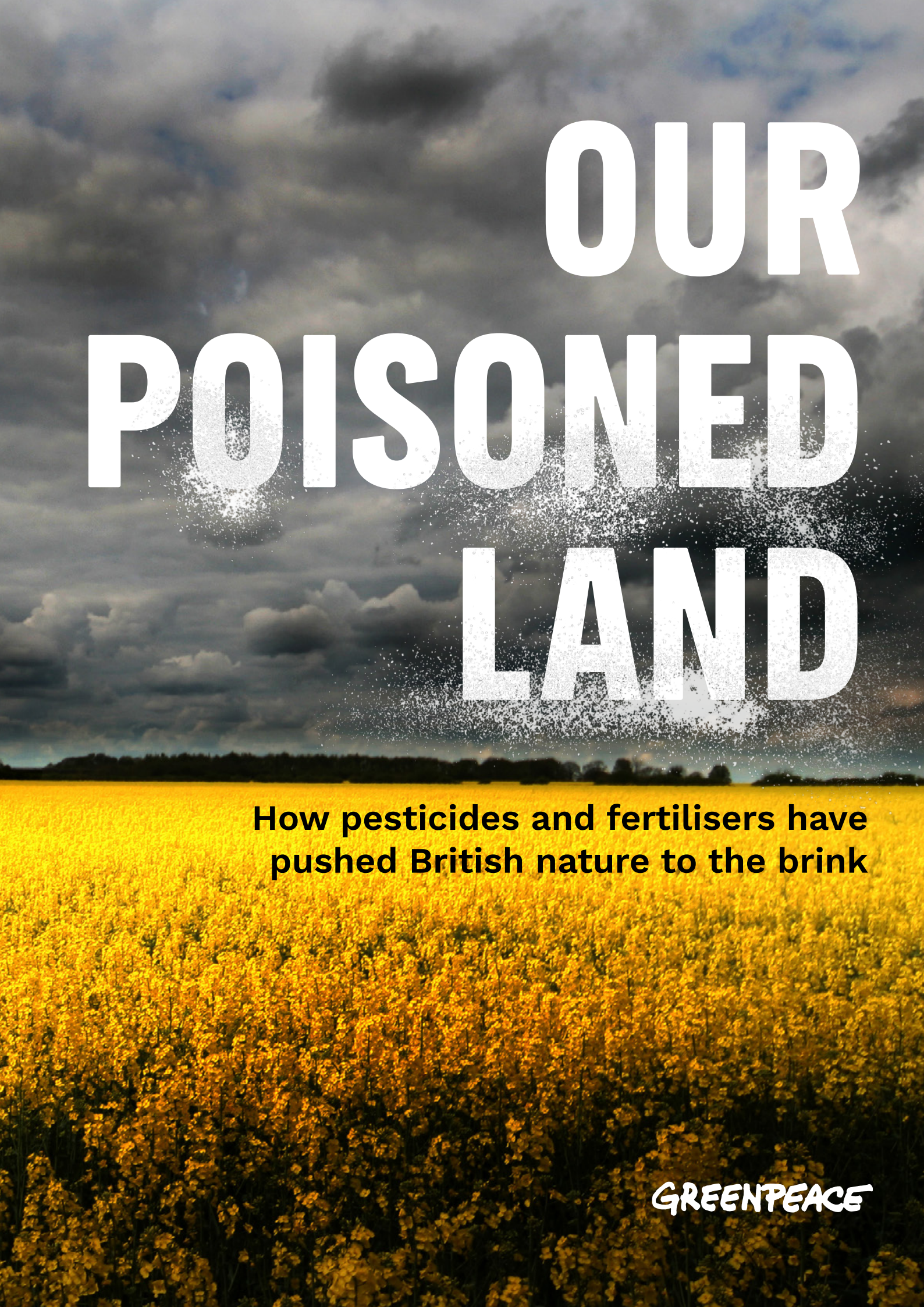
OUR
POISONED
LAND
How pesticides and fertilisers have pushed British nature to the brink
GREENPEACE

Published by Greenpeace UK
Canonbury Villas
London N1 2PN
www.greenpeace.org.uk

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Editors: Matt Kurton & Nina Schrank
Designer: Laura Yates

Front cover:
A rapeseed field in the UK
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This page:
Plants being sprayed by herbicides
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CONTENTS

A wheat field in late summer, UK


City St George's, University of London

FOREWORD

By Tim Lang

Tim Lang is Professor Emeritus of Food Policy, Centre for Food Policy, City St George's, University of London, and author of the 2025 *Just in Case* report for the National Preparedness Commission.

The issue of pesticides, fertilisers and food supply has the habit of stealing up on governments, farmers and the consuming public when they least want it. We are in such a position today, as the US-Iran war pushes up the cost of synthetic fertiliser and, with it, the cost of food.

Pesticides and synthetic nitrogen fertilisers were key elements in the post World War II policy package that transformed agrifood production. They were the technical fixes underpinning the 1940s optimistic pledges to feed the world and banish hunger. By the 1960s, doubts were being raised. Pesticides were created to destroy life, driving biodiversity loss. They and fertilisers polluted, putting residues in soil, food and water. They exacerbated social divisions between those farmers who could afford them and those who couldn't. They weakened natural predators and soil life. They created economic lock-ins to intensification and industrialised commodity production. They created schisms between nature and food production.

With conflict now exposing the oil-based commodities that drive the modern food system, must we simply hope that normality resumes? Or do we say: enough! and ask: where now? Let's develop a lower impact, positive food system.

I think this is a moment to slow down and stop the treadmill. We can grow food without these products. Not as much, perhaps, but so much of the vast acreages of grain and seeds onto which agrichemicals are spread in a country like the UK don't feed people directly. They produce feeds for inefficient animal convertors, themselves industrialised and commodified. The grains and oils become gambled commodities on futures markets. They are turned into notionally cheap, mass-produced, 'ultra-processed' foods high in unnecessary salt, sugar and fats that contribute directly to massive healthcare costs of obesity and poor diet-related ill-health.

We can improve not only public health, but ecosystem health, by not just lowering pesticide use, but stopping it. We can help farmers, growers and gardeners dramatically reduce reliance on synthetic inputs. Some are doing this via regenerative farming, but they need support to go further. Recognising pesticide harm to soil is a vital first step. The public can help, not least by lobbying politicians to get engaged.

The sad truth is the food system is in trouble. Returning to business-as-usual is a false goal. Whether we look at the land or sea or farm inputs, or how vulnerable the concentrated food economy is, or the creeping reality of food being used again as a weapon of war, or how food has been turned into the biggest driver of ill-health on the planet, we must ask: how did we get here, and where to now?

Surely, we must support the increasingly loud calls for a reset of national food policy. The politics that say we must choose between supporting ecosystems or feeding mass societies are wrong. We can and must do both. A better food system is possible and necessary.

EXECUTIVE SUMMARY

© Getty Images / Paul Maguire

Farmland sprayed with glyphosate, a herbicide, Buckinghamshire, UK

For decades, a handful of giant agribusinesses have had a chilling impact on UK nature. They have fuelled our dependency on fertilisers and ever-stronger pesticides, pushing these toxic and expensive chemicals as the default way to boost crop production. Now, from our fields to our skies, and our hedgerows to our waterways, we are seeing the consequences for the natural world. Biodiversity is plummeting, iconic species face a fight for survival and farmers are struggling as chemical costs soar in the wake of global conflicts. For the sake of wildlife, farmers and our food security, the UK government must urgently swap inaction for ambition and support farmers to shift away from this chemical dependency.

Look and listen closely enough, and the signs of nature in decline are everywhere. The birdsong in our skies is slowly quieting – with 19 million breeding pairs gone since 1966. The colourful flash of many of our butterflies is now a memory, with half of British species now missing from places where they would have been common in the 1970s. More and more of our fields have turned an unnaturally vivid green, their natural colouring lost to nitrogen fertilisers. Our hedgerows are no longer crowded with a tapestry of wild flowers. Our waters are plagued by algae, as chemicals travel far beyond farmland and leave species from kingfishers to freshwater insects facing a life-or-death struggle.

There is a link connecting all this loss and destruction of nature: chemical pesticides and nitrogen fertilisers. They are sold for enormous profit by giant agribusinesses to farmers who have faced decades of pressure to relentlessly increase crop production – regardless of the environmental cost. Farmers are nature's custodians. They have witnessed this dramatic change first-hand, as pesticides and fertilisers have become the default drivers of more intensive agriculture. But the natural world that supports our farming and food production is now suffering intolerably.

Pesticides don't discriminate. As well as targeting weeds and insects that eat crops, they harm the soil and the earthworms who keep it healthy. They kill insects and plants, and are driving the decline in our birds. When they are carried away by the wind and the rain, pesticides end up everywhere, from

Wild flowers
in a meadow

our hedgerows to our rivers, disrupting entire ecosystems. They can now be found almost all over the UK – including in our bodies.

New Greenpeace analysis has revealed the scale of pesticide use in the UK, showing that 102 individual pesticides are used across seven British food staples, including carrots and potatoes. Out of the nine pesticides most frequently applied, almost all are classified as Highly Hazardous Pesticides by the Pesticide Action Network or the University of Hertfordshire's Pesticide Properties Database, posing a serious risk to the natural world.

Synthetic nitrogen fertilisers are very different chemicals. They boost the nutrient content of the soil far beyond natural levels, rather than killing animals and plants. But in doing so they also disrupt our environment. Nitrogen-treated fields become monocultures, attracting far fewer pollinators and crowding out delicate plants and wild flowers that many species rely on. Vast amounts of fertilisers are also wasted once they are sprayed, and the run-off fills our rivers with algae that starves water of oxygen and stops underwater plants from growing.

This pesticide and fertiliser crisis has also burdened farmers with unmanageable and unpredictable costs. At the time of writing, the US-Iran war is causing synthetic nitrogen fertiliser costs to rocket, a spike we also saw just a few years ago when Russia invaded Ukraine. A large percentage of nitrogen sprayed on crops is lost as pollution into the environment, making its use a financial and ecological disaster. Our dependence on pesticides and synthetic fertilisers is an expense that many farmers could do without.

Yet for too long, the government's response has been ponderous. Agribusinesses have used tactics previously employed by tobacco and oil companies, systematically undermining scientific evidence of the damage they inflict. But their impact is becoming clearer and clearer, and farmers and scientists have shown that agriculture can thrive without dependence on chemicals. Ministers must respond – and agribusinesses must be held to account.

It's time for ambitious, urgent and binding targets to reduce our dependency on pesticides and fertilisers. The government must support farmers to halve agricultural chemical use by 2030 – and commit to an 80 per cent reduction by 2040. This is key to setting UK nature on the path to recovery.

Rolling green fields
in Derbyshire, UK

INTRODUCTION

There are millions of fields in the UK, a rich tapestry. Hedgerows and trees line their edges, interspersed with patches of woodland. Birds soar above the rivers, streams, ponds and lakes that wind their way through the landscape.

It is a farmland vista that speaks to our love of nature and living things, animals and plants; on the ground, in the water and in the air. Covering three quarters of the UK, farmland makes up our biggest ecosystem and is a foundation of our cultural memory.

At first glance, the UK landscape may seem to have changed relatively little in recent generations. And yet, while much may look the same, British agriculture has gone through incredible change over the past 90 years, with profound consequences for the natural world. Much of the farmland has turned a uniform, vivid green, blanketed by nitrogen fertilisers, while other shades have faded away. The blue skies are emptier. The hedgerows are less busy. The noise and bustle of millions of insects, birds and mammals living together in a thriving ecosystem has slowly been quietened.

The farmers who live and work on this land are its custodians, and they have seen and felt the consequences of this shift. Around farmhouse kitchen tables today, farmers of several generations sit together, each the product of a different – and often conflicting – farming era.

THE PRESSURE ON FARMERS THAT LED US HERE

We can trace our current situation back to World War II and post-war generations, when farmers were told by the government to prioritise production at all cost, with countless hedgerows ripped up and ponds drained as a result. Then came a web of subsidies under the EU's Common Agricultural Policy. These led to huge food surpluses and vast swathes of land being concentrated into industrialised farms. Today, the priorities have shifted again, with farmers being asked to serve as both food producers and environmental stewards.

Throughout this, the natural world that both supports and is entwined with our farming and food production has been suffering intolerably. Farmers must navigate a maze of financial and operational stressors, and, over time, chemical inputs like pesticides and synthetic fertilisers have become the default way of managing some of these pressures.

Now, as this report documents, we are seeing the costs to the living soil, to wildlife and to farmers' livelihoods more clearly than ever. And the damage

Farmers should be able to get rid of their hazmat suits and instead enjoy the sights and sounds of a healthy farming landscape

© Getty Images / Lee Adcock / 500px

The Marsh Fritillary butterfly – one of the UK's many butterfly species – has declined severely over the twentieth century

doesn't stop there, because this is an issue with consequences far beyond nature and biodiversity.

In an increasingly volatile world, it's become clear that we also need to shift away from expensive chemicals and complex supply chains, for the sake of our future food resilience. A recent Joint Intelligence Committee report underlined this, describing global nature loss as a matter of national security.[1] Our dependence on food imports from nature-depleted regions has become a vulnerability we can no longer ignore.

Rather than being reason to panic, however, this challenge presents an incredible opportunity. Rebuilding nature's scaffolding at home is a strategy for food security, but it has to happen without delay.

One key way we can do this is to reduce the use of pesticides and synthetic fertilisers in British farming. Do that, and there will be massive gains for nature, farmers, our food system and food security. Farmers should be able to get rid of their hazmat suits and instead enjoy the sights and sounds of a healthy farming landscape. Our wildlife is vanishing from the fields and skies it once filled, but we still have time to respond.

THE QUIET CRISIS IN OUR COUNTRYSIDE

The idea of a biodiversity crisis may feel at odds with the UK's green fields, rolling hills and beloved coastlines. In reality, we have been losing our birds, mammals, insects, trees and flowers over hundreds of years of industrial development, urbanisation and the intensification of farming. So much is gone that it's almost impossible to imagine a past where flocks of turtle doves and swarms of butterflies were unremarkable sights throughout the land.

Between 1966 and 2017, some 19 million pairs of native breeding birds disappeared from the UK, including 10.7 million pairs of house sparrows.[2] Insect numbers have also plummeted in recent decades.[3] British butterflies are perhaps the best-studied insect populations on the planet, and more than half the UK's species are now missing from areas where they could be seen as recently as the 1970s.[4] Those that thrive in flower-rich grasslands have suffered the worst. This is no coincidence, with only an estimated 3 per cent of England's wild flower meadows having survived since the 1930s.[5] And moths – butterflies' nocturnal counterparts – have declined in abundance by nearly a third since 1970.[6]

A house sparrow holding a mayfly in its beak

© Getty Images / sandra standbridge

Everywhere we look, nature is barely hanging on. The struggles of our moths and butterflies are anything but unique. They reflect how the foundations of our environment are crumbling. Today, one in six of our remaining species is at risk of extinction, including a quarter of our mammals and nearly half of our birds.[7]

© Getty Images / Justin Paget

Drone view of a tractor spraying pesticides in a newly-sown field

But time has not yet run out for UK nature. The same science telling us how quickly we are falling off the cliff can help us restore the nature we love. When the pressure on nature is lifted, British wildlife can bounce back from depletion in a few short years.[8] Scientists and farmers have shown how it can be done. We understand how to make our ecosystem a place where nature can thrive. One of the most urgent steps is to reduce the level of chemicals going into our landscape.

THE PROBLEM WITH PESTICIDES
Indiscriminate and unavoidable

Modern pesticides are hundreds or even thousands of times more toxic to insects and other wildlife than the first pesticides created in the 1940s and 50s

The post-war intensification of UK farming has been defined by two types of chemical inputs: pesticides and synthetic fertilisers.[9] Both have a devastating effect on biodiversity.

Most pesticides have two primary targets – the insects and diseases that damage crops, and the weeds that compete for the same soil, water and sunlight. Their use has become a default farming practice, diminishing our wildlife in the process.

However, what we might think of as a 'weed' may also be a wild flower that is shelter or food for a host of creatures. The insects that eat crops are themselves food for other animals, and share the fields with a multitude of species who are not the target, but are nevertheless impacted. As a result, our dependence on pesticides is a tale of terrible, unintended consequences for entire ecosystems.

The growing strength of pesticides is another major concern. Although the weight of pesticides applied to the UK's crops has decreased over the past few decades, modern pesticides are hundreds or even thousands of times more toxic to insects and other wildlife than the first pesticides created in the 1940s and 50s.[10] Shifting patterns in weather and farming practices also mean that crops now receive many more doses of pesticides every year than they did in 1990.[11] Combined with the lethality of many of the products being used, the environmental stress they create can be incredibly high.

Today, farmland covers three quarters of the UK, so what happens on this land is essential for determining whether nature thrives. Pesticides contribute

to making that land inhospitable to wildlife, squeezing it to the margins. And pesticides don't sit in place after being applied to a crop. Even if most farmers seek the best weather for spraying, chemicals can still be borne away by wind and rain, drifting into hedgerows and the wildlife that lives there, with some pesticides transported far beyond the field.[12,13] As a result, these chemicals can now be found practically everywhere in the UK. They are transported by clouds and fall as rain, run through our rivers, gather as dust in our homes, and are even found in human bodies.[14,15,16]

THE PROBLEM WITH SYNTHETIC NITROGEN FERTILISERS
A biodiversity timebomb

White pellets of nitrogen fertiliser on the ground

Nitrogen fertilisers are a very different chemical to pesticides, with very different goals. They exist to help crops grow, rather than to kill animals and plants. Sprayed over fields in small white pellets, they boost the nutrient content of the soil far above levels that exist in nature. But, like pesticides, they have a massive chemical impact on our farmland.

Much of what is applied to crops is lost to the wider ecosystem as pollution, where excess nitrogen drives down biodiversity.[17] The consequences for wildlife both on land and in the UK's rivers, streams and lakes have been devastating. Nitrogen pollution is one of the fundamental, but relatively untold, causes of the nature crisis.

In fact, global biodiversity assessments show that the levels of reactive nitrogen in the air and water are one of the most significant threats to biodiversity today.[18] This nitrogen has many sources – including the burning of fossil fuels – but synthetic fertilisers have been the single greatest addition to the overall levels of reactive nitrogen circulating in soils, water and the atmosphere.[19] Since the 1960s, the use of fertilisers has increased by nine times globally. Most worryingly of all, it's predicted to increase another 50 per cent over the next 40 years.[20]

A farmer spreading fertiliser on farmland

FERTILISER COSTS OUT OF CONTROL

At the time of writing, the US-Iran war is causing synthetic nitrogen fertiliser costs to rocket – the result of severe supply chain disruptions in the Strait of Hormuz. A similar spike happened when Russia invaded Ukraine – at that time, caused by the surging cost of natural gas, a key ingredient in nitrogen fertilisers. As well as being an ecological disaster, these fertilisers are a financial nightmare – and an unpredictable expense that many farmers could do without.

Fields treated with glyphosate in the South Downs, UK

© Getty Images / Steve Geliot

HOW PESTICIDES AND NITROGEN FERTILISERS ARE UNRAVELLING THE NATURAL WORLD

Some 70 years after government incentives for monoculture farming began reshaping the landscape, the decline in biodiversity can be seen across our countryside and far beyond. This is how nitrogen fertilisers and pesticides are disrupting the delicate balance and harmony of our ecosystems.

OUR FRAGILE FIELDS

Plants, pollinators and hedgerow life

A bee on a cornflower

© Getty Images / mcKensa

Synthetic nitrogen fertilisers have turned the UK's fields from a patchwork of different hues into an unremitting carpet of bright green. When nitrogen is added, the fast-growing grasses used to feed cows and sheep surge towards the sky astonishingly quickly, crowding out wild flowers and other slower-growing plants.

As a result of the rise in fertiliser use, these green meadows have become monocultures, making previously ubiquitous plants like corn marigolds scarce. Bright blue cornflowers are now nearly extinct. Studies indicate that fields treated with fertiliser might only contain three to five species of plant, while 35 to 40 are likely to be found thriving in untreated fields. Delicate native wild flowers and plants simply cannot grow in the nutrient-rich soil, nor compete for light.[21]

From mountain pastures to floodplain meadows, grasslands cover more than 40 per cent of land in the UK.[22] Officially, those grasslands that have had synthetic fertilisers applied are classified as 'improved', since they are able to grow more grass – but the environmental cost has caught up with

Fertilised fields typically attract only half as many pollinating insects, because nitrogen reduces the diversity of plants that grow

us. By contrast, so-called 'unimproved' grasslands are riotous, colourful and rich in nature, but today they only make up a few per cent of the total area of grassland in the UK.[23]

Inevitably, this stark shift means the insects that rely on healthy and varied fields are suffering too. Fertilised fields typically attract only half as many pollinating insects, because nitrogen reduces the diversity of plants that grow.[24] Nature is being weakened by synthetic nitrogen use, and this is then compounded by the near-continuous application of an incredible variety of pesticides.

For wild bees, hoverflies, moths, butterflies and other pollinators on the frontline of pesticide impacts, the spraying of pesticides has created lethal new risks. They feed on the nectar and pollen of flowering crops, delivering pollination in the process. This is an essential service for many food crops, and to the wider ecosystem. But pesticides like Lambda-cyhalothrin, an insecticide used in UK agriculture, have a calamitous impact. Classified as highly toxic to bees and very toxic to aquatic life, it is also a PFAS (forever chemical), which means it is highly persistent in the soil and can accumulate in the food chain.

By attacking an insect's nervous system, Lambda-cyhalothrin causes its nerves to fire uncontrollably, before spasms eventually give way to paralysis and death. Even if the dose received is too low to be deadly, bees may be left confused and unable to find their way home to their hive – a death sentence by any other name.[25,26,27]

Wild flower meadows in the Yorkshire Dales, UK

© Getty Image / Alexander W Helin

CHANGE BELOW AND ABOVE GROUND

Insects and the roots of plants burrow down into the soil, which is a living, breathing ecosystem all of its own. Earthworms are one of the key architects of this subterranean world, but their UK numbers have declined by over a third over the last quarter-century.[28] Studies have shown that earthworms struggle when soil becomes loaded with synthetic fertilisers and pesticides.[29,30] But these creatures are essential for aerating the soil and cycling nutrients. Without them, the soil suffocates. Synthetic nitrogen fertilisers also make the soil acidic. This drives away some of the microorganisms that naturally keep the earth fertile, creating more of a dependence on synthetic fertilisers and further damaging this ecosystem of the land.[31]

Above ground, meanwhile, creatures that make their homes in our fields are also struggling. Groundnesting birds like Montagu's harriers, for example, are unable to escape the clutches of pesticides. These beautiful, lesser-known birds of prey build their nests among cereal crops, but this leaves their chicks dangerously exposed to pesticides. One study found 18 different chemicals in the blood of harrier chicks, with the potential to hinder growth, reduce the birds' fat reserves and directly increase their stress levels.[32] Every winter, Montagu's harriers leave the UK on an epic migration to Africa. They are much less likely to survive the journey if they are weakened even before they take off.

© Getty Image / mauribo

Montagu's harrier at nest

Strawberry plants grow in a polytunnel whilst a farmer sprays pesticides. Herefordshire, UK

THE SCALE OF THE PROBLEM

New Greenpeace analysis has revealed the staggering scale of pesticide use on British food staples. Across just seven vegetable and soft fruit categories, a total of 102 unique pesticides were used according to the most recent data.[33] 43 different pesticides were recorded as having been used in the growing of onions & leeks, 42 for strawberries, 40 for the production of carrots and parsnips and 31 for potatoes. Seven of these pesticides are already banned in the EU.[34]

Of the nine pesticides most frequently used in the growing phase across these vegetable and soft fruit categories, nearly all are classified as Highly Hazardous Pesticides (HHPs).[35] These chemicals can cause serious threats to wildlife and/or human health. A handful of them are classified as forever chemicals (PFAS).[36]

This isn't a one-time application; plant species, insects, birds and the soil are being hit over and over again. In 2024, UK wheat crops were sprayed on average 13 times a year, while potato crops faced on average over 27 applications.[37] In addition, these pesticides are increasingly toxic to wildlife, creating a landscape where insects, birds and the soil can no longer recover.[38]

HEDGEROWS NO LONGER A HAVEN
The threat to hedgehogs, butterflies and flowers

Huge amounts of synthetic nitrogen fertiliser and pesticides escape into the wider ecosystem after being applied to crop fields

Away from the crops that dominate farmed fields, a far greater diversity of plants should be found in the boundaries and hedges, an essential habitat and food source for small mammals, birds and many other creatures. The soil here is much less disturbed, untouched by the plough and seed drill, and a variety of beautiful wild plants can flourish.

The reality, however, can be very different. Huge amounts of synthetic nitrogen fertiliser and pesticides escape into the wider ecosystem after being applied to crop fields. They seep into the soil. They are carried away by the rain and wind.[39,40] As a result, they are reshaping the natural world, and forcing iconic species into a fight for survival.

Hedgehog under a garden bush

Take the countryside hedgehog, a mainstay of our cultural heritage for centuries. As their name implies, hedgehogs stay close to hedgerows and field boundaries. But this habitat has left them more vulnerable than ever. Rural hedgehog numbers have been in freefall since the 1960s. They are now on the IUCN Red List of Endangered Species, struggling as the wild edges where they live are invaded by pesticides and fertilisers.[41] Hedgehogs are small and elusive, making them difficult to count and hard to study, but there may be fewer than one million now left in the whole of the UK. Much of this decline has happened in areas where farming has been most intensive. As their hedgerow habitats have become less abundant, and the earthworms and insects they depend on have become scarcer, hedgehogs are ever-more likely to seek refuge in village gardens.[42]

It's a similar story for butterflies, for whom hedgerows are a haven. In a 2024 nationwide count, butterfly numbers fell to the lowest level ever recorded, prompting calls for a butterfly emergency.[43] We know butterflies are a fragile species for many reasons – for example, being vulnerable to harsh weather conditions. But the use of pesticides has left them facing numerous additional pressures, as the food sources and habitats they depend on are depleted.

If you know what to look for, the evidence of fertilisers and pesticides altering the landscape is everywhere. We are used to seeing an abundance of nettles and cow parsley on country walks, but that's because they thrive in nitrogen-rich soils. They've become overgrown on the edges of fertilised fields and country lanes, crowding out the more delicate wild plants and flowers that should grow there. Hedgerows act as filters, catching toxic chemicals as they drift from fields, and suffering the effects in the process. The variety of plant life surrounding them reduces as a result, and when wild flowers become scarce, so do the insects and birds that feed on their seeds or take shelter in their leaves.

A landmark study, covering 37 years of data from across the UK and Europe, found that pesticide and fertiliser use is the single biggest driver of bird declines

A SKY-HIGH CRISIS

Fertilisers, pesticides and bird numbers in free fall

A landmark study, covering 37 years of data from across the UK and Europe, found that pesticide and fertiliser use is the single biggest driver of bird declines.[44]

Grey partridge – also known as English partridge – in flight

In the early half of the 20th century, the picture in our countryside was very different. Birds like grey partridges and turtle doves were a reliable and much-loved sight on UK farmland; the partridges impossible to miss because of the orange colouring around their beaks, the doves filling the skies with their purring songs. Today, however, they are among our fastest declining bird species – and the impact of pesticides and fertilisers is clear.

In the first two weeks of life, grey partridges feed their chicks exclusively on insects that live in plants on the margins of farmland. Disrupt that insect world, and the loss is like pulling bricks out of a building's foundations – very soon the entire structure will collapse. The use of herbicides is starving grey partridge chicks. The number of these birds in the UK fell 92 per cent between 1967 and 2021.[45]

As for turtle doves, these beautiful birds – for centuries associated with romance – are now close to extinction in the UK.[46] The key driver is thought

to be herbicide use, as chemicals destroy vital food sources they rely on, like fumitory and chickweed. Without enough food, the turtle dove nesting season shrinks, and chicks are more likely to starve.[47]

These are by no means the only examples. The number of spotted flycatchers declined by 93 per cent between 1967 and 2021.[48] Many other farmland birds, from yellowhammers to corn buntings to skylarks, are also suffering. They rely on the seeds of wild flowers and other 'weeds' that have been systematically eliminated as UK farming has moved towards artificially fertilised herbicide-controlled monoculture crops.[49] These plant species are a foundation of the UK's ecosystem, and the loss of plant diversity in fields, hedgerows, meadows and woodlands is stealing habitats and food away from birds at a dramatic rate.

Male yellowhammer calling from wooden fence post

YELLOWHAMMERS

Well-loved by farmers, the flash of its yellow wings makes the yellowhammer one of our iconic farmland birds. Yet the impacts of both fertilisers and pesticides are one of the key reasons this bird is declining. Its numbers fell by 66 per cent between 1967 and 2003, placing it on the red list of UK species.[50]

Adult yellowhammers depend on the seeds of wild plants, but this food supply has become less abundant through herbicide use, making survival through the winter months a struggle. Their young need a steady supply of insects – yet insecticide use has meant less successful foraging, poor body condition of their brood, and therefore more chicks starving in their nests.[51]

As fields enriched with nitrogen have become dense with closely grown grasses and crops, ground-foraging yellowhammers have found themselves unable to access the soil to find seeds and insects. Worse still, these fields lack a diversity of wild plants – a crucial food source for adult birds and a source of pollinating insects that would be brought back to chicks in the nest.

Yellowhammers have been found to ignore 'improved' (fertilised) grasslands, showing how inhospitable these landscapes have become for seed and insect eating birds.[52]

CHEMICALS IN OUR WATERWAYS

How river pollution begins in our fields

It's a national scandal that just 14 per cent of our rivers are in 'good' ecological condition. Profit-obsessed water companies have rightly been the target of furious public pressure recently, for allowing fetid water and human

Algal bloom in a ditch caused by fertiliser runoff from nearby farmland

Pollution from farms is now one of the biggest drivers of environmental damage in UK rivers

A male kingfisher on a willow branch

waste to enter our precious waterways and natural beauty spots.[53] But the reliance on pesticides and nitrogen fertilisers also has a central part to play in this story. In fact, pollution from farms is now one of the biggest drivers of environmental damage in UK rivers.

Farmed fields are inextricably linked to the wider landscape by the movement of water. The impacts of intensive farming don't stop at the hedgerow, but instead follow the rivulets and streams that weave through farmland, ending up in our rivers, lakes and seas. Nitrogen and pesticides are leached from the soil by rainwater, turning waterways into conduits for pollution.

Much of the fertiliser sprayed on farms is wasted, and rainfall will wash the excess into neighbouring rivers, ponds and lakes. There it can cause rapid algae growth, blocking sunlight and killing the underwater plants that provide food and habitat to river creatures.

Rivers and lakes caked in algae prevent visual hunters like the kingfisher from seeing through the choked-up river surface. Even a small amount of chemical runoff, and therefore algae cover, impacts their ability to dive accurately and catch fish. Add to this the final blow: the water is starved of oxygen as the algae rot and bacteria move in, causing fish and other aquatic creatures to suffocate and die. For kingfishers that may need to eat their body weight in fish each day, the collapse of a stickleback or minnow population can be a death sentence. Consequently, groups like the British Trust for Ornithology monitor kingfishers and other birds like dippers and great crested grebes as 'wetland indicators', using their presence as a measure of the health of our rivers and lakes.[54,55]

Pesticides also pose severe toxic problems to fish and other aquatic animals. And, with their use now ubiquitous in the UK, it's no surprise that most rivers contain pesticides too.[56,57] Freshwater insects are among the most vulnerable species, since even trace levels of pesticides can impair their growth, navigation and reproduction.[58] Lost in a chemical haze, these sensitive indicators of the waterworld's health are a clear sign that our rivers are sick.[59]

Another cocktail of pesticides is still finding its way into our waters – despite being long-banned for agricultural use. Imidacloprid and fipronil have been banned in agriculture because they are so potent, but they remain in heavy use in the UK as part of popular over-the-counter flea treatments for our millions of pet dogs and cats. A single monthly dose for a large dog is enough to kill 25 million bees.[60] After a dog owner washes their pet or the animal swims in a river or lake, much of that dose can end up down our drains and in our waterways. Once there, it poses a dangerous threat to wildlife.[61,62] This helps explain why fipronil is still found in so many rivers, years after the farming ban came into place.[63,64,65]

As long as Britain's rivers and their threading catchment basins carry all these unintended consequences of fertilisers and pesticides, their condition will only deteriorate. Healthy waterways are a sign of a healthy national ecosystem, and that's something we're far away from at the moment. Reining in our runaway use of fertilisers and pesticides is a crucial step towards cleaning up our degraded river systems. Only by healing the land can we allow life to flourish in the water.

Spray bottles of Roundup weedkiller for sale

The continued use of pesticides in public spaces in the UK is yet another sign of how we are allowing nature to be devalued and destroyed by toxic chemicals

FALLOUT IN OUR CITIES AND TOWNS

Why pesticides are an urban problem too

As the UK's rivers demonstrate, distance from farmland doesn't provide an escape from pesticides. The same is true of the country's towns and cities, where four out of five of us live.[66] Here, pesticides such as glyphosate are a big part of the problem.

Most gardeners using glyphosate to control a few dandelions won't be aware that this may have cascading impacts on other local wildlife. Nor will they know that there are serious human health concerns around glyphosate, which is subject to thousands of lawsuits in the US, relating to its probable links to cancer.[67] How can they be expected to? But several European countries have already banned glyphosate from their cities, and France has gone further – removing almost all pesticides from store shelves and banning their use by local councils.[68] The continued use of pesticides in public spaces in the UK is yet another sign of how we are allowing nature to be devalued and destroyed by toxic chemicals. Their impact on bees, butterflies and microorganisms is simply too high a cost to justify.

Today in the UK, there are 22 million home gardens and tens of thousands of public parks. These provide us with a crucial connection to nature. But spraying pesticides like glyphosate in these spaces shatters that connection, directly driving declines in iconic British species like the house sparrow.[69] By turning these urban oases into chemical minefields, we are inadvertently creating habitats that appear inviting to wildlife but ultimately prove fatal to its survival, while also posing serious potential public health risks.[70]

Pesticides have now penetrated the heart of life in Britain, from the farm to the river to the local park. Together with synthetic fertilisers, they are impossible for nature to escape. The costs of this system are legion and well understood, yet British wildlife and the British public keep paying the price. So, the question has to be: who stands to benefit?

HOLDING AGRIBUSINESS TO ACCOUNT

A handful of companies are responsible for this crisis

Immensely rich agribusinesses have fuelled the past half-century of intensive pesticide and synthetic fertiliser use, profiting while nature has withered and humans have suffered.[71]

These companies have carefully followed the tobacco and oil industry playbooks, deploying a full suite of underhand tactics to maintain business as usual and boost profits at all costs. They have undermined scientists and wilfully ignored mounting evidence of the harm their products cause, choosing instead to ramp up nitrogen fertiliser output and make pesticides more and more toxic.[72]

The upper reaches of agribusiness are dominated by just a few massive companies. Over 60 per cent of the pesticides market is in the hands of four companies,[73] while the top three nitrogen fertiliser producers accounted for over one third of global production in 2022.[74] The scale of these businesses is staggering, with the pesticide and fertiliser industries having global sales of $79 billion and $196 billion respectively in 2023.[75]

Industrial production of fertiliser also relies heavily on fossil fuels. So

[Agribusinesses] have undermined scientists and wilfully ignored mounting evidence of the harm their products cause, choosing instead to ramp up nitrogen fertiliser output and make pesticides more and more toxic

not only is it disastrous for the climate, but prices reflect the volatility of the natural gas market. Following Russia's invasion of Ukraine in 2022, the combined annual profit of the nine biggest fertiliser companies rose from just under $13 billion in 2020 to over $49 billion in 2022.[76] While communities in the UK were facing a crushing cost-of-living crisis, these multinational companies were directly profiting from war.[77] At the time of writing, the US bombing of Iran is having the same effect, driving up fertiliser prices as supplies are unable to travel through the Strait of Hormuz – and leaving farmers to try and cope with spiralling costs.[78,79]

The business models of these giant pesticide and fertiliser companies are based on selling products in the UK – and elsewhere – that inevitably result in polluting the broader ecosystem. As company profits pile up, farmers and rural communities are left to absorb this environmental degradation. Deep pockets and extensive lobbying mean that fertiliser producers have deflected responsibility, instead placing the burden on their customers – the farmers – who they have helped to make so reliant on chemical inputs in the first place.[80]

TOO LITTLE, TOO SLOWLY
The government response so far

In the face of this industry might, the UK government has moved ponderously. It has failed farmers, the wider public and the natural world, leaving us with a pesticide regulatory regime that isn't fit for purpose. The case of neonicotinoids – scourge of wild bees and other pollinators – typifies an approach that has lacked for decades anything near the required urgency.

Neonicotinoids have a devastating effect on an insect's nervous system, and have decimated bee populations, as their brain chemistry is particularly vulnerable to these chemicals. In fact, the impact of neonicotinoids around the world in the 2000s and 2010s was so dramatic that the sudden disappearance of bee hives has been described as a 'bee rapture'.[81,82] It took until 2018 for neonicotinoids to finally be banned for agricultural use in the EU, but the UK government then covered itself in shame by making exemptions for neonicotinoids to be used for several years afterwards. The UK ban was finally made complete in 2025.[83]

Concerns about neonicotinoids had been raised for many years. And yet it took two decades, dozens of papers and a wild bee cataclysm for the three most deadly neonicotinoids to finally be removed from sale for use in agriculture. This is symptomatic of the UK's response to a nature crisis that can only be resolved with real ambition and real urgency.

Right now, there are hundreds of pesticides approved for use in the UK, mixed to produce thousands of different products. Regulators consider their safety and approve each one on an individual basis.[84,85] Their impact on the environment is tested in laboratory conditions, which makes no allowance for how they interact with other chemicals.[86] In reality, though, they are applied to crops as a cocktail of pesticides, meaning the regulators' findings can only predict part of their impact. This is not the holistic approach the natural world is crying out for.

Unsurprisingly, lobbying by pesticide companies has greatly exacerbated this dysfunctional system. They have gone to extreme lengths to discredit

A bee approaching flowers

scientists whose work shines a light on the harm caused by pesticides, while simultaneously producing their own research of dubious merit that drastically understates their hazards.[87] It is high time for nature to take priority.

TIME TO END THE FAKE 'TARGETS'
Only ambition can save nature now

The only path forward at this point is to dramatically reduce the toxic load on the environment from pesticides and synthetic fertilisers. The UK government has belatedly acknowledged this, launching a Pesticides National Action Plan in 2025, with a stated goal of reducing its self-defined 'Pesticide Load Indicators' by at least 10 per cent from 2018 levels by 2030.[88] A brief look at the details, however, shows that the government still isn't taking this problem seriously.

The 10 per cent cut isn't remotely ambitious enough to address the scale of the pesticide problem. The UK has a commitment under the Global Biodiversity Framework to reduce pesticide and fertiliser impacts by 50 per cent by 2030, which the new National Action Plan will not achieve. Worse still, according to the government's own accounting, almost all the indicators had already reached the required 10 per cent reduction by 2022, implying that the status quo is acceptable and that its new 'target' has actually already been reached.[89]

The plan also only covers arable farmland used for growing crops, excluding all other types of farming and urban areas. And, to cap it all off, the targets aren't even legally binding, meaning there's no penalty for the government if it fails to do something that it claims to have already achieved.

The response has been very slightly more urgent for fertilisers. The government does have a legal requirement to reduce the level of nitrogen and phosphate fertilisers entering our rivers by 40 per cent by 2040, and there are technologies that might be more widely applied to limit the runoff, both at home and overseas. Some even believe Britain could be a world leader in these. But that's only one part of the fertiliser pollution problem.[90] It also doesn't place any limits on the amount of fertiliser being applied in the first place.

In both cases, the burden of action is being placed on the end users – farmers. But the drivers of this crisis are the producers, the big agribusinesses. Under the current rules, a farmer can be fined for allowing runoff of nitrogen into rivers, but there is no penalty for the company that sold them the fertiliser in the first place. For pesticides, no one at all is culpable for the amounts used. This tells you all you need to know about the position the agribusinesses have engineered for themselves. This situation now has to change.

Farmer on tractor harvesting organic potatoes

The burden of action is being placed on the end users – farmers. But the drivers of this crisis are the producers, the big agribusinesses

THE WAY FORWARD FOR OUR COUNTRYSIDE

There are many farmers who are already experts in reducing the use of chemicals in agriculture

In all instances, nature – and more of it – is the solution that can restore our countryside and enable it to thrive safely once again.

There are many farmers who are already experts in reducing the use of chemicals in agriculture. Their expertise – much of which has built up over many decades – should now lead the way.

They have shown how restricting chemical pesticides and synthetic fertilisers can revive whole ecosystems, with an average of 30 per cent more wildlife found on organic farms. They have shown how nature-friendly methods can start to restore ecosystems above and below land.

Integrated pest management has proven how restoring hedgerows and introducing habitats like 'beetle banks' (grassy areas encouraging predator insects) can remove the need for insecticides, providing nature-friendly pest control. The planting of a diverse range of nitrogen-fixing plants can restore natural fertility to the soil and remove the need for synthetic fertilisers.

Supporting nature supports and protects the UK's food system. So we must now take the steps below to transform our countryside and help farmers – who are already facing rising costs and the growing impact of climate change – to shift towards these practices and face the future with renewed hope.

Tractor on a farm in Essex, UK

REMOVING CHEMICALS FROM OUR COUNTRYSIDE

Our targets to restore nature

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Campaigners on the Restore Nature Now march in central London, June 2024

As this report makes clear, the challenges facing the UK's natural world are huge – but they are also surmountable. With dedicated action, we can create the conditions for a more secure food system, for farmers to be more valued and supported, and for wildlife to survive and thrive into the future. To help us get to that point, Greenpeace UK proposes the following:

OUR TARGETS TO END THE CHEMICAL ERA

The government must set ambitious targets to help reduce farmer dependency on pesticides and fertilisers:

- By 2030, the UK must achieve a 50 per cent decrease in the usage, impact and toxicity of pesticides and synthetic nitrogen fertilisers, as promised by the UK government in the Convention of Biological Diversity.
- This target would address the weak ambition of action currently proposed by the government, in particular in the Pesticides National Action Plan.
- By 2040, the UK must achieve an 80 per cent decrease in the usage, impact and toxicity of pesticides and synthetic nitrogen fertilisers.
- As has been done in France, use of all pesticides must be banned for non-agricultural use, e.g. parks, campsites and all public areas. Pesticides should be banned from sale for use in private gardens, as should some pesticides sold over-the-counter for use on pets.

OUR TARGETS TO PROTECT PUBLIC HEALTH AND FARMERS

- Food grown with pesticides banned in the UK should not be imported, to avoid undermining UK farmers and protect public health.
- As part of the UK's realignment with the EU, the UK should adopt all EU pesticide standards, viewing this as a baseline, not a ceiling, with the intention that the UK will go further if EU standards are lowered.
- The UK should increase the level of organic agriculture to reach 10 per cent at a minimum (we currently have one of the lowest proportions of organic farmland in Europe, at just 3 per cent of the total).[91,92] It should also break down the barriers between organic and conventional farming, supporting more conventional farmers to adopt organic practices that work in their context.[93]

Wild flower meadow in full bloom, North Yorkshire, UK

A skylark in flight

APPENDIX

HOW WE CAN MEET OUR TARGETS AND STANDARDS

- The government must invest in farmers and their advisers (including agronomists) via payments for the environmental services they render. It must also develop a comprehensive plan to reduce dependency on fertilisers and pesticides, including through Integrated Pesticide Management (IPM), publicly funded advisors, farmer-to-farmer workshops, skill sharing and knowledge exchange.
- The government must both maintain and extend payment for not using insecticides to cover horticulture and the use of fungicides and herbicides. This should happen as part of a transition period towards genuine, robust IPM that makes nature-friendly farming at scale the norm.
- The government must expand the use of nitrate vulnerable zones (NVZs) to potentially include the whole of the UK, while being mindful that some of the restrictions in existing NVZs may have pushed farmers to make choices that countered their overall intention. For example, manure spreading before the application window, leading to a higher chance of run off in rainy weather.
- The government should invest in new technology and innovation around nutrient capture and recycling in order to try and reduce the need for synthetic fertilisers.
- Supported by Westminster, devolved nations should develop action plans based on evidence of their own environmental and farmer needs, clarifying how to deliver positive outcomes for nature. This should include reviewing the 'whole farm' approach, which would enable farmers to transition away from expensive external inputs. 'Whole farm' thinking is a holistic approach that treats farms as an interconnected, interdependent unit. It recognises that rebuilding nature's scaffolding involves different actions that together work in synergy.
- Over-the-counter flea and tick treatments containing fipronil and imidacloprid should be obtainable only by veterinary prescription. Full environmental risk assessments should be undertaken for widely used companion animal parasiticides.

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May 2026

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