. Without urgent action to slow or reverse climate change, the scale and intensity of these threats will outpace our ability to respond.[49] Agroecological interventions, as outlined in this report, offer a practical pathway to enhance farm-level resilience, support sustainable production, and contribute to broader climate mitigation. It is therefore a critical tool in securing the UK's food system for the future.

Farming Approaches that Fail the Climate Adaptation Test

Growing maize on steep slopes and land liable to flooding
Maize is becoming an increasingly popular crop for biofuel feedstock, proposed as a sustainable energy crop and alternative to fossil fuels. However, maize crops leave soil exposed during much of the year. When planted on steep slopes, soils susceptible to erosion, and on floodplains, this increases the risks of soil degradation, flooding, and waterway pollution with pesticides and nutrients.[50] Well adapted to hot, dry climates, maize has potential as a future food crop, but only when grown in suitable locations and with practices that protect soil health.

Findings from **Innovative Farmers** trial labs show that these risks stem largely from cultivation practices rather than the crop itself, with alternative establishment methods and undersowing able to maintain yields while improving soil structure and infiltration.[51] A resilient approach, therefore, means selecting land uses to accommodate geological and hydrological factors. Practices like u**ndersowing, rotational grazing** and wetland compatible cropping can support soil health, whilst **buffer strips, agroforestry and herbal leys** can provide flood defence.[52]

Ploughing of grasslands
Driven by pressure to expand production, ploughing grasslands can deliver short-term gains at the price of long-term damage to productivity. This practice accelerates soil erosion and increases sedimentation and nutrient pollution in waterways.[53] Converting permanent grasslands also reduces biodiversity as habitats for pollinators and ground-nesting birds are lost.

Instead, incorporating agroecological practices such as **agroforestry in suitable grasslands** can support soil stability and carbon storage.

Industrial intensive poultry units
Intensive systems that depend on air conditioning may be described as climate resilient, as they maintain production despite rising temperatures. However, reliance on energy-intensive cooling increases emissions and vulnerability to energy price shocks. Intensive poultry production also comes with risks of increased ammonia, nitrate and phosphate pollution, which harms waterways and air quality, and these systems may prioritise efficiency over animal welfare.[54]

Rather than encouraging technological dependence, a resilient poultry system would adapt through **breed selection** and **natural ventilation**, and would be part of a transition to **'less and better' meat and dairy consumption** to reduce demand for intensive livestock production.

Industrial livestock production and feed demand

Large-scale, intensive livestock production generates a significant demand for domestic and imported animal feed. Commodity feed production at home relies heavily on synthetic inputs. In contrast, imported feed offshores environmental harms related to the UK food system, disconnects livestock from UK ecosystems, and increases vulnerability to global market disruptions. Soy fed to UK livestock uses approximately 850,00ha of land abroad[55], equivalent to around 1.2 million football pitches. This has driven land use change, deforestation, and ecosystem destruction on a massive scale in countries like Brazil. Tropical feed imports also artificially sustain high levels of pork and poultry production, which could not be produced under an indigenous UK food system, and underpin the consumption of meat products at levels that negatively impact both human and ecosystem health.

Locally sourced, circular feed systems can improve climate and economic resilience, for example, using **UK-grown legumes** to reduce soy imports for chicken feed and implementing **mixed forage crops** for grazing outwintered cattle.[56] However, as this report shows, **dietary changes** are essential to reduce demand for intensive meat production and facilitate the transition to more sustainable production aligned with UK landscapes.

The risks of intensification

Intensification, often underpinned by technologies such as genetic modification, is often promoted as a climate mitigation strategy, on the assumption that producing more food per hectare will reduce emissions and land use pressures. However, intensification frequently depends on external inputs, energy-intensive infrastructure, and specialised offshored monocultures. These practices can lock farmers into systems that deplete ecosystem functionality and increase their vulnerability to market shocks. Intensification of livestock production can create a mutually reinforcing chain of risks to soil health and resilience. For example, larger herds generate more manure, increasing the requirement for on-farm anaerobic digestion, which simultaneously drives increased maize cultivation for both livestock feed and anaerobic digestate energy needs.

A climate strategy centred on intensification risks short-term gains a t the expense of long-term stability. True resilience means tackling mitigation and adaptation through **holistic, diversified and systems-based, agroecological approaches.**

3. Recognise the importance of thriving soils for food security in a changing climate

Soil health is key for climate, nature, and health. It underpins nature-friendly food production, supports food quality and enables agricultural climate change resilience.[57]

Soils must be healthy to infiltrate and store water.[58] In the UK, soils have the capacity to store 130 trillion litres of water – more than all the UK's lakes and rivers combined.[59] Healthy soils reduce flooding and increase resilience to drought, acting as a sponge for rainfall.[60] Soils in good condition also function as a carbon sink, sequestering and storing carbon and improving our ability to mitigate climate change.

Yet, our soils are in crisis. Soil degradation costs were estimated at £1.2 billion per year in 2010.[61] In 2013, soil carbon loss equated to about 4% of the UK's greenhouse gas emissions.[62] As of 2019, 4 million hectares of soil were at risk of compaction in England and Wales.[63] Urgent action is needed.

Decades of policy, economic and market pressures have shaped a system that often leaves land managers with limited choices.

The drive for higher yields, short-term gains, and low-cost production, reinforced by market volatility and policy incentives, has encouraged intensive practices including monocropping, heavy mechanisation and reliance on fertilisers and pesticides. These practices have weakened soil function and reduced the ability of soils to regulate hazards such as flooding, drought, fire, and storms.[64 65]

Poor soil management compromises both climate mitigation and adaptation. UK soils contribute to 21% of total UK agricultural emissions, with management practices like artificial fertiliser use contributing further.[66] In England, late-harvested crops such as maize create erosion risks, especially on floodplains, and horticultural cultivation on fragile peat soils, such as the Fens, raises carbon emissions and flooding concerns. These soil pressures threaten progress towards net zero and climate resilience.[67]

Degraded and bare soils are more vulnerable to compaction, erosion, desertification[68] and run-off. Abnormal soil moisture content, alongside low soil organic matter, reduces yields and increases the risk of crop failure due to poor nutrient uptake and reduced water retention. This creates a vicious feedback loop as farmers increasingly rely on fertilisers, pesticides, and irrigation systems. These practices generate knock-on impacts for the broader ecosystem.

Heavy rainfall can cause nutrient leaching into rivers, while drought and heatwaves compromise water availability and the biodiversity upon which on- and off-farm systems rely.

Agroecological and regenerative soil management can strengthen resilience to floods and drought while improving the farm's capacity to sustain crop productivity in extreme conditions. The recent focus on soil health through the regenerative farming movement provides a welcome boost to the historic emphasis on soil health that has always underpinned organic farming.

Key adaptive agroecological practices include:

- **Adopting a whole farm approach:** A whole farm approach is a key factor in supporting a shift towards more sustainable farming – building resilience to economic and climate shocks while delivering public goods, reducing GHG emissions, increasing carbon sequestration and enhancing biodiversity.
- **Diversifying and rotating crops:** A narrow diversity of crops, particularly with large-scale monocultures, undermines soil health. Biodiverse agroecosystems show better soil health and lower economic losses than neighbouring monoculture farms.[69]
- **Optimising tillage:** As evidenced in organic and agroecological farming systems and in **Innovative Farmer** trials, cover crops, agroforestry, and living mulches reduce the need for intensive ploughing while improving soil structure and nutrient levels.[70] Min- and no-till systems can improve soil health and boost resilience to extreme stressors, but must address compaction and increased reliance on artificial inputs.
- **Reducing chemical inputs:** Overreliance on synthetic pesticides and fertilisers can undermine soil biodiversity and ecological functionality.[71][72] Organic farming is an exemplary model for a productive agroecological system that does not rely on pesticides and herbicides.
- **Cultivating deep-rooted plants:** Managing deep-rooted plants, such as herbal leys, improves soil structure and moisture content, which in turn safeguards soil health, enhances drought tolerance, and contributes to more consistent crop outputs.
- **Planting more trees on farmland:** Integrating more trees through agroforestry can boost environmental and socio-economic resilience. Agroforestry systems improve ecosystem services, support crop and animal welfare under extreme weather, and increase access to opportunities in tree fruit, nut, and timber markets.

Saving soils through farmer collaboration

Farmers need to access the right tools and networks to build resilience. The Soil Association's Innovative Farmers network is undertaking practical research on field-scale agroecological interventions common in organic practice.

One trial is investigating whether introducing diverse, deeper-rooting species into herbal ley mixes can help reduce flooding in catchments and improve drought resilience. The introduction of bespoke herbal ley mixes may also support soil water retention and complement activities undertaken on field margins and watercourses.[73]

State of UK policy

Healthy soil is integral to the resilience of food production and the farm business in the face of extreme weather.

However, national policy frameworks for soil are not currently ambitious enough to address the mounting risks to soil health.

Previous commitments to publish a Soil Health Action Plan for **England** were shelved and folded into the Environmental Improvement Plan. The plan initially committed **to all** soils being sustainably managed by 2030, but this target has since been reduced to 60% of soils. The Sustainable Farming Incentive includes payments for soil management plans and testing, though these are not mandatory actions, and there is no requirement to implement the plans.[74]

In **Scotland**, the Scottish Soil Framework needs updating, as many of the risks it identified in 2009 are still prevalent, undermining food security and climate resilience.[75] Environmental Standards Scotland has indicated that Scotland is falling behind international best practice, signposting an opportunity for the country to set statutory targets to protect and monitor soils.[76] Farm support payments are subject to Whole Farm Plans, which include a soil analysis.[77] The Scottish Government recently (2024/25) commissioned ClimateXChange to produce a route map that reviews where soil protection already exists, and explores opportunities to go further, including the potential for statutory targets.[78]

In 2025, the Welsh Government published an Agricultural Soil Policy Statement that outlines a vision for sustainable soil management in **Wales**. While it is not a binding regulatory framework, the Statement outlines objectives to make agricultural soils more resilient for current and future generations, nature, and climate.[79] The Sustainable Farming Scheme requires all farm businesses seeking payments to undertake soil testing.[80] However, as flagged by the Senedd's Economy, Trade, and Rural Affairs Committee, this requirement must be backed with capital support and guidance to enable farmers and land managers to act on the findings.[81]

In 2024, the Department for Agriculture, Environment and Rural Affairs (DAERA) launched the Soil Nutrient Health Scheme (SNHS), which aims to provide most farms in **Northern Ireland** with field-level soil analysis and nutrient maps. The SNHS is a voluntary scheme; however, participation is planned to be a condition for the receipt of the Farm Sustainability Payment, which will come into play in 2026. Whilst it marks a positive step towards evidence-based soil management, policies for soil health remain relatively underdeveloped in Northern Ireland, with no dedicated soil health strategy or targets.

4. Optimise the role of livestock in the right farming systems

It is widely accepted that food and farming must change to address the climate, nature and health crises.[82][83] This requires changing how we use land and how we eat.

Research shows that tackling runaway climate change and building resilience depends on dietary change: greater consumption of beans, legumes, fruit and vegetables, with smaller portions of meat and dairy from higher-welfare, extensively reared animals. This would free up land currently used to grow livestock feed and prioritise its use for grass-based livestock farming, the production of food for human consumption, and other land uses such as nature recovery. Extensive systems use manure and nitrogen-fixing crops to support soil fertility.

Our dietary choices impact our health and the environment. The UK eats twice the global average amount of meat[84], with nearly a third consumed as processed products linked to diet-related disease.[85]

Industrial livestock systems[86] are not climate resilient. Designed to produce artificially cheap foods, they rely on large concentrations of animals, and high levels of synthetic fertiliser and agrochemicals. This drives climate change and overseas land use change in sensitive ecosystems, and these systems are vulnerable to trade shocks.

Industrial livestock production continues to benefit from hidden forms of support that mask its true environmental and social costs. Subsidies and market incentives favour high-input, feed-dependent systems over mixed and extensive pasture-based farming.[87] Weak regulatory frameworks also act as indirect support, alongside planning policies that allow new or expanded intensive units even in nutrient-overloaded catchments.[88] The offshoring of habitat destruction, soil degradation and other environmental harms resulting from feed demand also keeps industrial livestock artificially competitive.[89] These mechanisms entrench industrial models of production and shift financial burdens onto the public and the environment rather than operators of industrial systems.

The scale and intensity of livestock production, paired with demand for domestic and imported feed[96], is undermining resilience. Over a third of UK wheat production – a crop that uses high levels[97] of synthetic nitrogen fertilisers - is fed to pigs and poultry.[98] The UK imports over 2 million tonnes of soybean meal annually.[99] Commodity soy production is driving habitat clearance and deforestation in vulnerable regions such as Brazil's Cerrado.[100] It also relies on hazardous pesticides (some of which are banned in the UK[101]). The cumulative impact of these practices irreversibly damages ecosystems that would otherwise act as carbon sinks[102], increasing greenhouse gas emissions and threatening the health and well-being of local communities.

Housing large concentrations of livestock indoors is not a viable, long-term climate mitigation or adaptation strategy. High-density indoor housing exposes animals to heat stress from summer temperatures[90] and winter humidity, undermining animal welfare and driving up energy intensity and costs for farmers. Moving industrial systems outdoors does not automatically increase resilience either; stocking large numbers of animals on limited land risks land degradation and pollution from synthetic fertilisers and excess manure.[91]

Industrial livestock systems are also a significant source of airborne emissions linked to ammonia, methane, and nitrous oxide.[92 93] In 2022, livestock accounted for 63% of UK agricultural emissions, including all agricultural methane.[94] Emissions reductions are one co-benefit of a shift to more resilient, agroecological farming systems with a rapid reduction in the large numbers of animals in industrial systems.[95]

These pressures create significant risks to global supply chains.[103]

Urgent action is needed to mitigate the climate, nature and health impacts of industrial livestock. Dietary change and supply-chain reforms, including a substantial reduction in animal protein consumption, will be essential for public health, food security and future Carbon Budget pathways. A strategy is needed to work with farmers and citizens to shift towards greater production and consumption of whole and minimally processed alternative proteins, such as nitrogen-fixing beans and pulses, to maximise resilience.

Livestock still plays a vital role in a resilient system centred on rotations, forage, and farm-level nutrient circularity. When aligned with a 'less and better' approach that prioritises domestic products, grazing livestock can increase on-farm adaptive capacity while reducing pollution and emissions.[104 105 106] Surplus, waste food, and food-processing byproducts could also be used to feed animals within a circular economy.[107]

Adaptation must be tailored to the farm context and should adopt whole-farm approaches that look beyond carbon and methane alone towards a holistic approach to livestock resilience. This would promote mixed farming that rotates livestock with diverse horticultural and cereal crops to strengthen resilience, food security and environmental and socio-economic outcomes.[108]

More specialist systems, such as dairy farms, can apply agroecological and silvopastoral practices related to herd management (e.g., managing stocking rates), land management (e.g., multispecies grazing and drought-resilient forages) and infrastructure (e.g., agroforestry, water storage and shelter).[109]

EU and UK modelling suggests that phasing out industrial livestock, reducing meat consumption and maintaining grazing at maximum sustainable or lower-intensity thresholds can drastically reduce emissions.[110] Manure from grazing livestock improves soil quality and reduces the need for artificial fertiliser by boosting microbial biomass, thereby improving nitrogen cycling.[111] The increased availability of high-quality forage with strong roots can also reduce feed costs (thus, reducing the reliance on soy feed imports) and improve soil resilience to drought by increasing carbon stocks and soil organic matter. Grazing livestock at the right intensity for the land may also support habitat conservation in freshwater environments.[112] Finally, well-managed, holistic grazing systems can support meat production on permanent pasture that cannot be used to produce other food. Leveraging these interdependencies across the farm could improve economic and environmental resilience.

In organic systems, animals can graze freely, and 60% of the feed must be sourced from the same region,[113] which can reduce harmful externalities, such as diffuse pollution to waterbodies and emissions, compared to industrial housed systems. While mixed farms are subject to unique economic pressures, there are routes to profitability that are supported by whole farm planning.[114] For example, Soil Association Certification certified Barnside Farm in Scotland, which adopted rotational grazing practices, has reported increased pasture growth and a nearly 50% increase in output.[115]

In this way, adaptation measures can also support long-term economic resilience.

Pictures: Belmont Estate

Holden Farm Dairy: Farming with Nature in West Wales

Bwlchwernen Fawr, home of Holden Farm Dairy, is the oldest certified organic dairy farm in Wales. It has been farming organically since 1973.

At the heart of the largely self-sufficient farm is a dairy herd that produces milk made into raw milk cheese on site. The Holden family follows organic principles of positive health – from soil to plant, animal, and people.

Farming is a solution, not a problem.
Patrick and Becky Holden and their family see farming as part of the solution to climate change. The farm embodies self-sufficiency and circularity in its custodianship of the land. Soil health and microbiology are central to the farm's ethos, and serve as the key link between climate resilience, animal health and food quality.

Diverse pastures and herbal leys build soil health, store carbon, and support pollinators and animal welfare. Centuries-old hedgerows are managed to create habitats for wildlife, while trees provide shade and shelter. Crops like organic carrots are destined for local schools and strengthen local food resilience. From hilltops to wet pastures, the farm fosters a patchwork of ecosystems that support biodiversity.

Data is key for monitoring impact.
Through **Soil Association Exchange**, the farm has benchmarked its performance on soil, biodiversity, and carbon, alongside water quality, animal welfare, and social impact. Strong flora and biodiversity scores show that decades of organic farming have improved ecological health. Becky sees this data as vital for the future of farming: it gives farmers confidence, helps consumers trust the food they buy, and shapes policies that reward nature-friendly farming.

Nature-positive farming can be profitable and resilient.
For Holden Farm Dairy, resilience means both ecological and financial stability against climate and global shocks. By farming with nature in a low-input system, adding value through cheesemaking and building community partnerships with cheesemongers and schools, Holden Farm Dairy demonstrates how a small, mixed family farm can remain viable while tackling the twin crises of climate change and biodiversity loss.

> "It's not enough to do no harm. We have to go further, to see the biodiversity potential, and actively do more."
>
> **Becky Holden**

5.
Reduce reliance on synthetic inputs to increase farmland resilience

Since the mid-1900s, synthetic (or 'artificial') nitrogen fertilisers and pesticides have significantly improved crop yields alongside growing populations.

However, this has come at the cost of rising air, water and ecosystem pollution, harm to human health and accelerated climate change.[116] The historic overreliance on these inputs in farming has created serious climate mitigation and adaptation risks. This report focuses primarily on synthetic nitrogen fertilisers and pesticides; however, other inputs, such as phosphates and other related agrochemicals, also contribute significantly to the challenges outlined.

Nearly all synthetic chemicals rely on fossil fuels, meaning their very production sustains fossil fuel extraction and slows the transition to a decarbonised agricultural system.[117] Their use also drives end-use emissions and reduces farm system resilience to climate shocks, as soil health and biodiversity decline, whilst input prices become more volatile.[118] The overuse of these chemicals creates a cycle of dependency that undermines long-term economic resilience for farmers vulnerable to supply chain shocks. **Farming systems that rely on fossil fuel-derived inputs at the expense of biodiversity are not genuinely resilient.**

Nitrogen is an essential element for life on Earth. However, excess nitrogen use has generated global human and environmental costs that outweigh the benefits of artificial fertiliser use.[119] These synthetic nitrogen fertilisers are produced using fossil fuels as both a feedstock and an energy source. Their application is often inefficient, and this overreliance causes substantial emissions, harm to wildlife and biodiversity, and diffuse water pollution.

As a contributor to climate change, ozone depletion and greenhouse gas emissions, the agricultural sector produces 71% of UK nitrous oxide (N2O) emissions,[120] with 31% from synthetic nitrogen fertiliser.[121] Nitrous oxide contributes roughly 6% of the UK's total greenhouse gas emissions, with a global warming potential 273 times that of carbon dioxide.[122]

Meanwhile, approximately 60% of nitrate pollution in water comes from agriculture[123], and agricultural ammonia emissions contribute to air pollution.[124] High-density intensive livestock systems worsen these impacts, producing more than 50,000 tonnes of untreated manure

a day.[125] Evidence of the harmful effects of excess nitrate pollution continues to grow.

Synthetic pesticides similarly compound biodiversity loss. Harms to pollinators, birds, mammals and bacteria create knock-on consequences, as the vital ecosystem services which farm systems rely upon are depleted over time.[126 127] These chemicals also put farmworkers' health at risk, with pesticide exposure contributing to increased rates of depression, cancers, asthma and Parkinson's.[128] Meanwhile, the link between pesticide use and climate change is frequently overlooked. Global pesticide production generates 3.1% of global cropland emissions.[129 130] Climate change is already reducing crop resilience, increasing pest pressure and weakening natural predator populations.[131] Accelerated pesticide degradation rates due to climate change mean chemicals become less effective over time, requiring increasingly higher use and elevated risks of insecticidal and herbicidal resistance.[132]

The interconnected human, environmental and climate impacts of synthetic inputs create a self-reinforcing dependence cycle. Breaking the dependence cycle on synthetic inputs requires a transition to low-input systems that are less resilient to external shocks, and enabling farmers to build circularity, efficiency, and nutrient recycling into their farm systems.[133]

Spatially targeting agroecological practices to farm types and geographies can reduce the use of fertilisers and pesticides while closing yield gaps.[134] Reducing nitrogen and pesticide inputs and increasing the resilience of local nutrient cycles, plant immunity, and soil health will reduce farm vulnerability to long-term resilience shocks, as well as input price spikes and supply chain disruptions. This will also allow the production of healthy food with less toxic pollution for people and wildlife.

Although farmers show an innate ability to adapt to new conditions and drive alternative, 'low/no-input' land management techniques, they need the knowledge, funding, and skills to capitalise on these opportunities. Practices that support nutrient cycling and Integrated Pest Management are gaining popularity, and policymakers across the UK recognise them as viable alternatives to artificial inputs. Collaboration also builds resilience against invasive species favoured by climate change. For example, the Soil Association's **Innovative Farmers** network is trialling non-chemical approaches to bracken management.

Other practices, such as Agroecological Crop Protection, combine ecology, agroecology, Integrated Pest Management, organic farming, and permaculture to address pests without the use of chemicals.[135] Here, increasing soil organic matter through green and animal manures, compost and polycultures can improve plant health outcomes.[136] More broadly, agroecological practices like herbal lays and cover cropping can improve soils' ability to hold water, cycle nutrients and buffer climate shocks, reducing the need for synthetic nitrogen fertilisers.[137] Planting beans and other legumes supports nutrient fixation, offers a healthy and sustainable dietary alternative to animal proteins and can increase access to new markets. In this way, agroecological processes bring benefits across the production-consumption lifecycle.

Scotston Farm: Boosting Beans and Fighting Bracken with Trees in Fife

Diarmid Baird and his family run Scotston Farm in Auchterhouse near Dundee in Scotland.

Organic conversion occurred in 1988, and the 1,200-acre mixed farm now boasts a diverse ecosystem of arable crops and livestock, as well as a separate parcel of land that is home to a Site of Special Scientific Interest. A circular approach is adopted across the farm: the arable operation produces feed for the animals while energy needs are met through renewable energy projects like a woodchip gasifier and wind turbine.

Nitrogen fixation and cropping systems

Diarmid has been fixing nitrogen with clover for years, and adding legumes has improved the nitrogen cycle for other crops. Early results from intercropping wheat and winter beans have shown promising outcomes, with yields estimated to be close to that of a conventional yield.

Soil is the heart of resilience

Livestock such as Aberdeen Angus cattle, sheep and poultry contribute to resilient soils by providing manure for compost and weed seeds passing through the cattle are killed without resorting to chemical spraying.

The farm has been impacted by both flooding and dry, hot conditions. In Diarmid's view, increasing soil carbon is the key to resilience. He wants the soil to act as a sponge, retaining water during periods of heavy rainfall and drought. Planting diverse, multi-species cover crops like deep till radishes and sunflowers and trialling winter cover crops have supported these efforts. A shallow plough is used to lightly turn the soil without releasing precious carbon.

Trees for bracken management and livestock welfare

Scotston Farm recently acquired a new parcel of land, of which over half is covered in bracken. Diarmid wants to plant a continuous cover native woodland on it, but to do so, they need to get rid of the bracken without spraying chemicals. He plans to adapt mechanised roller-crimping techniques to suppress the bracken enough for the trees to get established. On the farm itself, there are plans to roll out 10 hectares of agroforestry every year to provide scratching posts and shade for livestock in hotter conditions.

Connecting the dots

For Diarmid, there is a disconnect between the rules that the Government produces and how farmers put them into practice. More knowledge-sharing and research would be helpful to support farmers to implement policy schemes.

> "You just watch the soil turn around, it's [so healthy] it's a thing of beauty. It looks like chocolate."
>
> **Diarmid Baird**

6. Tap into agroforestry as a climate solution for whole-farm resilience

Agroforestry – integrating trees, shrubs and hedgerows into crop and livestock systems – is widely recognised as essential for climate mitigation and adaptation.

While woodland creation brings significant benefits for nature recovery and habitat restoration, agroforestry is unique because it maintains (and improves) food production while delivering public goods rarely seen in intensive systems. These include healthier soils, cleaner air and water, improved livestock welfare, and carbon sequestration. Tree densities of 50–100 trees per ha can sequester up to 4.0 tC ha^{-1} yr^{-1}[138], and trees can capture ammonia emissions from livestock.[139] The IPCC identifies agroforestry as an economically viable emissions-abatement practice.[140]

Agroforestry also offers substantial adaptation benefits that support climate resilience. Trees improve water filtration and reduce flood peaks[141], reduce soil erosion from wind and water, protect crops and livestock from extreme weather[142], enhance soil health and organic matter through root systems.[143,] improve nitrogen cycling and carbon sequestration[144], and create cooler microclimates.[145]

Integrating trees and woodland into the farmed landscape, particularly where high-value habitats don't already exist, can increase the landscape's multifunctionality and support environmental co-benefits.[146] With the right market access and support, they can provide new income opportunities that mitigate financial risk and enhance economic resilience.

Agroforestry improves resilience in diverse ways:

- **Silvoarable:** Trees planted within arable systems buffer environmental stressors (e.g., reducing wind damage), improve biodiversity and productivity[147], and can reduce soil erosion by up to 65%[148]. While fruit trees may compete with existing crops in fields, timber aligns well with silvoarable systems, offering access to high-value markets.[149] Similarly, hedgerow margins provide biomass, fodder, fruit, and nuts, as well as ecosystem services for adjacent soils and crops.

- **Silvopastoral:** Trees in livestock fields improve soil health, animal welfare and productivity through shade and shelter from extreme weather[150] and diverse fodder for nutritional and medicinal supplementation.[151 152] Modelling also shows silvopasture at 400 trees ha^{-1} can sequester the equivalent of 16 tCO-e ha^{-1} yr^{-1}.[153] Together, these benefits support animal welfare and may reduce input costs. For example, a Soil Association Innovative Farmers scheme found that willow coppice helped address cobalt deficiency in lambs.[154]
- **Hedgerows, buffer strips, and riparian planting:** Trees and shrubs along watercourses reduce runoff, enhance flood protection, and deliver multiple ecosystem benefits.[155]

Agroforestry can offer opportunities to diversify farm income and provide environmental co-benefits. Farmers can spread their risk across climate-induced fluctuations in production by planting annual and perennial trees and crops. Biochar and timber markets can also offer additional long-term revenue streams for UK farmers. For example, walnut timber offers multiple benefits, including high-value nut crops and ecosystem services, before providing harvestable timber.

However, investments can often have long payback periods. Trees take a long time to grow but deliver significant benefits with maturity. Farmers, therefore, need support with long-term planning to integrate trees in the farmed landscape. Limited skills, advice, and investment obstruct market access, and progress depends on coordinated public–private investment and well-resourced advisory and knowledge-sharing systems.[156]

State of UK policy:

The UK Government has ambitions to plant 30,000 hectares of new woodland annually from 2024[157], and a statutory target to reach 16.5% tree and woodland cover by 2050.[158]

These targets include agroforestry, yet adoption remains low. Only 3.3% of the UK's farmland currently practices agroforestry.[159] Across the four countries, national policy implementation varies:

In England, government tree planting currently meets less than half of its annual targets.[160] Payments for agroforestry under the Sustainable Farming Incentive had only recently become available before the scheme closed to new applicants. The Capital Grants scheme offered a range of agroforestry and agroforestry support options, such as deer fencing. This closed in 2025 and is expected to reopen in 2026. Additional tree planting schemes in England include the England Woodland Creation Offer (EWCO), which explicitly supports the creation of woodland, rather than agroforestry in a mixed land use setting.[161]

Scotland has ambitious targets for 21% woodland cover, and overall forest cover has increased from 5% in the post-War period to 18.5% in 2024.[162] The Forestry Grant Scheme (FGS), administered by Scottish Forestry, includes an agroforestry option and targeted support, such as the Sheep and Trees initiative. However, uptake has been low due to a combination of factors, including practical, knowledge and financial barriers, with only 8 agroforestry applications submitted to the FGS as of May 2024.[163]

In Wales, a new Sustainable Farming Scheme (SFS) is due to launch in 2026. This is underpinned by a 'whole farm approach' and Universal layer. Under current plans, farms entering SFS would have to commit to increasing the tree cover on their farms by the end of 2028. The Welsh Government want the SFS to deliver at least 17,000ha of new trees across Wales by 2030, representing 1% of agricultural land.[164]

Northern Ireland's Department for Agriculture, Environment and Rural Affairs (DAERA) aims to plant 18 million trees over the coming decade under the 'Forest for Our Future' programme.[165] However, Northern Ireland currently offers limited agroforestry payments, which include grazed woodland options under the Environmental Farm Scheme Higher Management Options.[166] Uptake has been low, with farmers and landowners facing similar barriers as across the wider UK.[167]

7.
The case for system transformation

This report has outlined practices needed to strengthen resilience in farming systems.

A shift towards nature-friendly, climate-resilient agriculture is essential to future-proof farming as a competitive and productive business model. While there are multiple routes to get there, systems that prioritise agroecological practices can deliver substantial economic, environmental and food-security co-benefits and, consequently, secure greater return from public investment.

Agroecology is a holistic, systems-based approach to agriculture that works with nature rather than against it.

Unlike recent approaches to farming, agroecology examines the entire food system and its broader impacts. It is an umbrella framework that embraces ecological, social, and cultural principles[168] and includes systems such as organic. The FAO's ten elements of agroecology aim to benefit people and the planet.[169] A key component – the resilience of people, communities and ecosystems - is central to a sustainable, climate-resilient food and farming system.[170]

Agroecological and organic land management are a transformative pathway to a more equitable food system, grounded in nature-positive strategies.[171] In practice, agroecological farming avoids synthetic chemical inputs such as synthetic pesticides and nitrogen fertilisers. It fosters biodiverse ecosystems that sustain local livelihoods and encourage inclusive community participation. This makes agroecology an important driver of social justice and the realisation of human rights.[172]

Together, these conditions build climate resilience by improving farms' ability to withstand extreme weather and by supporting strong community links and shorter, decentralised, localised supply chains that can better adapt to market disruptions.[173]

Agroecology is not a silver bullet for mitigating flood or drought risk, but it is a credible pathway to improve on-farm climate adaptation. Because it is place-based and adaptable, it uses proven techniques that work with local landscapes rather than applying a 'one-size-fits-all' specialised model that pushes ecosystems beyond sustainable limits.

That's Agroecology


pply chains
Wasting less
Good food
ealthy
nections
Nature friendly food
Sustainable diets
Food connections
unity power

7.1
Evidence for agroecological outcomes

Agroecology delivers multiple benefits for biodiversity, climate resilience, and the reduction of land degradation.

Research shows that monocultures and intensive systems lack the natural defences needed to cope with climate-driven stressors—from pest and disease outbreaks to water scarcity or excess rainfall.[174]

Studies highlight higher soil carbon, greater crop and habitat diversity, and reduced reliance on inputs in agroecological systems.[175 176] These gains are evident for smaller farms and for farms using intercropping and improved soil management and agroforestry, which enhance water retention and reduce crop and livestock stress.[177]

Key benefits of agroecology include:

- **Soil health:** Diversified rotations and mixed farming in agroecological systems like organic improve soil fertility, reduce degradation and build climate resilience.[178179]
- **Biodiversity and ecosystem resilience:** Agroecological interventions have an overall positive effect on biodiversity, strengthening ecosystem resilience.[180 181 182]
- **Climate mitigation:** Practices like organic farming in arable systems increase soil carbon storage and reduce nitrous oxide emissions.[183]
- **Input reduction:** By reducing or eliminating agrochemicals like pesticides, herbicides and synthetic nitrogen fertilisers, agroecology relies on biological processes for nutrient cycling, crop quality and productivity.
- **Animal Welfare:** Mixed agroecological systems support high-welfare livestock management, can lower methane emissions through manure management and diverse pastures rich in high-quality herbs and forage legumes[184] and provide heat- and cold-weather shelter.

Certified organic farming is a legally assured agroecological system. Organic farming is productive and well-evidenced to deliver co-benefits including biodiversity gains (increasing species richness by about 30%)[185], climate adaptation[186] and soil conservation[187], while supporting long-term farm profitability.

RBOrganic: Horticulture on a mixed farm in northwest Norfolk

RBOrganic operates from the Houghton Hall Estate, where organic conversion began in the late 1990s under the estate owner's direction.

This transformed a traditionally arable farm on light sandy soils into a diverse mixed enterprise. The business now grows around 100 hectares of vegetables, primarily carrots, alongside arable crops, grass leys, and a range of livestock, including dairy cattle and sheep.

No such thing as a normal year
Climate change has brought increasingly erratic conditions to the region, with warmer, wetter winters and prolonged, hotter summers. These extremes have created challenges with drought, waterlogging and an increased need for irrigation. For RBOrganic, climate resilience means producing viable products regardless of climatic conditions, and organic farming practices have helped them achieve this.

Long rotations incorporating cover crops and livestock have improved soil health, including structure, fertility and moisture retention, demonstrated through regular soil testing. The integration of hedgerow margins and beneficial insect habitats has also supported pest control. It means that when it comes to the climate, the soil and the plants are given a stronger start, and RBOrganic have seen their yields match or exceed those of conventional production practices locally.

Balancing risk and reward
While the system has proven robust, challenges remain. Horticulture receives less government support across the UK than arable or livestock businesses, and nature-based solutions to challenges like pest control can take time and resources. Labour shortages and the need to attract new entrants compound these challenges.

RBOrganic's experience highlights the need for better market development for organic produce and support for growers entering the organic conversion process. In the early stages of the organic conversion process, growers are unable to reap the ecological or financial rewards of organic production, and improved support in this transition period would support more growers to adopt agroecological practices, which build climate resilience in the long term.

Despite these pressures, RBOrganic demonstrates that organic and agroecological practices can deliver resilient soils, viable yields and environmental benefits. Their enterprise offers a scalable model for climate-resilient, nature-positive farming in the UK.

> "If I look at the yield of our crops, the quality of our crops, the resilience of them - that all suggests to me that the way that we're farming is having a really positive impact."
>
> **Joe Rolfe, RBOrganic**

7.2.
Risks of business-as-usual

Climate change is already affecting UK and global harvests, creating price and supply shocks across the food system. These impacts directly undermine farm profitability and resilience for UK farmers.[188]

A new generation of agricultural technology (agri-tech), supported by public-sector agricultural R&D, can strengthen farming resilience, boost food production, and deliver broader public benefits. With proper governance, agri-tech can even help underpin a transition to agroecology.[189] However, **technological fixes can also entrench business-as-usual practices, undermine resilience and fail to tackle the root causes of climate change.**

Agri-tech is wide-ranging, and there is a risk that it is applied as a 'silver-bullet' solution instead of leveraging tried and tested solutions.

Genetic technologies, like herbicide-resistant crops, can lead to increased use of chemical inputs, reducing crop diversity and harming ecosystems and human health.[190]

High-tech livestock innovations - including energy-intensive housing ventilation systems, extract profit from farmers and do not resolve the underlying climate pressures affecting animal welfare. Their high upfront and maintenance costs, and their vulnerability to extreme weather (e.g., power outages due to storms, electrical failures due to overheating or corrosion caused by high humidity or ammonia levels[191]), increase financial risk.

Early public investment in the right adaptation measures (such as using deep-rooted herbal leys over drought-tolerant precision-bred organisms) will reduce long-term damage to farming systems while promoting outcomes such as improved biodiversity and the production of nutritious food. Robust public investment in the right adaptation actions early on will likely result in lower residual damage[192] to farming systems.

While agroecological practices can increase resilience, their effectiveness remains limited when extreme weather persists.[193 194]

On-farm adaptation, therefore, must be accompanied by broader climate mitigation measures that improve the broader adaptive capacity of landscapes and farm businesses.

7.3.
Implications for the farm business

Agroecology can build climate-resilient rural communities by increasing farmers' capacity to deliver multiple outcomes for food security, wellbeing, carbon sequestration and nature recovery.[195]

Profitability and risk management will, of course, shape decisions on whether to adopt such practices and although agroecological practices can reduce productivity, losses are usually under 10%.[196]

Farm-level changes that integrate diversity, a central element of agroecology, through rotations and intercropping can stabilise yields, cut input costs by reducing pest and disease risks, and create new opportunities for minor crops.[197] Carefully managing on-farm water resources and reducing water losses across the farm (e.g., by improving soil health and through wetland-compatible cropping and buffer strips) may also reduce the need for costly infrastructure like water storage and irrigation. Overall, modelling indicates that agroecological transformation could be an economically viable approach at both the national and farm levels, offering multiple pathways to profitability.[198]

Recent geopolitical events demonstrate the risks faced by farm businesses tied to globalised supply chains. Agroecology, by contrast, prioritises value chain resilience, like fairer pricing and more decentralised routes to market, making farms better placed to absorb climate-related food system shocks.[199] A large-scale transition will require a mindset shift to ensure implementation at scale.[200] Success under agroecology is measured not just by yields but also by improved margins, lower costs, and diversified production. True resilience will also depend on farmers' adaptive capacity, which may require knowledge transfer and resourcing, creating a policy imperative for targeted support. Adaptation must also be tailored to land use and geography to maximise impact and avoid unintended consequences.

Systemic change on the scale required will not occur without enabling policies and markets that support increased diversity at farm and landscape levels.[201] The right conditions must be created to help farmers set up profitable agroecological enterprises that are long-term resilient and to ensure diets shift within society to support agroecological farming.

Some agroecological practices are still not widely implemented across the UK[202], meaning there is significant scope for stronger policy incentives, financial mechanisms, innovation and market development to scale agroecology.[203] Private markets can contribute, particularly if governed to deliver resilience as well as carbon reduction, but public funding remains essential to drive a systemic shift.[204] Well-designed enabling measures can deliver win-win outcomes for farms, supply chains and society at scale.

Soil Association programmes demonstrate that interest is there, but barriers to adopting agroecology as an effective adaptation action prevent farmers from adopting practices at scale.

An Innovative Farmers trial on strip tillage on a market garden scale has led to further trials for field-scale growers in Southwest England. The Agroecology at Scale demo farm is also trialling strip tillage in field-scale horticulture.

The Agroecology at Scale Learning Network is attracting farmers and growers of all scales to events and webinars. 296 attendees have joined farm walks and webinars across sectors.

8. Recommendations

Climate change is already undermining the resilience and sustainability of UK farming. Policymakers must act quickly to support a climate-resilient food system.

This report has outlined the risks of a climate strategy centred on intensification. Short-term gains cannot come at the expense of long-term stability.

True resilience means scaling up climate mitigation and adaptation through holistic, diversified and systems-based approaches. The report identifies agroecological practices that can strengthen environmental and economic resilience. If integrated across whole farms, these practices can build on-farm adaptive capacity to flooding, drought and heatwaves while supporting long-term profitability and stable yields.

Public and private investment are essential to help farmers build resilience, improve productivity and deliver long-term environmental outcomes.[205] The UK must also meet international obligations on climate mitigation and adaptation, including its commitments on climate-resilient food systems[206]. The joint work on implementation of climate action on food and agriculture, continued at COP30[207 208], and the Breakthrough Agenda for unlocking new opportunities for a low-carbon future[209], both acknowledge the value of agroecology. Government policy should be designed to support and align with these developments.

Adaptation must reflect local landscapes and conditions, meaning resilience will look different across the UK. Even so, the UK and devolved administrations should take shared action to help farmers scale up agroecology to build resilience.

We recommend action across ten key themes:

A Ten Point Plan for Building Climate Resilience

1. **Develop a national resilience plan for farming:** UK administrations should work with the Climate Change Committee on an integrated resilience plan that prioritises adaptation and mitigation. The plan should set out green (e.g., nature-based solutions) and grey (e.g., water reservoirs) infrastructure measures for drought, heatwaves, and flooding, align with existing thinking on food system resilience[210] and inform the UK Nationally Determined Contribution and the National Adaptation Plan.

   The resilience plan should aim to break down silos across the UK, as well as within national farming, climate, and land use policy. For example, all four governments should align policy for 10% organic farmland and whole-farm planning as key enabling mechanisms for the adoption of agroecology and climate resilience at the farm level.

2. **Strengthen soil protections:** Governments should develop Soil Health Action Plans with binding soil recovery targets to ensure all soils are under sustainable management by 2035. Farm payments should be made conditional on basic good soil management practice, with funding made available for soil management practices above that baseline. Clearer farming rules for soil should be developed to address issues such as planting maize on floodplains and cultivating steep slopes.

3. **Scale up production and consumption of climate-friendly foods:** Reduce UK reliance on fruit and vegetable imports from climate-vulnerable countries by doubling land for horticulture and expanding support for agroecological, organic and small-scale growers. Increase demand for British whole and minimally processed foods by investing in beans, legumes, and other alternative proteins, and by scaling local and sustainable sourcing in public procurement.

4. **Reduce industrial livestock pollution:** Provide incentives for mixed and extensive pasture -based systems. Complement this with firm, fair regulation of industrial livestock, including permitting thresholds and planning controls in nutrient-overloaded catchments. [211] Industrial livestock production continues to benefit from hidden forms of support that hide its true environmental and social costs. Curbing public and private support for these models and requiring industrial system operators to halt these practices will facilitate more resilient production systems.

5. **Reduce reliance on synthetic inputs:** Promote organic farming and low-input practices, like IPM and extensive livestock farming, and improve nutrient cycling at the catchment level. Nearly all synthetic inputs rely on fossil fuels, which sustain fossil fuel extraction and prolong the transition to more sustainable land management methods. Cutting synthetic inputs will reduce soil, air, and water pollution, support public health and limit exposure to price shocks.

6. **Scale up agroforestry:** Expand agroforestry to 5% of agricultural land by 2030 and 10% by 2040, with half of all farms implementing agroforestry by 2050. [212] Promote whole-farm, multifunctional systems, especially silvoarable and silvopastoral models, that improve water filtration, reduce flood peaks, and protect crops and livestock from extreme weather. Provide long-term funding and remove

barriers for all farmers, including tenants, to adopt agroforestry and access new markets for UK-grown woody products and nuts. [213]

7. **Improve monitoring and baselining to track progress and use this data in Whole Farm Plans:** Invest in robust infrastructure and incentives for farmer-led monitoring, verification, and reporting (MRV), with robust indicators to minimise trade-offs with biodiversity and welfare. Expand training and consider making farm payments conditional on the adoption of MRV to help drive climate action. This data should be integrated into whole farm planning to help farmers build resilience to economic and climate shocks while delivering public goods.[214]

8. **Make supply chains fairer for British producers:** Ensure trade and tariff agreements uphold domestic standards and avoid displacing environmental or human rights harms to the most climate-vulnerable regions. Invest in regional food infrastructure to support agroecological producers, including local hubs, abattoirs, processing, and distribution, to diversify markets, support on-farm value-addition and improve resilience.

9. **Make private markets work for climate resilience:** Strengthen governance of voluntary carbon and natural capital markets to reduce risk and enable credible blended public-private finance for nature and climate outcomes. While markets can improve resilience by delivering incentives for land change management[215], boosting nature-based solutions and diversifying economic gains, robust governance is needed to mitigate unintentional negative impacts to long-term adaptation (e.g., poorly designed offset schemes).[216]

10. **Invest in the right technology, infrastructure and renewables for resilience:** Fund research and innovation for on-farm water storage, local renewable energy and technology that aligns with agroecological principles (avoiding over-reliance on unproven silver bullet solutions[217] that deliver few multifunctional benefits, representing poor value for money for the taxpayer).

This Ten-Point Plan offers a coherent framework to build resilience by advancing the transition to agroecology, recognising that farm-level climate resilience depends on the ability to mitigate emissions and respond effectively to rapidly changing conditions.

Resilience is the product of holistic climate mitigation and adaptation. A transition to agroecology can help farmers along this journey to a more resilient future.

While many farmers are already adopting agroecological and organic practices, systems-wide change requires stronger support. Successful system transformation hinges on delivering whole-farm planning, advice, and knowledge-exchange services that communicate the benefits of adaptation and link to agri-environment schemes that reward mixed and organic farming practices.

References

1 Kendon, M. et al. (2025) State of the UK Climate in 2024.

2 Energy & Climate Intelligence Unit (2025) 'Farmer confidence battered by climate change – new research'.

3 Kotz, M. et al. (2025) Climate extremes, food price spikes, and their wider societal risks.

4 The Autonomy Institute (2025) Climate-induced inflation and the price of food.

5 Office for National Statistics (2025) 'RPI: Percentage change over 12 Months – Beef' [Accessed November 2025].

6 IDDRI (2018) An agroecological Europe in 2050: multifunctional agriculture for healthy eating.

7 Marrakech Partnership for Global Climate Action (2021) Climate Action Pathway: Climate Resilience.

8 IPCC (2023) AR6 Synthesis Report.

9 Eeswaran, R., Nejadhashemi, A.P., and Miller, S.R. (2021) Evaluating the climate resilience in terms of profitability and risk for a long-term corn-soybean-wheat rotation under different treatment systems.

10 Malhi, et al. (2020) Climate Change and ecosystems: threats, opportunities and solutions.

11 The Humane League UK (2022) 'How does factory farming affect wildlife?'.

12 House of Commons Environmental Audit Committee (2022) Water Quality in Rivers.

13 Rowe, E.C. et al. (2023) Air Pollution Trends Report 2023: Critical load and critical level exceedances in the UK. Report to Defra under Contract AQ0849, UKCEH project 07617.

14 Alliance to Save Our Antibiotics (2024) How to End the Misuse of Antibiotics in Farming.

15 UK Government (2025) United Kingdom of Great Britain and Northern Ireland's 2035 Nationally Determined Contribution.

16 WWF and Climate Focus (2024) Food Forward NDCs: Summary Update to 2022 Report.

17 Leippert F. et al. (2020) The potential of agroecology to build climate-resilient livelihoods and food systems. Rome. FAO and Biovision.

18 Climate Change Committee (2025) Progress in adapting to climate change: 2025 report to Parliament.

19 Climate Change Committee (2024) Independent Assessment of the Third National Adaptation Programme (NAP3).

20 IUCN (2020) Issues Brief: Ensuring Effective Nature-Based Solutions.

21 Marrakech Partnership for Global Climate Action (2021) Climate Action Pathway: Climate Resilience, p. 3.

22 Altieri, M.A. et al. (2025) Agroecology and the limits to resilience: extending the adaptation capacity of agroecosystems to drought.

23 Met Office (2025) 'Summer 2025 is the warmest on record for the UK'.

24 The Sunday Times (2025) 'Farmers struggling after 'devastatingly dry' growing season'.

25 Defra (2024) United Kingdom Food Security Report 2024. Theme 2: UK Food Supply Sources.

26 Lawrence et al. (2020) Cascading climate change impacts and implications - ScienceDirect

27 WWF Cymru (2024) Extreme weather and its impact on farming viability in Wales.

28 Nooten, S.S. et al. (2024) The heat is on: reduced detection of floral scents after heatwaves in bumblebees.

29 IPPC Secretariat (2021) Scientific review of the impact of climate change on plant pests – A global challenge to prevent and mitigate plant pest risks in agriculture, forestry and ecosystems. Rome. FAO on behalf of the IPPC Secretariat.

30 Burnett, N. et al (2025) Climate change adaptation and resilience in the UK.

31 Telegraph (2023) 'Shoppers braced for broccoli shortages after washout October'.

32 Farming UK (2024) 'Growers call for action to save UK potato crop amid "perfect storm"'.

33 Newson, N. (2025) Climate change: Supporting farmers and growers.

34 Met Office. (n.d.). Effects of climate change. Retrieved September 5, 2025.

35 Defra (2024) Agri-climate report 2024.

36 Energy & Climate Intelligence Unit (2025) 'The impact of climate change on British farms and farmers' mental health'.

37 The Sunday Times (2025) 'Farmers struggling after 'devastatingly dry' growing season'.

38 Defra (2024) United Kingdom Food Security Report 2024. Theme 2: UK Food Supply Sources

39 Energy & Climate Intelligence Unit (2023) 'Climate, fossil fuels and UK food prices: 2023'.

40 Garcia, L., and Jones, P. (2025) On the horizon: Climate-induced inflation and the price of food. The Autonomy Institute.

41 IGD (2025) A climate risk assessment of the UK food system.

42 IGD (2025) A climate risk assessment of the UK food system.

43 National Preparedness Commission (2025) Just in case: 7 steps to narrow the UK civil food resilience gap.

44 Climate Change Committee (2025) Progress in adapting to climate change: 2025 report to Parliament.

45 Kotz, M., et al. (2025) Climate extremes, food price spikes, and their wider societal risks.

46 Garcia, L., and Jones, P. (2025) On the horizon: Climate-induced inflation and the price of food. The Autonomy Institute.

47 World Resources Institute (2025) Strengthening the Investment Case for Climate Adaptation: A Triple Dividend Approach.

48 Systemiq (2025) Returns on Resilience: Investing in Adaptation to Drive Prosperity, Growth and Competitiveness.

49 Juhola, S. et al (2024) A new dynamic framework is required to assess adaptation limits.

50 Environment Agency (2024) Hazards of growing high-risk crops in south-west England.

51 Innovative Farmers (2025) Farm Net Zero Maize field lab

52 Innovative Farmers (2025) Herbal ley mixes for natural flood management.

53 IUCN UK Peatland Programme (n.d.) Grassland.

54 Cumulus and The Wildlife Trusts (2025) Quantifying the Environmental Risks from Pig & Poultry Production in the UK.

55 WWF (2022) Future of Feed.

56 Innovative Farmers (2023) Diverse forage crops for sustainable livestock wintering.

57 House of Commons Environment, Food and Rural Affairs Committee (2024) Soil Health, p. 5.

58 Pasture for Life (2025) Water Infiltration and the Soil Sponge.

59 Committee on Climate Change (2016) Written Submission from the Committee on Climate Change: Environmental Audit Committee – Inquiry into Soil Health.

60 Union of Concerned Scientists (2017) Turning Soils into Sponges: How Farmers Can Fight Floods and Droughts.

61 Environment Agency (2019) The state of the environment: soil.

62 Committee on Climate Change (2016) Written Submission from the Committee on Climate Change: Environmental Audit Committee – Inquiry into Soil Health.

63 Environment Agency (2019) The state of the environment: soil.

64 Sanderman, J., Hengl, T., and Fiske, G.J. (2017) Soil carbon debt of 12,000 years of human land use.

65 Saco, P.M. et al. (2021) The role of soils in the regulation of hazards and extreme events.

66 Climate Change Committee (2020) The Sixth Carbon Budget: Agriculture and land use, land use change and forestry, p. 6.

67 CPRE, The countryside charity (2020) 'Net-zero virtually impossible without more ambition on peatlands'.

68 Saco, P.M. (2018) Vegetation and soil degradation in drylands: Non linear feedbacks and early warning signals.

69 Altieri, M.A. et al. (2015) Agroecology and the design of climate change-resilient farming systems.

70 Soil Association (2018) To plough or not to plough: Tillage and soil carbon sequestration.

71 Rothamstead Research (2019) New 'early warning system' finds blackgrass evolving resistance to glyphosate.

72 Gunstone, T. et al. (2021) Pesticides and Soil Invertebrates: A Hazard Assessment.

73 Innovative Farmers (2024) Herbal ley mixes for natural flood management.

74 Defra (2024) Expanded Sustainable Farming Incentive (SFI) offer from summer 2024.

75 Climate Xchange (2025) Securing soils in a changing climate: A soil route map for Scotland.

76 Environmental Standards Scotland (2024) The risks to Scotland's soils: a scoping report.

77 Scottish Government Rural Payments and Services (2025) Whole Farm Plan full guidance.

78 Climate Xchange (2025) Securing soils in a changing climate: A soil route map for Scotland.

79 Welsh Government (2025) Agricultural Soil Policy Statement 2025.

80 Welsh Government (2025) Sustainable Farming Scheme 2026: scheme description.

81 Welsh Parliament: Economy, Trade and Rural Affairs Committee (2025) Digging the dirt: Improving Wales' Soil Health.

82 IDDRI (2018) An agroecological Europe in 2050: multifunctional agriculture for healthy eating.

83 Defra (2025) A UK government food strategy for England, considering the wider UK food system.

84 The Food Foundation (2025) Meat Facts: What meat is the UK eating and why does it matter?.

85 Eating Better (2025) It's time to act on processed meat.

86 Eating Better (2025) We need to talk about industrial livestock production.

87 World Animal Protection (2025) Subsidising factory farm harm.

88 River Action (2025) River Action wins landmark High Court case against Shropshire Council over industrial chicken farm chaos - River Action UK.

89 Soil Association (2023) Ultra-processed planet.

90 World Animal Protection (2025) Cooked alive: the agony of heatwaves for chickens in UK factory farms.

91 Bilotta, G.S., Brazier, R.E., and Haygarth, P.M. (2007) The Impacts of Grazing Animals on the Quality of Soils, Vegetation, and Surface Waters in Intensively Managed Grasslands.

92 Defra (2024) Agri-climate report 2024.

93 Defra (2025) Emissions of air pollutants in the UK – Ammonia (NH3).

94 Climate Change Committee (2025) The Seventh Carbon Budget: Advice for the UK Government.

95 Defra (2024) Agri-climate report 2024.

96 Soil Association (2021) Peak Poultry – briefing for policy makers.

97 Rodríguez, A. et al. (2024) Costs and benefits of synthetic nitrogen for global cereal production in 2015 and in 2050 under contrasting scenarios.

98 Cumulus and The Wildlife Trusts (2025) Quantifying the Environmental Risks from Pig & Poultry Production in the UK.

99 Soil Association (2024) Stop Killing Our Rivers.

100 WWF (2011) Soya and the Cerrado: Brazil's forgotten jewel.

101 Unearthed (2024) ''If it's dangerous for one population, it will be for the other': the Brazilian farmers poisoned by a banned pesticide exported from Britain'.

102 Cliff, C. (2023) Planet Earth III: How intensive UK chicken production is destroying climate and nature.

103 Godde, C.M. (2021) Impacts of climate change on the livestock food supply chain; a review of the evidence.

104 Sustainable Food Trust (2025) Grazing Livestock: It's not the cow but the how.

105 Sustainable Food Trust (2025) Grazing Livestock: It's not the cow but the how.

106 Roos, E. et al. (2022) Agroecological practices in combination with healthy diets can help meet EU food system policy targets.

107 WRAP (2016) Using surplus food in animal feed.

108 Baker, E. et al. (2023) Mixed farming systems: potentials and barriers for climate change adaptation in food systems.

109 McFadzean, H. (2024) Enhancing The Resilience Of UK Dairy Sector: How Do We Practically Adapt To Increasingly Volatile Weather Conditions?

110 Roos, E. et al. (2022) Agroecological practices in combination with healthy diets can help meet EU food system policy targets.

111 Ma, Q., et al. (2020) Farmyard manure applications stimulate soil carbon and nitrogen cycling by boosting microbial biomass rather than changing its community composition.

112 Freshwater Habitats Trust (2025) Livestock grazing: a natural tool for freshwater conservation?.

113 IFOAM (2022) Organic agriculture and its benefits for climate and biodiversity.

114 Soil Association (2022) Exploring the economic impacts of a transition to agroecology in the UK.

115 Soil Association (n.d.) 'Higher output with regenerative grazing', Accessed October 2025.

116 Lassaletta, L. et al. (2016) Nitrogen use in the global food system: past trends and future trajectories of agronomic performance, pollution, trade, and dietary demand.

117 Pesticide Collaboration (2023) Pesticides and the Climate Crisis: A Vicious Cycle.

118 AHDB (2025) GB fertiliser Prices.

119 Soil Association (2020) Fixing Nitrogen: The challenge for climate, nature and health.

120 Defra (2023) Agri-climate report 2023.

121 Climate Change Committee (2019) Net zero – technical report.

122 Sustainable Nitrogen Alliance (2024) The Challenge

123 Dragosits, U. and Pearson, C. (2023) A new UK Nitrogen Balance Sheet (UK-NBS), Methodology overview.

124 Rathbone, C. and Ullah, S. (2024) Ammonia emissions from nitrogen fertilised agricultural soils.

125 Sustain (2023) 'Alarming levels of industrial animal waste poisoning UK rivers'.

126 Woodcock, B.A. et al. (2016) Impacts of neonicotinoid use on long-term population changes in wild bees in England.

127 Wan, N.F., et al. (2025) Pesticides have negative effects on non-target organisms.

128 PAN UK, RSPB and the Pesticide Collaboration (2023) Pesticides and Human Health.

129 PAN UK (2023) Cultivating Coherent Climate Action: Why agroecology and pesticides reforms should underpin action on agriculture and food systems in support of the Paris Agreement.

130 Drugmand, D., et al. (2022). Fossils, Fertilizers, and False Solutions: How Laundering Fossil Fuels in Agrochemicals Puts the Climate and the Planet at Risk. The Center for International Law.

131 IPPC Secretariat (2021) Scientific review of the impact of climate change on plant pests – A global challenge to prevent and mitigate plant pest risks in agriculture, forestry and ecosystems. Rome. FAO on behalf of the IPPC Secretariat.

132 Pesticide Collaboration (2023) Pesticides and the Climate Crisis: A Vicious Cycle.

133 FAO (n.d.) Breaking the Vicious Cycle of Pesticides and Climate Change with Agroecology.

134 Oldfield, E.E, Bradford, M.A., and Wood, S.A. (2019) Global meta-analysis of the relationship between soil organic matter and crop yields.

135 Deguine, J.P., et al. (2023) Agroecological crop protection for sustainable agriculture.

136 FAO (n.d.) Towards an agroecological approach to crop health: reducing pest incidence through synergies between plant diversity and soil microbial ecology.

137 Von Cossel, M., et al. (2025) Spotlight on agroecological cropping practices to improve the resilience of farming systems: a qualitative review of meta-analytic studies.

138 Soil Association (2025) The Agroforestry Handbook, Second Edition.

139 Bealey, W.J., et al. (2014) Modelling agro-forestry scenarios for ammonia abatement in the landscape.

140 IPCC (2022) Summary for Policymakers.

141 Woodland Trust (2022) Farming for the future: how agroforestry can deliver for nature and climate.

142 Organic Research Centre (2016) Agroforestry for livestock systems.

143 Fahad, S. et al. (2022) Agroforestry Systems for Soil Health Improvement and Maintenance.

144 Haskett J.D., Simane B., Smith C. (2019) Energy and climate change mitigation benefits of Faidherbia albida Agroforestry in Ethiopia.

145 Rolo, V. et al. (2023) Agroforestry potential for adaptation to climate change: A soil-based perspective.

146 Soil Association (2022) Exploring the economic impacts of a transition to agroecology in the UK.

147 Smith, J., Pearce, B.D., and Wolfe M.S. (2012) Reconciling productivity with protection of the environment: Is temperate agroforestry the answer?

148 Palma, J., et al. (2007) Modelling environmental benefits of silvoarable agroforestry in Europe.

149 Cumulus (2022) Woodland and trees in the farmed landscape: Towards a diverse, resilient and vibrant agroforestry and farm woodland economy for the UK. Report for Soil Association. Pp. 31-32.

150 Cumulus (2022) Woodland and trees in the farmed landscape: Towards a diverse, resilient and vibrant agroforestry and farm woodland economy for the UK. Report for Soil Association.

151 Bright A. and Joret, A. (2012) Laying hens go undercover to improve production.

152 Soil Association and Woodland Trust (2018) Agroforestry in England: Benefits, Barriers & Opportunities.

153 BEIS (2022) 2020 UK Greenhouse Gas Emissions, Final Figures cited by Woodland Trust (2022) Farming for the future: how agroforestry can deliver for nature and climate.

154 Innovative Farmers (2025 Evaluating the effect of feeding willow leaves on growth rates in weaned lambs.

155 Cole, L.J., Stockan, J. and Helliwell, R. (2020) Managing riparian buffer strips to optimise ecosystem services.

156 Westaway, S. and Smith, J. (2019) Barriers to uptake of agroforestry in the UK.

157 UK Government (2021) The England Trees Action Plan.

158 Forestry Commission (2023) England Tree Planting Increases for 2022/23 – Forestry Commission.

159 Den Herder, M. et al. (2017) Current extent and stratification of agroforestry in the European Union

160 Environmental Audit Committee (2023) 'Government tree planting meets less than half its annual targets, despite the growing demands on UK woodland for net zero'.

161 Forestry Commission (2021) How the England Woodland Creation Offer works.

162 Scottish Government (2019) Scotland's Forestry Strategy 2019-2029.

163 Cumulus (2024) Farm payments to support integration of trees and woods into farming systems in Scotland. Report for Soil Association and Woodland Trust Scotland.

164 Welsh Government (2025) Sustainable Farming Scheme 2026: scheme description.

165 DAERA (n.d.) DAERA Forestry Grants.

166 DAERA (2018) EFS Higher Remedial Management Options – Woodland.

167 Olave, R.J., Smith, J., and McAdam, J.H. (2025) Drivers of agroforestry adoption in Northern Ireland in the context of British and Irish policy.

168 FAO (n.d.) The 10 Elements of Agroecology.

169 FAO (n.d.) The 10 Elements of Agroecology.

170 Wezel, A. et al. (2020) Agroecological principles and elements and their implications for transitioning to sustainable food systems. A review.

171 Agroecology Coalition (2025) FROM SANTOS TO BELEM: Key Actionable Messages from the High-Level PreCop Convening in Santos-SP Bridging the Gaps: Climate Adaptation & Mitigation for Agriculture and Food Systems.

172 Catacora-Vargas, G., Perfecto, I. and Ching, L.L. (2022) The Land Gap Report, Chapter 5: Agroecology for socioecological resilience.

173 IDDRI (2018) An agroecological Europe in 2050: multifunctional agriculture for healthy eating.

174 Altieri, M.A. et al. (2015) Agroecology and the design of climate change-resilient farming systems.
175 Defra (2022) Evaluating the Productivity, Environmental Sustainability and Wider Impacts of Agroecological compared to Conventional Farming Systems.
176 Albanito, F. et al. (2022) Agroecology – a Rapid Evidence Review: Report prepared for the Committee on Climate Change.
177 Altieri, M.A. et al. (2025) Agroecology and the limits to resilience: extending the adaptation capacity of agroecosystems to drought.
178 El-Hage Scialabba, N. and Müller-Lindenlauf, M. (2010) Organic agriculture and climate change.
179 Debray, V. et al. (2019) Agroecological practices for climate change adaptation in semiarid and subhumid Africa.
180 Blaix, C. et al. (2026) Agroecological interventions increase biodiversity and the potential for climate change mitigation in Europe.
181 Topp, K. et al. (2023) Organic farming, net zero targets and the impact of a changing climate – an evidence review.
182 Palomo-Campesino, S. et al. (2022) Do agroecological practices enhance the supply of ecosystem services? A comparison between agroecological and conventional horticultural farms.
183 Blaix, C. et al. (2026) Agroecological interventions increase biodiversity and the potential for climate change mitigation in Europe.
184 Aboagye, I.A. and Beauchemin, K.A. (2019) Potential of Molecular Weight and Structure of Tannins to Reduce Methane Emissions from Ruminants: A Review.
185 Tuck, S.L. et al. (2013) Land-use intensity and the effects of organic farming on biodiversity: a hierarchical meta-analysis.
186 IFOAM Organics Europe (2022) Organic agriculture and its benefits for climate and biodiversity.
187 Gattinger, A. et al. (2012) Enhanced top soil carbon stocks under organic farming.
188 Beedell, J. et al. (2025) Review of the state of farming finance and challenges faced. Final report for the York and North Yorkshire Combined Authority.
189 Soil Association (2021) AgroEcoTech: How can Technology Accelerate a Transition to Agroecology?
190 Schütte, G. et al. (2017) Herbicide resistance and biodiversity: agronomic and environmental aspects of genetically modified herbicide-resistant plants.
191 Van de Vegte, J. et al. (2016) Factsheet: Electric Systems in Barns.
192 Watkiss, P. (2022) The Costs of Adaptation, and the Economic Costs and Benefits of Adaptation in the UK. Policy Paper.
193 Juhola, S. et al. (2024) A new dynamic framework is required to assess adaptation limits.
194 Altieri, M.A. et al. (2025) Agroecology and the limits to resilience: extending the adaptation capacity of agroecosystems to drought, Table 1.
195 Amoak, D., Luginaah, I. and McBean, G. (2022) Climate Change, Food Security, and Health: Harnessing Agroecology to Build Climate-Resilient Communities.
196 Albanito, F. et al. (2022) Agroecology – a Rapid Evidence Review: Report prepared for the Committee on Climate Change.
197 Hufnagel, J., Reckling, M. and Ewert, F. (2020) Diverse approaches to crop diversification in agricultural research. A review.
198 Soil Association (2022) Exploring the economic impacts of a transition to agroecology in the UK.
199 Alum, E.U. (2025) Agroecology and resilient supply chains: Building sustainability from farm to fork.
200 Soil Association (2022) Exploring the economic impacts of a transition to agroecology in the UK.
201 Cumulus (2022) The Economics of a Transition to Agroecological Farm Businesses. Report for the Soil Association.
202 Albanito, F. et al. (2022) Agroecology – a Rapid Evidence Review: Report prepared for the Committee on Climate Change.
203 Alum, E.U. (2025) Agroecology and resilient supply chains: Building sustainability from farm to fork.
204 Soil Association (2022) Exploring the economic impacts of a transition to agroecology in the UK.
205 Soil Association (2022) Exploring the economic impacts of a transition to agroecology in the UK.
206 UAE Consensus (2023) COP28 UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action.
207 UNFCCC Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation (2025) Sharm el-Sheikh joint work on implementation of climate action on agriculture and food security: Elements of draft conclusions.
208 UNFCCC Subsidiary Body for Scientific and Technological Advice and the Subsidiary Body for Implementation (2025) Sharm el-Sheikh joint work on implementation of climate action on agriculture and food security: Draft conclusions proposed by the co-facilitators.
209 The Breakthrough Agenda (n.d.) Agriculture.
210 Lang, T., with Neumann, N. and So, A. (2025) Just in Case: narrowing the UK civil food resilience gap. Main report to the National Preparedness Commission.
211 Wildlife and Countryside Link (2024) Permitting Reform: Reducing Environmental Damage from Intensive Livestock Farms.
212 Soil Association (2022) Regenerative Forestry.
213 Cumulus (2022) Woodland and trees in the farmed landscape: Towards a diverse, resilient and vibrant agroforestry and farm woodland economy for the UK. Report for the Soil Association.
214 Soil Association (2024) Planning for change: The role of Whole Farm Plans in the agricultural transition.
215 UKRI and AFN Network+ (2025) Roadmap for Resilience: A UK Food Plan for 2050, p. 64.
216 Climate Change Committee (2022) Voluntary Carbon Markets and Offsetting.
217 Soil Association (2021) AgroEcoTech: How can Technology Accelerate a Transition to Agroecology?

To find out more visit:

www.soilassociation.org

Soil Association, Spear House, 51 Victoria Street, Bristol BS1 6AD
T **0300 330 0100**
F **0117 314 5001**
Registered charity no. 206862

Do you need this in an alternative format?

If you require this document in an alternative format, please email **digitdigitalteam@soilassociation.org** to request a copy.