

Nature Positive 2030

Evidence Report

Investing for healthy nature, people and economy



Cyfoeth Naturiol Cymru
Natural Resources Wales



Northern Ireland
Environment Agency

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NatureScot
Scotland's Nature Agency
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Foreword

We are the generation who has been handed the climate and ecological crisis and we are the generation who will have to live with the decisions you make today. You have nine years to make the changes needed. You have to fix it. We have to live with it.

It's the year 2050. Imagine this.

A coast where the sight of a surge of redshank, knot, and oystercatcher flocking in, to breed, make their home and thrive. A coastline where the cry of tern and flute of curlew competes with wind and wave. A place where the salty air is fresh and untainted by the stench of human waste and the shoreline is free from plastic. The feel of rocks encrusted with barnacles, periwinkles, and bladderwrack. An intact marine ecosystem with mammal, bird and fish in abundance. Harmonious and majestic; a place to get lost in. One that can persist for generations into the future for all to love and enjoy.

The rivers of the UK run clear and rich of life - tufted banks, luscious wet meadows and long reed beds stretch from the meanders up the valley sides. The electric blue flash of a kingfisher disappears into an overhanging veteran willow. Beavers gnaw loudly in the woodland, engineering the diverse ancient landscape where otters and water voles now thrive. The woodlands are now vast and sprawling, a mosaic of coppice and old growth, providing protection from memorable flash flooding in the town below. Fungi and bird nests burst from the gnarled standing dry timber as hazel dormice and nightingales recover their ancestral lands. The farmlands are now stitched together with a patchwork of dense and continuous hedging, which tumbles into crop fields with a broad and colourful meadow verge. These rich green corridors connect to the horizon, creeping through the urban gardens, linking commuting routes for wildlife and people to connect as one.

The sprawling UK uplands, once over-grazed and burned, are clothed in a myriad of habitats and species. Young saplings, springy and tough, rise from the feet of towering giants draped in moss, providing a home to nests of great spotted woodpeckers and dreys full of sleepily squirming squirrels. The woodland, humming and buzzing with life, trails up the steep



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mountain slope to the weathered peak far above, buffeted by winds where ptarmigan cower and golden eagles soar, free from persecution. This is a land where people and nature walk as one. A sanctuary, healing and free.

As animals, we respect our place in nature. Somewhere that keeps us well and allows us to flourish within a clean, nurturing and healthy environment. Swimming safely in rivers and seas free from sewage, breathing lightly and feeling the clean fresh air of our cities and countryside on our smooth skin. Badgers, hedgehogs, sparrows and starlings once again a regular sight in our gardens, wild verges and wildflower meadows heavy with bees, butterflies and ladybirds. Everyone with equal access to natural spaces and with the freedom to enjoy our environment.

This is a world worth living in for generations to come, one which can be achieved. But only through concerted action and a will for change and only if we begin this journey now. A first, critical step is becoming Nature Positive by 2030. We can do this, as demonstrated in this report. Curbing climate change, hand in hand with nature to benefit both humans and wildlife in an inter-connected cooperation.

Holly, Dara, Mya-Rose and Emily



Executive Summary

In response to the crisis of biodiversity loss, many Heads of State around the world have recently made hugely significant commitments for nature, notably through the Leaders' Pledge for Nature launched at the United Nations General Assembly in 2020, and the 30by30 commitment to protect 30% of our land and seas for nature by 2030. These commitments are far reaching, requiring transformational change across sectors in the way we protect, value, use and engage with nature. They are also consistent with many goals and targets of the draft post-2020 Global Biodiversity Framework of the Convention on Biological Diversity and support the UN's Decade of Ecosystem Restoration, enabling us to become 'Nature Positive' by 2030.

In this report, the five statutory nature agencies of the UK have come together to identify how the UK can succeed in achieving these commitments along with ensuring that nature recovery plays its critical role in achieving net zero. We draw upon the extensive good practice that exists across the UK to present solutions that can be scaled up to achieve change. First, we make the case for urgent action: briefly describing the scale of biodiversity loss in the UK and around the world, why it is happening, and why this matters profoundly to people. We then consider the commitments in the Leaders' Pledge for Nature and 30by30 in detail. For each, we set out why the commitment matters and how we can succeed in delivering it. Finally, we identify the most promising pathways to rapidly recover nature and enable us to become Nature Positive by 2030.

Our aim is to support UK and international ambition at COP15 and COP26 by demonstrating a route to becoming Nature Positive by 2030 whilst also contributing to meeting Net Zero commitments here in the UK.

The case for action

At global level, over 1 million species are threatened with extinction and the populations of many vertebrate animals have declined by two-thirds since 1970. In the UK over 40% of species are in decline, more than 40 million birds have been lost from our skies over the past 50 years, and a quarter of UK mammals are threatened with extinction.

Nature is declining around the world because of the demands we are placing on our natural systems. We are over-fishing our seas and using more and more land to grow food, extract materials and build homes. For example, the rate of global deforestation between 2015-2020 was about 10 million hectares per year, the equivalent of losing a football pitch of forest every three seconds.

Biodiversity loss is made worse by climate change, and vice versa. However, creating and restoring biodiverse habitats on land and in our seas lock up carbon, and nature can also provide solutions for helping us to adapt to climate change, such as by reducing flood risk. This inextricable link between the crises of biodiversity loss and climate change is why we need to tackle them together.

The scale of biodiversity loss has profound consequences for people. Globally, and in the UK, many of the essential services for human life provided by nature have declined, including water and air quality, regulation of our climate, soil formation and benefits to people's physical and mental health. Ecosystems with their full complement of biodiversity are more productive and resilient, providing greater benefits to more people and underpinning sustainable economic prosperity. The recent seminal review of *The Economics of Biodiversity* by Prof. Sir Partha Dasgupta emphasised the importance of factoring in the value of nature in decisions and makes it clear that recovering nature is everyone's business: all government ministries, all organisations, all people.

Our Commitments

This report focusses on the implementation of those commitments made in the *Leaders' Pledge for Nature* and *30by30* that require action within the UK. The commitments span all sectors of society, from national and local governments to communities, private businesses and the way people interact with nature. In this report, we group these diverse commitments into three sections. First, we consider the need to mainstream nature recovery, so that it becomes a core part of decision-making, including for the finance sector. Second, we describe how we can effectively protect and enhance nature, underpinned by science-based targets. Thirdly, we set out how we can transition to a more sustainable use of our land and seas by tackling the main drivers of biodiversity loss.

Mainstreaming nature recovery

For nature to recover and to meet our climate change targets, the work to achieve these twin challenges needs to involve all parts of society. The UK can succeed in achieving mainstreaming commitments by:

- **Planning for a healthy planet and healthy people.** We present evidence that using natural 'green and blue' spaces and environmental features instead of 'grey' (e.g. concrete) built infrastructure can benefit biodiversity while also delivering a host of health and well-being benefits for people, and contribute to a fairer society.
- **Aligning action for nature and climate change.** We describe ambitious programmes underway across the UK to deliver natural solutions to climate change both in terms of mitigation (such as through planting trees) and adaptation (such as through reducing flood risk), while also stressing the need to avoid perverse consequences where actions to address climate change harms nature.
- **Financing nature's recovery.** We highlight significant opportunities to dramatically increase investment in nature from public and private sources. Businesses, for example, are increasingly investing in natural solutions because they provide better business outcomes. We are also seeing a trend towards greater transparency of biodiversity impacts to support better choices by consumers and investors.
- **Embedding the value of nature in decision-making.** We demonstrate how taking account of the value of nature can provide better, more holistic outcomes. This has led to, for example, water companies investing in natural drainage systems. Some local and national governments in the UK are also embedding nature's value in strategic decisions, such as is required by Wales' ground-breaking 'Well-being of Future Generations Act'.

Protect and restore nature, including through ambitious targets

Nature needs sufficient space with appropriate protection to support thriving species populations and healthy ecosystems. Targets inform the scale of action required and promote action by others. The UK can deliver these commitments by:

- **Protecting 30% of land and sea.** The UK has a Marine Protected Area network that covers 35.9% of the sea area, and the priority is to achieve effective management of this network. On land, we are not yet at our target and we identify the need to: make our protected areas richer in wildlife, create more habitat, and recover nature within the framework of a nature network. We highlight fantastic examples of transformational change through large-scale projects across the UK.
- **Protecting and recovering species.** We describe innovative approaches to species protection and ambitious species recovery programmes across the UK, including to reintroduce lost species. Wilder approaches to habitat management are also helping UK species thrive.
- **Ensuring a robust evidence base and targets.** We highlight the importance of the UK's extensive citizen scientist network together with the growing use of technology, from genes to satellites. Robust targets are important to guide action and resource allocation and legally-binding targets for nature are being developed in parts of the UK.

Transition to sustainable land and sea use

Humankind is depleting nature's resources faster than they can regenerate, leading to growing negative impacts on nature and people. A rapid transition is needed so that nature's resources are used sustainably and sources of harm are reduced. We consider how the UK can succeed in making this transition and delivering commitments for:

- **Agriculture.** Critical reforms are underway to refocus the UK's annual £3.342 bn farming subsidy payments on nature recovery and other public benefits. We describe outcomes that could be achieved through sparing farmland for large-scale habitat creation and wildlife-friendly farming, including through regenerative agriculture.
- **Fisheries.** The UK's new Fisheries Act is world-leading and we highlight the potential to implement the Act to recover fish populations, reduce wildlife by-catch and entanglement as well as to improve Marine Protected Areas and reduce the climate change impacts of fishing.
- **Forestry.** The countries of the UK have ambitious woodland expansion programmes to help mitigate climate change. We identify opportunities for delivering biodiversity enhancements and a range of other benefits such as improving soil health. Key will be planting the right trees in the right places.
- **Pollution and harmful chemicals.** We identify action across the UK that is reducing pollution from a range of sources that are harmful to nature and people, including atmospheric ammonia and nitrogen deposition, diffuse water pollution, and marine plastics.
- **Invasive non-native species.** We demonstrate the benefits of the UK's approach of focussing on preventing invasive species from arriving or rapid action to prevent establishment, although this remains work in progress. Some of the most ambitious island eradication projects in the world are in Scotland.

The Time is Now

The approaches and emerging delivery commitments we describe in this report have real potential to achieve sustained nature recovery in the UK in the longer term, if implemented well. However, many of the highest impact changes are still under development or being progressively introduced, and so cannot be relied upon to deliver a significant contribution until later this decade. This is worrying because what happens in the next few years is critical: wildlife habitats are not restored or created overnight. For species to be increasing by 2030, as much action for habitats as possible needs to be underway in the next 2-3 years. We cannot leave most of the habitat improvements until the end of the decade if we are to succeed.

Does this mean we should just wait and reverse biodiversity loss later than 2030? Absolutely not. It is far easier and cheaper to retain species and their ecosystems, than to re-establish them. Delaying action by a decade would mean it will cost us much more to succeed and much of what we lose will never return. Delay also postpones our ability to benefit.

Becoming Nature Positive by 2030 requires significantly greater action and investment in nature now. Nine changes can be delivered rapidly, by national and local governments, landowners, businesses and others, that will have particularly high impacts on reversing biodiversity loss this decade:

1. Ensure wildlife thrives within SSSIs/ASSIs and Marine Protected Areas through improving their management and tackling sources of harm. Protected areas need to be the beating hearts of nature networks on land and at sea, supporting thriving populations of species that spill out across the rest of the network.
2. Better conserve remaining wildlife habitats outside SSSIs/ASSIs, in particular those areas identified as parts of nature networks or as important blue/green infrastructure.
3. Invest in habitat restoration and creation to strengthen nature networks that deliver for biodiversity and climate change. In particular, we need to create large areas of wildlife habitat with restored ecosystem functions.
4. Integrate outcomes for nature into developments on land and at sea, ensuring access to nature is improved, and delivering a wide range of health and other benefits.
5. Tackle atmospheric and diffuse water pollution, especially from nitrogen and ammonia.
6. Develop the market for green finance, putting in place the frameworks necessary to facilitate private investment in nature recovery, and ensuring there is a supply of investable on-the-ground projects.
7. Deploy Nature-based Solutions by default. Decision makers need to ask themselves ‘can nature provide a solution?’
8. Develop the UK’s evidence base so that it is ready to support the larger, transformative changes underway.
9. Adopt targets to become Nature Positive, so that nature goals are put on an equal footing with climate change ambitions.

Changing course quickly to become Nature Positive by 2030 is possible but will require investment. Of the \$15 trillion being mobilised globally to recover from Covid-19, only 3% is benefitting nature. Re-focussing more of this recovery investment provides a fantastic opportunity to rapidly recover nature and build a fairer and better future, while also increasing opportunities for ‘green’ employment.

We conclude that the UK can become Nature Positive by 2030, provided we act now, and that investing to become Nature Positive will deliver many benefits to people and our longer-term economic prosperity.



1 Introduction

Over recent decades the understanding of our relationship with nature has changed. We once saw nature as a never-ending source of food, materials and space. We were wrong. We now know that our levels of consumption are exceeding nature's capacity to sustain us. Nature is being damaged by the pressures we are placing on it and is not regenerating fast enough to recover. These losses matter. Globally, fourteen of eighteen essential services for human life provided by nature have declined, including water and air quality, regulation of our climate, soil formation and benefits to people's physical and mental health¹. This means that, in countries like the UK, we no longer have a sustainable natural system that can provide reliable supplies of clean water, purify our air, regulate our climate, or secure our food supplies; nor do we have enough space for nature to prevent even more species, the vital building blocks that make up our ecosystems, from going extinct². Urgent and transformational action to reverse biodiversity loss is now essential.

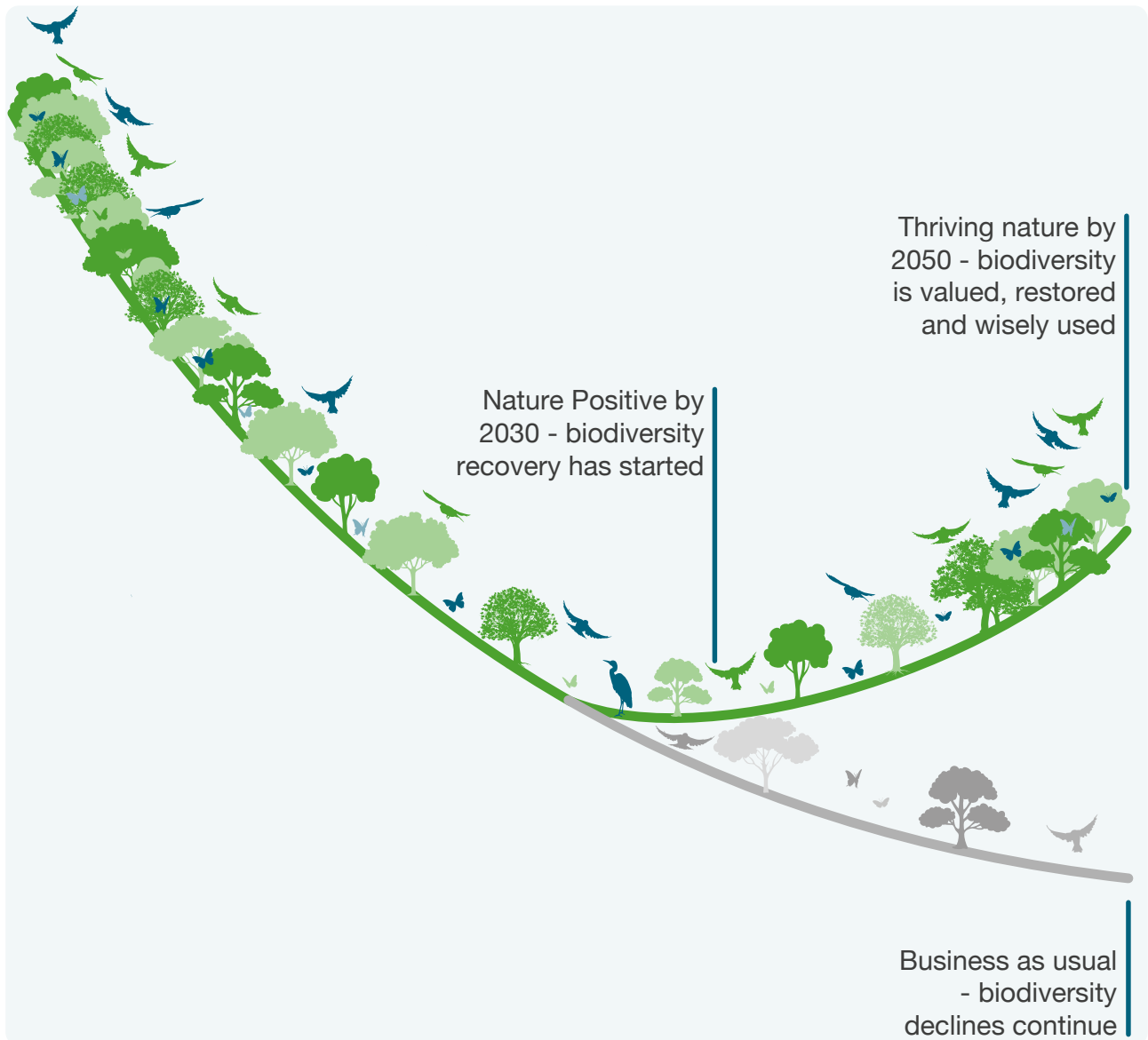
People around the world, often led by younger people, are calling for change. Here in the UK, the public demand for environmental action is the highest ever, and public support has grown during the coronavirus pandemic as the importance of connecting with nature has become even more apparent in our everyday lives³.

In 2021, the world has an unparalleled opportunity to change course. Political leaders of a growing number of countries have recently signed the Leaders' Pledge for Nature⁴, and many have also committed to protecting 30% of land and sea for nature by 2030 ('30by30')⁵. The commitments made in the Leaders' Pledge for Nature and 30by30 are hugely significant at both the national and global scales. They support the UN's decade of ecosystem restoration, enabling us to be "Nature Positive" by 2030 (so that that the current trend of biodiversity loss is reversed, figure 1) while making significant contributions to achieving climate change commitments to reduce carbon emissions to "Net Zero", and building resilience to the inevitable impacts of climate change.

The five statutory nature agencies across the United Kingdom now set out opportunities to achieve the Leaders' Pledge for Nature and the 30by30 commitments in the UK⁶.

Our aim is to support UK and international ambition at COP15 and COP26 by demonstrating a route to becoming Nature Positive by 2030 whilst also contributing to Net Zero commitments here in the UK.

Figure 1. Becoming Nature Positive by 2030 means reversing the current decline of biodiversity so that ecosystem restoration is underway and species are increasing in abundance and fewer are threatened with extinction. This is a critical step on the way to thriving nature by 2050.





2 The Case for Action

2.1 Our Nature

Our nature is the wealth and variety of living things (our biodiversity); it is our beautiful and varied seas and landscapes, shaped by their diverse geology and historic uses; it is healthy ecosystems providing us with clean water, fresh air, healthy soils, recreation and much more.

The UK's nature is special and unique, forming part of our common heritage and giving us all a sense of where we belong. Our nature includes 15% of the world's blanket bogs and most of the world's chalk rivers. We have Atlantic temperate rainforests, ancient woodlands, flower-rich grasslands and fens – all key areas for many species. Our rich seas with many islands, contain coral reefs and huge kelp forests, and support globally important numbers of seabirds including over half the world's gannets *Morus bassanus*⁷. Some species occur nowhere else in the world, such as the Scottish primrose *Primula scotica* and the Schelly *Coregonus stigmaticus*, a relative of the salmon. The overall assemblage of species and habitats found across the UK is a unique and precious heritage, but it is changing rapidly and needs our help.

Most of all, the UK's nature is special because it is ours! It has shaped our culture, inspired our poets and artists, it fascinates us and delights our children. **By diminishing nature, we diminish ourselves.**

2.2 The Scale of Biodiversity Loss

Biodiversity is being lost at an alarming rate and our understanding of the scale of change, the underlying causes, and the actions that we need to take to respond has increased considerably in recent decades. Globally, it is estimated that over 1 million species are threatened with extinction and that the populations of many vertebrate animals have declined by at least two-thirds since 1970⁸. The diversity of species that are present and their abundance has declined significantly and continues to do so, year on year. This reduces ecosystems' resilience to change and increases their likelihood of tipping into less diverse, less productive states which may have far reaching consequences for the biosphere, the economy and people⁹.

The UK is one of the most nature-depleted nations on Earth¹⁰. Over 40% of UK species are in decline¹¹, more than 40 million birds have been lost from our skies over the past 50 years¹² and a quarter of UK mammals are threatened with extinction, including many once common species such as the hedgehog *Erinaceus europaeus*¹³.

2.3 Why is Biodiversity being Lost?

Globally, the main cause of declines in the biodiversity of terrestrial and freshwater ecosystems is land use change to grow food and produce materials such as wood, or for space to build homes and infrastructure. These changes are exacerbated by increasing impacts from climate change. Other factors are also significant, including pollution, the illegal wildlife trade and invasive species. In global marine ecosystems, direct exploitation of organisms (mainly fishing) has had the largest relative impact, with warming seas and increasing ocean acidity, both driven by climate change, introducing additional stresses¹.

Key examples of humanity's impact at the global level include:

- The rate of global deforestation between 2015-20 was about 10 million hectares per year, the equivalent of losing a football pitch of forest every three seconds.
- The area of wetlands around the world declined by over 35% from 1970-2015, with the greatest losses being in coastal areas¹.
- The combined weight, or biomass, of all people alive today is now nearly 10 times the total biomass of all wild mammals, from mice to whales¹⁴.

The UK was one of the first countries to industrialise so the loss of nature began sooner and has been worse than in many countries. Declines in the UK accelerated through the second half of the 20th Century in the wake of significant land-use change and agricultural intensification. For example, a total of 97% of wildflower meadows had been lost by 1984, and some 10,000 km² of wetlands were drained in the 1970s. Today 71% of the UK is under agricultural use. The scale of these relatively recent losses means that the baseline of nature that we see and experience today, and the resilience of our ecosystems, is significantly impoverished, even compared to just a few decades ago. After large scale habitat loss, there is usually a time-lag before species go extinct, because small populations cling on. Consequently, although many UK species are threatened, relatively few have yet been lost completely¹⁵. But these past habitat losses represent a significant future extinction risk that we can only reduce by increasing the current extent of habitats and ecosystems.

Put simply, this means that just stopping any further habitat loss is not enough to halt biodiversity decline: we now need to make more space for nature.

2.4 The Twin Crises of Biodiversity Loss and Climate Change

Globally the crises of climate change and biodiversity loss are inextricably linked. The degradation of natural systems is one of the causes of climate change, and land-use change (especially deforestation) has been responsible for 19% of the CO₂ emissions caused by people over the past 40 years¹⁶. As impacts from climate change increase, species that are unable to adapt are likely to decline or even become extinct, in turn further undermining the resilience of ecosystems and creating a downward spiral of environmental harm. Conversely, creating and restoring biodiverse habitats on land and in our seas lock up carbon: a recent estimate suggested that these 'Nature-based Solutions' (see Box 1) could contribute 10Gt CO₂e (carbon dioxide equivalents, a standardised method of quantifying greenhouse gas emissions) per year to

reducing net global emissions, or around 20% of current global greenhouse gas emissions¹⁷. As well as mitigating climate change, nature can provide critical solutions for helping us to adapt to climate change, such as by reducing flood risk.

In the UK, all plausible pathways to Net Zero require us to change the way we manage our land. Achieving the commitments for nature, as described in this report, can consequently make a critical contribution to meeting climate change targets too - a win-win for nature and for the climate.

Box 2.1 Nature-based solutions

Defined by the International Union for the Conservation of Nature (IUCN) as “action to protect, sustainably manage, and restore natural or modified ecosystems, that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.”¹⁸

2.5 The Economics of Biodiversity

Many people would argue that losing nature is an ethical issue, and that driving species to extinction is simply wrong. Whether you subscribe to this view or not, recovering nature is very much in our self-interest: our economic prosperity and well-being depends upon doing so. The recent review of *The Economics of Biodiversity* by Professor Sir Partha Dasgupta⁹ stressed that nature is our home, and sets out a simple truth: our economies are wholly embedded in nature.

A healthy environment and a vibrant economy can go hand in hand, and indeed must do, otherwise we will have neither.

In his review, Prof. Dasgupta concludes that humanity and our economy must be seen as being embedded in the natural world, not somehow external to it as in traditional economic thinking. This means our economic growth, and human well-being are ultimately limited by the availability of natural capital (i.e. the stock of natural assets, such as forests, that provide benefits to people). He provides a straightforward economic framing, arguing that the way we interact with nature should be viewed as a form of asset management. Worryingly, as a society we are currently mismanaging nature’s assets because we are drawing them down faster than they can regenerate, leading to a 40% decline in natural capital per person since 1992 at the global scale¹⁹. We need to change both our demand on nature (by reducing our impact) and its ability to provide what we need (by restoring nature).

Ecosystems with their full complement of biodiversity are more productive and resilient, providing greater benefits to more people and underpinning sustainable economic prosperity. Consequently, Prof. Dasgupta argues, their value must be factored into decisions. This avoids nature being given a default value of zero, resulting in it being ignored. It also makes it clear that **recovering nature is everyone’s business**: all government ministries, all organisations, all people.

The commitments being made for nature by leaders from many countries are commitments for everyone.



3 Our Nature Commitments

Reflecting devolved responsibilities for the environment, each of the four countries of the UK have distinct and evolving policies and powers to recover nature and to respond to climate change. However, it is the UK government as a whole that signs up to international commitments, including those relating to multi-lateral environmental agreements, such as the Convention on Biological Diversity. As such, there needs to be coordination and agreement across all four countries on how the UK will meet and demonstrate progress towards international commitments. The UK Biodiversity Framework is the key mechanism for setting out how these commitments will be delivered²⁰.

Within the last year, the UK has made hugely significant commitments for nature, most notably through the Leaders' Pledge for Nature⁴, which has so far been signed by leaders from over 85 countries; the '30by30' commitment to protect 30% of our land and seas for nature by 2030, agreed by more than 60 countries in the 'High ambition coalition for people and nature'; and, at the G7 in June 2021, to 'halt and reverse biodiversity loss'²¹ (i.e. become Nature Positive) by 2030. These pledges are far-reaching and build on existing commitments: spanning multilateral agreements and cooperation, international finance, trade and knowledge management. They require transformative change across sectors and in the way we protect, value, use and engage with nature. **These commitments are also consistent with many goals and targets of the first draft of the post-2020 Global Biodiversity Framework²² of the Convention on Biological Diversity.**

The Leaders' Pledge for Nature stresses the importance of scaling up Nature-based Solutions to deliver for nature and climate. These sit alongside legally binding commitments for carbon reductions, not least to reduce emissions in the UK by 78% of 1990 levels by 2035 and achieving net zero emissions by 2050.

Some of these international commitments require multilateral action such as changing the way global trade operates, however, the majority will need to be delivered through country-level action. This report focusses on the implementation of those commitments made in the Leaders' Pledge for Nature and 30by30 that require action within the UK. Achieving these commitments will require delivery to be scaled up, building on best practice from across the UK and identifying approaches that hold greatest potential. This is the focus of the following sections. First, we consider the need to mainstream nature's recovery, so that it becomes a core part of decision-making, including for the finance sector. We then describe how we can effectively protect and enhance nature, underpinned by science-based targets. Finally, we set out how we can transition to a more sustainable use of our land and seas by tackling the main drivers of biodiversity loss.

For each section, we begin with a summary of the relevant Leaders' Pledge for Nature (LPN) commitment and identify which of the 10 LPN commitments are the most relevant. We then consider why this commitment matters, and describe how we can succeed in delivering it.



4 Mainstream Nature Recovery

The way we live our lives, especially in richer nations of the world, is harming the health of our planet. This is already undermining human health and well-being, and is increasingly creating risks to our economy, including by undermining supply chains upon which our long-term prosperity depends. We need a fundamental change that embraces nature as our global life support system. The work to recover nature and meet our climate change targets needs to involve all parts of society. This section outlines the key steps needed for this.

4.1 Plan for a Healthy Planet and Healthy People

Summary

Space is scarce and too often the price for built development on land and at sea is the degradation of nature. These losses are bad for people, notably by harming our health and well-being. The Leaders' Pledge commits us to embedding a 'One-Health' approach. In the UK, there are important opportunities to do so through integrated planning, in particular by:

- Integrating green and blue infrastructure into developments on land. This means using natural solutions in place of built 'grey' infrastructure and the use of greenspace standards can help to ensure people can easily access nature, even in urban settings.
- Planning for integrated environmental and socio-economic outcomes in our seas, seeking win-wins for nature and people.
- Securing environmental gains alongside built development through the planning system, and ensuring gains are maintained in long-term.
- Enabling contact with nature, so that it becomes part of everybody's daily experience.

Our Leaders' Pledge for Nature commitment

“Integrate a ‘One-Health’ approach in all relevant policies and decision-making processes at all levels that addresses health and environmental sustainability in an integrated fashion.”
(LPN commitment 8, also relevant to commitment 3)

Why this matters

Embracing a *'One-Health'* approach in decision-making reinforces the links between the health of our planet and all aspects of human health and well-being. Around the world nature's degradation has already had enormous impacts on people, undermining progress towards many of the United Nation's Sustainable Development Goals²³. The fundamental connection between nature, economic prosperity and human health and well-being has become more evident than ever during the current Covid-19 pandemic, which itself probably had its origins in nature's over-exploitation and degradation. This made the spread of deadly pathogens to humans more likely and we need to address the root causes behind this chain of events if we want to reduce the risk of future pandemics²⁴.

In the UK, space is scarce. We need more land and sea for built development, infrastructure and power generation, among other uses. However, this development is too often happening at the expense of our environment, causing declines in nature that have widespread negative impacts for people especially where socio-economic inequalities are highest (see also section 4.4). Perhaps the greatest of these impacts relates to the health consequences of local nature being degraded, often as a result pursuing short-term economic benefits. We need to embrace the opportunities for health benefits that access to nature provides which include: reductions in stress and depression; increased life expectancy; improved child cognitive development; and reduced auto-immune diseases such as asthma²⁵. Built development and infrastructure are important uses of our land and sea but need not be undertaken at the expense of nature and people's well-being.

How we can succeed

4.1.1 Integrate green and blue infrastructure into developments through strategic planning

An integrated approach is needed to deliver long-term benefits for our economy, health and well-being and for nature. This means, for example, an administrative body responsible for housing not just having an objective to build new houses, but also having a stake in the quality of the lives of the people who will live in them. Strategic planning provides a framework in which potentially competing priorities can be reconciled.

Urban landscapes can be rich in wildlife and help support nature's recovery. An important opportunity to achieve win-wins for nature and people is by delivering many of the outcomes currently sought primarily through built 'grey' (concrete) infrastructure through 'green and blue' infrastructure. This involves using natural environmental features such as trees and semi-natural spaces ('green' infrastructure) or wetlands and coastal habitats ('blue' infrastructure). The focus of national and local governments on reaching net zero, and the need to adapt to climate change, are powerful drivers for greater deployment of green and blue infrastructure. For example, they can provide:

- Better air quality. In the UK air pollution accounts for about 40,000 premature deaths and over six million sick days each year²⁶. Planting trees can be an effective way of improving air quality by removing harmful particulate matter. For example, native species such as silver birch *Betula pendula* and yew *Taxus baccata* growing along roads can lower adjacent indoor concentrations of harmful particulate matter by up to 79%²⁷.
- Reductions in the urban island heat effect. Towns and cities experience average temperatures 1-3°C higher than surrounding non-urban areas, a difference which can have adverse effects on people's health. Urban blue and green infrastructure can provide significant heat reduction benefits, through shading and evaporative cooling²⁸.

- Reducing the health and economic costs of flooding. Sustainable Drainage Systems (SUDS) use green infrastructure to control flooding but their wider benefits to physical and mental health and land values may outstrip flood-damage avoidance savings by up-to an order of magnitude if they are applied strategically over a wide urban area²⁹.

In the UK developments in built ‘grey’ infrastructure (such as roads, railways, and housing) require planning for them to be delivered effectively, and to resolve inevitable conflicts between competing interests. Often these decisions are supported by standards and tools to ensure people have access to key facilities such as public transport or schools. **Mainstreaming Nature Recovery requires ‘green and blue’ infrastructure to be treated as a key part of the planning process, with standards for access to nature** (see Box 4.1). For example, the Belfast Green and Blue Infrastructure Plan sets out an ambitious vision that by 2035 *green and blue infrastructure will be strategically planned to enhance ecosystem services that benefit all living, working in and visiting Belfast*³⁰. The vision has five guiding principles to ensure that the green and blue infrastructure is: biodiverse; planned as integrated networks; integrated into the urban environment; well designed and managed; and appropriately funded. Increasing numbers of cities across the UK are also implementing ‘Urban Greening Factors’ which require a certain proportion of green space within urban developments.

A strong evidence base to underpin strategic planning is important, and the lack of evidence is often a limiting factor. In Wales to address this issue, seven Area Statements across the country have been produced bringing together the evidence base in the Wales Environmental Information Portal for use by planning authorities and others. Within the countries of the UK, evidence-based integrated planning at large spatial scales is increasingly being implemented (see Box 4.2):

Box 4.1 Greenspace Standards

Peterborough City Council has adopted Natural England’s Accessible Natural Greenspace Standards³¹ within its Open Space Strategy. This is proving effective in securing on and off-site contributions from developments to support nature recovery and increase opportunities for contact with nature. The Accessible Natural Greenspace Standard operates according to a system of tiers for different types of sites and aims to ensure that:

- no person should live more than 300m from their nearest area of natural greenspace (as measured by a straight line; or 500m walking/cycle route);
- there should be at least one accessible 20ha site within 2km from home;
- there should be one accessible 100ha site within 5km;
- there should be one accessible 500ha site within 10km; and
- overall, there should be at least 1 ha of Local Nature Reserve per 1000 people in each district.

Natural Resources Wales’s Green Space Toolkit³² helps local authorities plan and improve natural green spaces for people in towns and cities. The Toolkit’s Accessible Natural Green Space Standards enable local authorities to decide if there are enough of the right kind of green spaces, in the right places, to keep their citizens healthy, and it has informed supplementary planning guidance in some authorities. Among the principles of the Toolkit are that two hectares of greenspace are needed per 1,000 population and no person should live more than 400 metres walking distance from their nearest area of natural greenspace.

Box 4.2: Integrated Spatial Planning on Land

1. Central Scotland Green Network

The Central Scotland Green Network (CSGN)³³ was jointly established by NatureScot and Forestry Commission Scotland in 2009 and now comprises a broad coalition including Scottish Government, public bodies, 19 local authorities, NGOs, private sector businesses and investors and communities. It is one of the largest green infrastructure projects in Europe and has become a symbol of green regeneration for 3.5 million residents over 10,000 square kilometres. It includes areas of exceptional beauty offset by post-industrial landscapes which are in significant decline and communities of high socio-economic disadvantage and environmental degradation.

The CSGN vision is that “By 2050, Central Scotland has been transformed into a place where the environment adds value to the economy and where people’s lives are enriched by its quality”. It has been designated as one of only 14 National Developments critical to the delivery of the Scottish Government’s spatial strategy. The CSGN promotes the protection and development of green networks as crucial to sustainable economic development and quality of life through four workstreams:

- *Natural Climate Solutions* - delivering climate change mitigation and adaptation and increasing the resilience of Central Scotland.
- *Placemaking* - delivering quality, liveable places.
- *Health and Well-being* – delivering positive impacts for health, well-being and quality of life through high quality accessible greenspace and multifunctional green infrastructure.
- *Green Recovery* focusing on reducing inequalities and promoting sustainable and inclusive economic activity.

2. Strategic Planning in Greater Manchester

In England, Mayoral Combined Authorities have devolved authority to plan at large, strategic scales. Greater Manchester is a City-Region governed by a Combined Authority led by an elected Mayor. In 2017 it adopted the Greater Manchester Strategy – Our People, Our Place that integrates environmental outcomes alongside those for services necessary to support socio-economic growth, health care, education, transport, utilities, and housing³⁴.

The City-Region’s integrated ambitions are supported by a Five Year Environment Plan³⁵ with an ambitious vision for a “clean, carbon-neutral, climate resilient city region with a thriving natural environment” and requiring urgent action across sectors to achieve this. This is supported by a requirement for Biodiversity Net Gain (see box 4.4) from developments and a Greenspace Standard to reduce inequalities in access to the natural environment³⁶.

4.1.2 Plan for integrated environmental and socio-economic outcomes in our seas.

The sea can provide solutions to many of our current challenges: renewable energy, more 'sustainable' protein sources, a place to store captured carbon from land-based power stations and the provision of building and manufacturing materials. These are all valid uses and important elements in the jigsaw of environmental sustainability, but we must not overlook our greatest marine asset, the natural environment itself. Healthy seas provide us with a diverse range of benefits including food, materials and a place for recreation, as well as helping us mitigate and adapt to climate change. The capacity of the marine environment to sequester carbon is enormous and critically, when damaged, its ability to release carbon is equally large.

The challenge is to achieve an integrated approach to marine planning across sectors in a manner that enables economic uses while also securing the ecosystem services of a healthy biodiverse marine environment. A solution lies in large-scale spatial planning that accounts for all marine uses, including commercial fishing, offshore wind, and protecting and enhancing nature (see Box 4.3). Clear, up-to-date government policy that addresses how conflicts are managed while supporting a multi-use marine space is essential to underpin these plans.

Just as on land, a strong evidence base on the extent, distribution, condition and functioning of marine habitats and species is important to confidently manage our marine environment to achieve the maximum benefit for the economy and society. Currently, there are significant data deficiencies, under-mining the effectiveness of integrated marine spatial planning.

Box 4.3 Marine Spatial Planning

Scottish Sectoral Marine Plan for Offshore Wind Energy

The Scottish Sectoral Marine Plan for Offshore Wind Energy³⁷ identifies a suite of ‘Plan Option’ areas in Scottish seas best suited for future commercial offshore wind farm (OWF) development, i.e. sites which have sufficient wind resource for exploitation but also least impact on biodiversity and other sectors, such as fishing. The finalised plan was approved by Scottish Ministers and published in October 2020, and leases for large scale OWF development in Scotland are now only available within these agreed Plan Option areas. Particular strengths of the approach are:

- The Sustainability Appraisal process was carried out at Plan level, rather than making individual project level assessments.
- A wide range of stakeholders were engaged to encompass their evidence and principal concerns, leading to a final plan delivering better environmental and socio-economic outcomes.
- Some of the mitigation identified and accepted has a substantial impact upon the final Plan. For example, five of the 15 final Plan Option areas are currently withheld from development until research and monitoring elsewhere establishes the rate of seabird mortality arising at consented windfarms.

Evidence to support integrated decision-making for Welsh Seas

The Welsh Sustainable Management of Marine Natural Resources project, funded by the European Maritime and Fisheries Fund, helps to support marine planning and implementation of the first Welsh National Marine Plan³⁸ (WNMP) adopted in 2019. The project’s aim was to explore, develop and apply marine ecological evidence to support the sustainable development of three core sectors in Welsh seas: tidal stream energy, wave energy and aquaculture.

The project:

- Developed a method to assess and map potential ecological constraints and opportunities based on the distribution and sensitivities of marine features; and
- Delivered outputs including maps and supporting narrative and reports to differentiate between areas more, or less likely to be given planning consent.

The approach and outputs have received positive feedback from stakeholders and the analysis provides a useful tool that can inform high-level decision-making. The project highlighted the importance of high-quality core datasets to underpin the approach, which were lacking for some marine features and in certain locations, and of the need for on-going commitment to update outputs as new relevant data becomes available.

Welsh Government, NRW and other stakeholders are now exploring how the project’s mapping of environmental constraints and opportunities could be integrated with evidence on social, economic and sector specific considerations, across the full breadth of the WNMP policies, to support sustainable management of marine resources in Welsh waters.

4.1.3 Secure environmental gains alongside built development on land and at sea.

Sustainable development does not mean that damage to nature will never occur. However, we should seek to enhance nature wherever possible, as well as applying mechanisms to ensure that any damage is minimised and mitigated. An established approach to mitigation is to use the hierarchy: avoid, minimise, restore, offset. In other words, we should first avoid loss through good planning and considering alternative approaches, then minimise unavoidable losses, conduct on-site restoration and only then compensate through offsetting, which may be located away from the development site.

Despite this good practice, developments often lead to a net loss of biodiversity, either immediately or over time (for example, due to a lack of long-term management of sites created as compensation). In addition, the mitigation hierarchy aims to ensure no net loss, instead of developments helping to contribute to nature recovery. One way of addressing this, which is being adopted in parts of the UK and will become mandatory in England, is to require developments to achieve net gains for biodiversity (see Box 4.4). In Scotland, work is underway to use the National Planning Framework to secure “Positive Effects for Biodiversity” through planning and development. This will strengthen the powers of Scottish Local Authorities to achieve delivery of locally prioritised biodiversity enhancements from all scales of development. Welsh Government guidance for planning authorities requires them to seek to maintain and enhance biodiversity so development provides a biodiversity net benefit. It encourages a proactive approach that accounts for biodiversity and ecosystem resilience at an early stage within the development planning process to avoid biodiversity loss and secure benefits that are maintained and enhanced post development.

Mechanisms are needed to protect and enhance existing wildlife habitats (including those identified as important blue and green infrastructure) as well as managing any newly created natural spaces to maintain their value in the long term. Opportunities include protection through the planning system, the use of mechanisms such as conservation covenants (which are voluntary but legally-binding agreements by landowners to protect and manage their land for nature), securing funding for long-term management, and involving local communities in their care and protection.

Box 4.4 Achieving biodiversity net gain through development

Many built developments lead to a loss of biodiversity. A new approach has been introduced in England to support biodiversity net gain from development, using a biodiversity metric which enables biodiversity levels before and after a development to be assessed. The metric works by giving unit values to land parcels based on their distinctiveness, condition and strategic significance for biodiversity. This allows comparison based on notional biodiversity units, which form the ‘currency’ of the tool. The metric is designed to support and reinforce the mitigation hierarchy: avoid, minimise, restore, offset. It helps to identify high value habitats where development is undesirable, and rewards developers for respecting this view. It also encourages the integration of nature into the development itself. Where on-site losses are unavoidable the tool encourages the creation or enhancement of offsite locations considered to be of strategic biodiversity importance. Careful evaluation of the use of the metric will enable it to be refined to ensure it is effective in supporting the biodiversity net gain policy. Efforts are also underway to determine how this approach can be extended to the marine environment.

4.1.4 Enable contact with nature, so that it becomes part of everyday living.

There is a strong case for investing in Nature-based Solutions to ensure access to nature for people: put simply, it is better and cheaper to invest in nature to keep people well than to treat them when they become ill and cope with their absences from work. For example, £2.1 billion per year could be saved in health costs if everyone in England had good access to greenspace³⁹. Spending just two hours per week in nature is associated with good health and high psychological well-being⁴⁰. 83% of people in the UK live in urban areas and not everyone has access to good quality natural spaces, especially people on low incomes and those from ethnic minorities, meaning that these significant health benefits are not universally enjoyed⁴¹.

Bringing nature closer to people, for example by following appropriate standards is part of the solution, but we also need to enable and inspire access so that people can benefit from green and blue infrastructure, by:

- Creating a stronger outdoor culture through the promotion of informal recreation and sport, such as Parkruns, care farming, community gardening and food growing projects, as well as conservation volunteering and citizen science, green gyms, and arts and cultural activities which take place outdoors.
- Implementing a “healthy parks, healthy people”⁴² approach across all our protected areas.
- Embedding nature in our education system, to connect young people with nature in school grounds and local greenspaces for regular outdoor learning and play, and the development of nature content across all parts of the curriculum.
- Engaging communities to help design, create and participate in Nature-based Solutions.
- Reaching out to communities most affected by disconnection from nature, including some ethnic minorities.
- Improving collaborations between public health teams, transport teams and planners to create, maintain and use green and blue spaces for walking and cycling.
- Making greater use of social prescribing, which links people with health issues to nature. Examples include Walking for Health schemes and dementia walks⁴³.
- Improving awareness of the role of nature in health and the opportunities which Nature-based Solutions provide during the training and development of health professionals.

The Green Health Partnerships in Scotland have, for example, proved successful in providing health benefits aligned with medical needs (see Box 4.5).

Box 4.5 Dundee Green Health Partnership

The Dundee Green Health Partnership (GHP) is one of four such cross-sectoral partnerships in Scotland. They are the main strategic intervention of NatureScot's "Our Natural Health Service" programme.

The main objective of the GHP is to increase physical activity and improve mental health through engagement with the natural environment. Dundee GHP connects to Community Planning and Health & Social Care Partnerships in relation to physical activity, mental health and health inequalities. The GHP interventions include:

- Green Health Directory that includes health walks, cycling, community gardening, conservation work, pram pushing for parent groups, and many more incorporated into the NHS Inform website and Green Health Prescriptions.
- Green Health Prescriptions referral process for health care professionals to link patients to nature-based interventions, supported by Dundee Volunteer & Voluntary Action to choose an appropriate activity.
- Re-discover Dundee programme using e-bikes and trikes funded by the Energy Saving Trust that encourages older people facing inactivity and isolation to join guided rides in nearby greenspaces as an opportunity to actively engage with nature.
- 'Walk Dundee' campaign - to promote the use of public transport and walking options to reach the city's parks and greenspaces.

By raising the profile and awareness of the benefits of cost-effective nature-based initiatives to help address health and well-being challenges, the GHPs are mainstreaming these approaches in the health system and social care.

4.2 Align Action for Nature and Climate Change

Summary

The Leaders' Pledge commits us to doing more to mitigate climate change and build resilience. The twin crises of climate change and biodiversity loss are inextricably linked and we need to tackle both or we will solve neither. This means:

- Deploying Nature-based Solutions for climate change mitigation, notably by restoring peatlands and planting trees.
- Deploying Nature-based Solutions for climate change adaptation, thereby reducing the risk of flooding and overheating, amongst other benefits.
- Ensuring that actions to respond to climate change do not damage nature, such as by ensuring trees are planted and wind-turbines are constructed in the right places.
- Taking account of climate change in the way we protect and enhance nature because adaptation cannot be taken for granted – we need to actively ensure biodiversity can thrive under a changing climate.

Our Leaders' Pledge for Nature commitment

“Raising ambition and aligning our domestic climate policies with the Paris Agreement, with enhanced Nationally Determined Contributions and long-term strategies consistent with the temperature goals of the Paris Agreement, and the objective of Net Zero greenhouse gas emissions by mid-century, strengthening climate resilience in our economies and ecosystems and promoting convergence between climate and biodiversity finance.” (LPN commitment: 5; also relevant to commitment 9)

Why this matters

We cannot solve biodiversity loss without addressing climate change and vice versa (see section 2.4). The 2015 Paris Agreement⁴⁴ placed the onus on signatory countries to set out their plans to deliver the goal of *limiting global warming to well below 2°C, preferably to 1.5°C, compared to pre-industrial levels*. Recent evidence has confirmed the importance to people and biodiversity of limiting global warming to 1.5°C⁴⁵. The UK's ambition to attain Net Zero greenhouse gas emissions by 2050 has been reinforced by legislation to make it a statutory target, along with devolved legal targets for Net Zero emissions by 2045 in Scotland and 2050 in Wales. Climate change legislation for Northern Ireland with associated targets is progressing through the Northern Ireland Assembly process. These targets are based on scientific recommendations from the UK's Committee on Climate Change (CCC), including the UK's Nationally Determined Contribution (NDC) pledge, published in December 2020, to reduce territorial emissions by at least 68% by 2030 compared to a 1990 baseline. Critically, routes to achieving these targets identify the need for land use and land management to play a key role in boosting carbon sinks and reducing emissions from degraded habitats. The case for including ecosystem restoration goals within all NDCs is clear.

How we can succeed

Recovering nature must not be seen as an alternative to decarbonising across all sectors, but nature can provide important solutions. We need to take account of the links between biodiversity loss and climate change to avoid unintended perverse outcomes. Better alignment of our nature recovery and climate change delivery requires four key actions.

4.2.1 Deploy Nature-based Solutions for climate change mitigation.

Ecosystems and habitats can lock up carbon, providing substantial opportunities to mitigate (i.e. reduce) climate change. A recent UK review provided quantitative estimates of the carbon storage and sequestration by different habitats⁴⁶. The highest rates of sequestration are in new woodland, and in many places native broadleaved species of trees sequester comparable amounts to non-native conifer plantations whilst supporting many more species. Our biggest terrestrial carbon stores are in peatlands, but many are in poor condition and have become a major source of greenhouse gas emissions. However, restoration of hydrology and natural vegetation cover can dramatically reduce these emissions from degraded peat, and in the long-term lead to them sequestering carbon.

In terms of delivering both the 2030 NDC and net zero by 2050 commitments, the Committee on Climate Change⁴⁷ set out in the 6th Carbon Budget a pathway in which the UK:

- Increases afforestation rates up to 30,000 ha per annum by 2025 rising to 50,000 ha per annum by 2035, so that UK woodland area increases from 13% in 2019 to 15% in 2035 and 18% by 2050;
- Achieves full restoration of upland peat by 2045 (or stabilisation if degradation is too severe to restore) and re-wetting and sustainable management of 60% of lowland peat by 2050;
- Plants trees on 10% of farmland to develop agro-forestry and extend the length of hedgerows by 40% by 2050, as well as improving both woodland and hedgerow management. Harvested wood used to produce long-lived products can play a significant role in carbon sequestration.

Due to their high climate change mitigation potential, woodland creation and peatland restoration will be the principle approaches to delivering increased carbon sinks and reduced ecosystem emissions. Semi-natural grasslands and heathlands can also store more carbon than intensive agriculture and support a wide range of species of conservation concern. There are additional gains that can be derived from restoring other habitats, such as inter-tidal saltmarshes and seagrass beds. We are still learning about the role of marine habitats, particularly coastal habitats, in sequestering carbon ('blue carbon'). Globally around 25-50% of vegetated coastal habitats, including in the UK, have already been lost or degraded due to developments and other human disturbances, contributing significantly to carbon emissions⁴⁸. On a per unit area basis these coastal habitats can act as significant carbon stores and so their restoration provides important mitigation opportunities.

Around 94% of biogenic terrestrial carbon is stored in the UK's soils (especially peat) rather than vegetation and, between 1998 and 2007, it is estimated that soil erosion led to a fall in total UK biocarbon stocks despite increased tree planting over this period⁴⁹. This emphasises the importance of good soil and peatland management. Across the UK, national programmes to restore peatlands are established (see Box 4.6). They include erosion prevention, blocking of drainage channels to re-wet the bog and restore *Sphagnum* dominated vegetation, and removal of tree plantations (which draw water from the peat). Increased peatland restoration rates are now required to meet the ambition of the UK CCC targets. The same is true for woodland creation, where the combination

of woodland grants to support planting along with appropriate use of natural regeneration could encourage more landowners to create a woodland legacy for the future, providing the “right trees” are planted in the “right place” to deliver resilient mixed woodlands that store carbon in the long term as well as supporting sustainable forestry (see section 6.3).

Box 4.6 Peatland restoration for nature and climate change across the UK

Peatlands are estimated to cover approximately 10% of the UK land area – nearly three million hectares⁵⁰. Significant resources and effort are being made across the UK to restore peatland habitats both for their biodiversity, carbon and wider cultural and societal benefits they provide. In Scotland, Peatland ACTION, a partnership led by the Scottish Government, is a national programme to restore damaged peatlands across Scotland. Drainage, overgrazing and cultivation for agriculture and forestry have been the main causes of damage. Over 25,000 hectares have been restored since 2012. The programme is now subject to a multi-annual investment in peatland restoration of more than £250 million to 2030, playing a key role in Scotland’s green recovery and helping deliver a just transition to net-zero by supporting the rural economy through the creation and development of land-based jobs and skills across Scotland⁵¹. Funds from the Peatland ACTION Project are enabling on the ground improvements through initiatives such as the Cairngorms Peatland Restoration Project which is repairing damaged peat across 200 ha of the National Park⁵².

In Wales, NRW’s National Peatlands Action Programme⁵³ is an ambitious 5-year programme of peatland restoration to improve peatland ecosystem resilience and thus contribute to addressing both the declared Nature and Climate Change Emergencies in Wales. It focusses on improving peatland condition across six main priority action areas reflecting the main key contexts of peatland degradation in Wales; the programme also includes cross-cutting objectives focussing on national coordination and capacity building, monitoring and evidence and stakeholder engagement. Other major initiatives outside the Programme include a 25-year project to restore 1500 ha of afforested habitats as part of the planning permission for the Pen Y Cymoedd windfarm development. Work is taking place to restore blanket bog, felling up to 1500ha of conifer plantation and undertaking ground works to restore natural hydrological processes.

The Pennine Peat Partnership is delivering over 1300 ha of blanket bog restoration in the north of England and is trialling the use of the UK Peatland Code as a source of potential income for the work. Cumbria BogLIFE has restored three lowland bogs successfully improving both carbon and greenhouse gas budgets across the sites, as well as managing invasive species, and improving biodiversity across the sites. The Government’s recently published England Peat Action Plan⁵⁴ seeks to restore upland and lowland peat and commits to fund at least 35,000 ha of peatland restoration by 2025, supported by a Nature for Climate Peatland Grant Scheme run by Natural England. The Plan also commits to phase out managed burning on protected blanket bogs and consult on banning the sale of peat in the horticultural sector.

The Garron Plateau Bog Restoration Project in Northern Ireland was launched in 2013. This partnership between the RSPB, Northern Ireland Environment Agency and Northern Ireland Water aims to improve the condition of the bog, and the quality and reliability of water that flows from it. The project has helped to restore natural hydrological conditions, restore carbon sequestration and promote colonisation of Sphagnum moss. Raw water quality coming off the bog has improved, with colour, turbidity and total organic carbon being reduced since the restoration began, improving the quality of the water received at Northern Ireland Water’s Dungonnell treatment works.

4.2.2 Deploy Nature-based Solutions for adaptation.

We cannot avoid some impacts of climate change. They are already happening and we need significant further investment if we are to be better prepared for the changes being experienced today, such as the recent unprecedented heatwaves, fires and severe flooding in many parts of the world (including the UK), and to be ready for the inevitable changes ahead⁵⁵. Nature can help by providing a range of Nature-based Solutions for climate change adaptation. For example⁵⁶:

- When established in the right location, woodlands can slow the flow of flood waters and wetlands can safely store floodwaters and protect homes.
- Coastal habitats (e.g. salt marshes, sea-grass beds and, in warmer climates, mangroves) provide a protective buffer against storm surges with rising sea levels (see Box 4.7).
- Strategically placed natural areas within cities allow water to drain away safely during heavy rainstorms (see Box 4.8).
- Natural systems reduce temperatures (in so-called urban heat islands – section 4.1.1) compared to the surrounding landscape.
- Within urban environments, trees in parks and natural areas provide shade, and green roofs can help to prevent overheating in buildings.
- Alongside water courses, shading by trees reduces water-temperature and allows temperature sensitive fish species such as trout *Salmo trutta* and salmon *Salmo salar* to spawn successfully and survive.
- Trees provide shade in summer and shelter in winter for livestock and woodlands offer a cool place for recreation by people.

Box 4.7 Alkborough Flats Managed Realignment Site

The Humber Estuary is 70km long, drains one fifth of England, is one of England's biggest SSSI and is internationally important for wildlife. It is exposed to coastal squeeze, where coastal habitats are unable to move due to defences built around most of the estuary which means they were progressively being lost. The multi-objective Alkborough Flats Project occupies a site where the Rivers Trent and Ouse meet, comprising 440 hectares of previously intensive arable farmland on land that had been reclaimed from the estuary over many years. The land now has multiple objectives, balancing flood risk management - part of an overall estuary strategy protecting the homes of 400,000 people from flooding - alongside improved biodiversity, access and recreation, and economic farm management. Overall, the scheme is estimated to have delivered a financial benefit of £400,000 per year⁵⁷.

Box 4.8 Natural solutions to water management

Greener Grangetown Sustainable Drainage Scheme

This project has been designed to transform the quality of the environment, streetscape and improve cycling and pedestrian infrastructure across a Cardiff city centre neighbourhood. The project uses the latest sustainable drainage techniques to catch, clean and divert rainwater directly into the river instead of collecting and pumping it to a treatment works and then discharging it to sea – thereby saving significant energy. Some 108 raingardens, containing native trees and plants, help remove 40,000m³ of surface runoff from the combined sewer system annually. This was the first time in the UK that these techniques were retrofitted into an urban environment at this scale. The result is a more resilient urban sewer network and a street environment that is more attractive - and more useful - for residents and commuters. A partnership approach to delivery with Cardiff Council, Welsh Water and Natural Resources Wales allowed the wider benefits of the SUDS project to be identified and maximised.

Connswater Community Greenway

The Connswater Community Greenway⁵⁸ has created a 9km linear park through east Belfast, following the course of the Connswater, Knock and Loop Rivers, providing an extensive wildlife corridor, and improved habitat and water quality from Belfast Lough to the Castlereagh Hills as well as greater access to greenspaces. A major flood alleviation scheme incorporated into the project has helped to reduce flooding to 1700 properties. In parallel, the Greenway has created vibrant, attractive, safe and accessible parkland for leisure, recreation, community events and activities. This £40 million project in East Belfast was developed by EastSide Partnership and delivered by Belfast City Council with funding from the Big Lottery Fund, Belfast City Council, the Department for Communities and Department for Infrastructure.

4.2.3 Ensure that actions to respond to climate change do not damage nature.

Increased action to mitigate and adapt to climate change is essential for our prosperity and well-being, but steps need to be taken to ensure that wherever possible biodiversity also benefits from these actions. We have already considered the importance of strategic spatial planning to ensure green and blue infrastructure is appropriately located and designed and the need to take account of biodiversity and other interests when, for example, developing off-shore wind infrastructure (section 4.1). Other trade-offs are less obvious. For example, although woodland creation on grasslands may be good for climate change mitigation, if the grassland being planted with trees is species rich this may harm biodiversity. Similarly, while bioenergy with carbon capture and storage is likely to play an important part in our transition to net zero, this strategy needs to be deployed in the right place (see Box 4.9).

Box 4.9: Bioenergy with carbon capture and storage

One of the main technologies involving the direct capture of CO₂ from the atmosphere is bioenergy with carbon capture and storage (BECCS). This includes the growing and harvesting of woody crops, such as short rotation coppice and grasses such as Miscanthus and could also provide a use for by-products from resource industries, such as residues left over from forestry management. The products are used for fuel, with emitted carbon captured and then stored, effectively providing energy without emissions.

The UK CCC has advised that 260,000 hectares of domestic agricultural land needs to be shifted to bioenergy production by 2035 in order to meet net zero⁴⁷. Careful consideration needs to be given to how this change occurs, to avoid damaging wildlife habitats, impacting hydrology or shifting associated emissions onto other countries to meet the demands of the UK food market. BECCS undoubtedly has the potential to help alleviate climate change, but the mitigation benefits of BECCS must be compared with other potential uses that could give greater carbon benefits, such as native-tree planting, as well as the impact on availability of high-value land for food production.

4.2.4 Take account of climate change in ways which will protect and enhance nature.

We are now seeing very clear impacts of climate change on species and habitats⁵⁹. Many species are now occurring in new places often (in the northern hemisphere) well to the north of former ranges as the climate warms, and there are declines in species adapted to cool conditions. Sea-level rise (another consequence of climate-change) is driving the rapid loss of coastal habitats. These changes will strongly influence our ability to protect and restore nature⁶⁰. We need to build resilience to change, principally by restoring natural processes and increasing the size, condition, number and connectedness of protected areas and habitats (see section 5.1). But we will also have to adjust our approach to nature conservation, by revising site management objectives (where loss of species is inevitable), providing habitats for species to colonise in the future and 'corridors' to facilitate natural dispersal. Importantly, a programme of assessing the vulnerability of England's National Nature Reserves to climate change has been implemented which provides a valuable template for improving the resilience of all our protected areas⁶¹. We also need to continue to protect 'refugia' where species are best able to survive, and from where they can spread out to colonise new areas. We also need to help conserve vulnerable species and habitats, by increasing the heterogeneity – structural diversity – of sites because structurally diverse sites offer a wider range of temperatures and humidities (increasing the chances of species finding the 'right' conditions) than do structurally simple sites. There are limits to the ability of species to adapt to rapid climate change so, as a last resort, we may choose to need to resort to translocating certain species to prevent extinctions.

Adaptation by nature cannot be taken for granted – we need to manage terrestrial, freshwater and marine environments to facilitate it.

4.3 Financing Nature's Recovery

Summary

At global and country scales we need to dramatically increase investment in nature from public and private sources, while also reducing or re-directing spending that is harmful to nature. This means:

- Increasing financial flows to nature by: more direct investment by private companies who are realising the business benefits; spending more of our climate-related investment on Nature-based solutions; and increasing opportunities for private investment in nature, such as by developing suitable investment opportunities.
- Eliminating and repurposing harmful subsidies so that, instead of harming nature, public money supports its recovery and thereby delivers a range of public benefits.
- Increasing transparency and disclosure of nature-related financial risks and investments, so that investors and customers can make informed choices about the impact on nature of the companies that they invest in and the goods they buy.

Our Leaders' Pledge for Nature commitment

“We will strengthen all financial and non-financial means of implementation, to transform and reform our economic and financial sectors and to achieve the wellbeing of people and safeguard the planet by...

- a. Incentivizing the financial system, nationally and internationally;**
- b. Enhancing the mobilization of resources from all sources;**
- c. Eliminating or repurposing subsidies and other incentives that are harmful to nature, biodiversity and climate while increasing significantly the incentives with positive or neutral impact for biodiversity;**
- d. Improving the efficiency, transparency and accountability in the use of existing resources.”**

(LPN commitment 9, also relevant to commitment 1)

Why this matters

We need to dramatically increase investment in nature from public and private sources. Global biodiversity finance is currently estimated at \$78-91 billion per year from public and private sources, compared to an estimated spend of approximately \$500 billion per year by governments in support that is potentially harmful to biodiversity⁶². The estimated annual investment needed for an expanded global protected area network covering 30% of our land and seas is \$103–\$178 billion. This is an investment because expanding the world's protected areas to 30% would generate higher overall output (revenues) than non-expansion (an extra \$64-\$454 billion per year by 2050)⁶³. In the UK, current annual biodiversity expenditure (based on 2018/19 figures) is £731 million⁶⁴, and estimated requirements for land-based environmental measure to recover nature are of the order £2.2bn-£2.3bn⁶⁵, or about 0.1% of the UK's GDP.

How we can succeed

4.3.1 Increase financial flows into nature recovery.

Achieving nature's recovery is in everyone's interest and requires substantially more funding from a wider range of sources. There are several immediate opportunities to do this.

(i) Businesses directly invest in nature.

Organisations are increasingly realising that investment in nature provides good business outcomes. This is often because working with nature, and benefiting from the services that healthy nature can provide, is more efficient than alternatives. Investing in nature can reduce business risk by helping to secure and sustain key production resources or create opportunities for reaching out to new customers as well being part of how to demonstrate commitments to corporate social responsibility. For example, water companies in the UK have found that investing in sustainable land management and restoring habitats in upland water catchments is a cost-effective means of achieving their water quality objectives (see Box 4.11).

(ii) Ensure more climate funding for nature.

Given the intimate relationship between biodiversity loss and climate change, more climate finance should deliver for both crises, in particular by increasing investment in Nature-based Solutions. Only around 3% of global climate funds, from public and private sources, are allocated to biodiversity and ecosystems, despite the potential cost-effectiveness of natural solutions relative to other interventions⁶⁶. The voluntary carbon market (see Box 4.10) is a tangible way of mobilising flows of funds into these projects, and linking green finance to the application of the Woodland Carbon and Peatland Carbon Codes would provide a clear mechanism to increase funding for NbS. UK governments are beginning to improve alignment of their nature and climate investments. For example, in England a 'Nature for Climate Fund' will allocate £640 million over 5 years to nature projects that also deliver for climate (mostly tree planting and peatland restoration). Scotland's 'Peatland ACTION' fund will allocate £250 million to peatland restoration over the next 10 years.

(iii) Increase opportunities for private finance to invest in nature.

There is a growing range of financial initiatives and mechanisms through which public and private funding can work together to support nature recovery (for example, the £1 Billion challenge in Scotland)⁶⁷. Public finance can help encourage and reduce the risk to private investors, thereby leveraging significant additional funding for nature recovery. Mobilising this investment will be facilitated by identifying projects which offer sufficient return to investors, and then grouping these projects to make them collectively of sufficient scale to attract large investments. The government has established a £10 million Natural Environment Investment Readiness Fund in England to support innovative projects that provide environmental benefits and attract private finance. This fund is currently supporting projects tackling climate change and nature recovery through woodland and habitat creation, peatland restoration, sustainable drainage and river catchment management, while also supporting innovation in the marine environment including developing a carbon credit model for saltmarshes across England and kelp forest restoration off the Sussex coast. The private sector and NGOs are also mobilising to identify opportunities for public and private finance to work better together.⁶⁸ In parallel, it is becoming increasingly easy for investors to support environmental solutions through, for

example “green bonds” which use their capital for environmental projects in return for a fixed rate of return. In 2021 the UK Government is launching its first sovereign green bond to help fund the UK transition to a net zero carbon economy.

Box 4.10 Woodland and peatland code

There is growing market for voluntary carbon offsets. In addition, as part of their corporate responsibility, some businesses are also willing to spend money on improving nature. But investors need clear standards so they can have confidence in what their funding will achieve. This can be provided through a code which provides a set of agreed, science-based standards, verification and sometimes a market structure.

The Woodland Carbon Code (WCC) is a UK-wide quality assurance standard for woodland creation projects. Using the code allows woodland creators to sell carbon credits into the voluntary offset market. It provides a full range of assurance including standardised and scientifically-backed methods for estimating the carbon that will sequestered, public-registration of the details of the project and independent verification. The project must also demonstrate that they meet national forestry standards. The scheme was launched in 2011, and is now rapidly growing: as of March 2021, there are 708 projects registered, which are creating 31,800 ha of woodland. This woodland is expected to sequester 11.2 million tonnes of CO₂ over their lifetimes.

The Peatland Carbon Code (PCC) plays a similar function for peatland. In their natural waterlogged state, peatlands sequester carbon. But due to the way they have been managed, most of the UK’s peatlands are emitting carbon– at a rate of approximately 16 million tonnes of carbon dioxide equivalent (CO₂e) each year. Like the Woodland Carbon Code, the Peatland Carbon Code requires land managers to meet a series of best practice requirements, including a standard method for quantifying carbon benefits. The carbon savings are designed for sale in voluntary carbon markets. Peatland restoration also provides significant wider ecosystem service benefits, such as water-quality and colour improvements, which increase the attractiveness of the scheme. The Welsh Peatland Sustainable Management Scheme Project (2017-2020) used the Peatland Carbon Code to validate the carbon benefit of five sites, provide a simple guide to the Code and so help in restoring over 1200ha of damaged peatlands.

To encourage investment in the environment it would be helpful to have a wider suite of available codes for different habitats. Without this there is a risk of investment money skewing nature delivery priorities.

4.3.2 Eliminate or re-purpose harmful subsidies

Eliminating or re-purposing harmful subsidies is key to re-directing significant finance to benefit nature. At the global level, the IMF estimates that, taking into account externalities, the social cost of perverse subsidies that damage nature is US\$4 - \$6 trillion per year⁶⁹. In the UK, the farming and fisheries sectors receive direct subsidies, and the changing approach to these sectors is considered in sections 6.1 and 6.2. These sectors, like aviation, also benefit from fossil fuel subsidies by paying substantially less tax on fuel. Both fishing and intensive agricultural systems are highly dependent on fossil fuels for their direct energy needs (for machinery and transport) and, in the case of agriculture, for the production of fertilisers and pesticides. However, as the UK transitions to net-zero, UK subsidy support is likely to move away from fossil fuels towards alternative energy sources providing a driver for innovation to decarbonise these sectors.

4.3.3 Increase transparency and disclosure of nature-related financial risks and investments

There is increasing awareness within the business and financial sector of the implications of nature-related financial risks both in terms of the implications of the degradation of nature on companies' prospects and the direct and indirect impact that sectors or individual organisations have had on nature. There is growing evidence that investors want financial providers to consider sustainability and nature in their investment decisions⁷⁰. Similarly, customer choices can influence company investment and supply chain decisions.

The drive to net zero has led to establishing robust means of assessing climate impacts of investment decisions and supply chains. For example, the Task Force on Climate related Financial Disclosures (TCFD)⁷¹ produced a set of guidelines designed to help the financial sector report on climate risks, thereby enabling companies to incorporate risks and opportunities into their risk management and strategic planning process. The UK will become the first country in the world to make TCFD aligned disclosures fully mandatory across the economy by 2025, going beyond the 'comply or explain' approach⁷².

Approaches to measure business and financial sector impacts on biodiversity are rapidly developing and have the potential to enable companies to better take account of the value of nature, and their impacts upon it, in their decision-making. In particular, there is work to develop a 'Task Force for Nature related Financial Disclosure' (TNFD)⁷³ to create a reporting framework that is closely aligned in structure with TCFD framework which, taken together, has potential to support a holistic, coherent approach in reporting on environmental risks. There are also developing opportunities for businesses to align with international commitments for nature, for example through setting Science Based Targets for Nature⁷⁴. An agreed 'taxonomy' to ensure environmental standards and transparency, and comprehensive, relevant and regularly collected data are needed to embed nature and biodiversity firmly into finance and economic decision-making and risk management⁷⁵ (see also section 4.4). The UK government has established a Green Technical Advice Group to oversee the delivery of a green taxonomy to help companies, investors and consumers make better choices⁷⁶.

Box 4.11 Upstream Thinking

South West Waters' 'Upstream Thinking' project is an innovative and effective approach to catchment management. The core of the project is a different approach to dealing with a widespread problem. Land management practices upstream are a significant cause of water pollution, which water companies must deal with before they can sell the water to consumers. But because the causes of this pollution are diffuse, and because farming businesses are stretched, a traditional legal enforcement approach to 'polluter pays' doesn't work. Having recognised that, it is cheaper to pay farmers to manage the land differently than to treat the polluted water.

For example, Upstream Thinking pays farmers to fence their cattle away from the river and to plant buffer strips between fields and the river. This reduces the amount of faeces entering the water course, which is good for water company costs and river wildlife. The buffer strips are planted with nectar rich plants, which is good for bees, butterflies and birds. The project has also invested in moorland restoration, rewetting the moor by blocking drainage 'grips', which reduces flooding downstream, helps to sequester carbon, and reduces brown peat-staining of the water, which requires expensive treatment if not dealt with at source.

4.4 Embed the Value of Nature in Decision-Making

Summary

Nature's worth to society – the true value of the various goods and services it provides – is not reflected in market prices or most of the decisions we make. This failure leads to poor decision-making and poor choices across sectors. To help address this we need to:

- Take account of the value of nature in relevant strategies and decisions across public and private sectors, thereby making better decisions in the long-term. Some businesses are already seeing benefits of this approach, including helping to manage the risks to their supply chains.
- Provide regularly updated evidence on the extent and condition of natural capital, enabling impacts to be assessed at the right scale to support decisions by different stakeholders.

Our Leaders' Pledge for Nature commitment

“We commit to mainstreaming biodiversity into relevant sectoral and cross-sectoral policies at all levels.....We will do this by ensuring that across the whole of government, policies, decisions and investments account for the value of nature and biodiversity.” (LPN commitment 7, also relevant to commitment 3)

Why this matters

At the global level the World Economic Forum has estimated that US\$44 trillion of economic value generation – over half of global GDP – is moderately or highly dependent on nature⁷⁷. However, nature's worth to society – the true value of the various goods and services it provides – is not reflected in market prices or most of the decisions we make. Too often, decisions and markets are based on short-term time scales, and therefore do not price in things that matter in the longer-term, such as soil health. These pricing distortions have led to decisions ignoring the role and value of nature putting supply chains at risk and resulting in the long-term decline in biodiversity and the erosion of the natural capital upon which our future prosperity and well-being depend⁹ (section 2.5).

The UK National Ecosystem Assessment highlighted the critical role nature plays for society and the economy⁷⁸. It found that, despite previous efforts to address historical declines in nature in the UK, many ecosystem services (the benefits that nature provides for people) are still far below their full potential, with adverse impacts on human health and well-being. These declines directly affect people's lives: from how often our homes are flooded, how much we pay for clean water, and how badly we suffer respiratory illnesses, to how much we can benefit from green and wild spaces close to where we live.

How we can succeed

4.4.1 Take account of the value of nature in relevant strategies and decisions

Taking account of the value of nature means considering both its monetary and non-monetary values. In doing so, it can be helpful to think in terms of 'natural capital' (i.e. the stock of renewable and non-renewable natural assets such as ecosystems that provide benefits to people)

emphasising the role of *nature as a capital asset*, equivalent to *produced capital* (e.g. roads and buildings) and human capital (e.g. knowledge and skills), which economists and other decision makers are more used to taking into consideration⁹.

Wales was the first country in the world to explicitly require the interests of future generations to be taken into account in decision-making, and in doing so requires impacts on nature to be considered (see Box 4.12). Some companies are already taking account of natural capital values to provide better business and social outcomes. For example, Yorkshire Water has adopted a ‘six capitals’ approach in their business planning, which incorporates natural capital alongside social and human capital and more traditional economic and manufacturing metrics⁷⁹. This has changed the company’s understanding of the benefits and opportunities associated with different forms of investment, leading to greater investment in Nature-based Solutions such as Sustainable Urban Drainage Systems. More widely, the UK Water Industry Forum has established Natural Capital Principles to support the adoption of a natural capital approach⁸⁰.

Data on natural capital and ecosystem services is particularly useful for regional and local decision-making (see Box 4.13). The England Natural Capital Atlas⁸¹ draws together the best available evidence on the state of natural capital in England, in terms of its quantity, quality and location. The Atlas shows where there are opportunities to enhance existing natural capital and where to target its creation for the provision of multiple benefits. The Oxford to Cambridge Local Natural Capital Plan Pilot⁸² used the Natural Capital Atlas method as a starting point for engagement between new partners, and a visual aid to explain the relationships between ecosystem assets and ecosystem services when framing proposed developments along this major corridor.

Data on natural capital is required to apply the UK Green Book⁸³ guidance for policy analysis across government. It also informs corporate natural capital accounts and approaches to help businesses to identify, measure and value their direct and indirect impacts and dependencies on natural capital.

Box 4.12 Embedding the value of nature in the culture of decision-making in Wales

The Well-being of Future Generations (Wales) Act 2015 is about improving the social, economic, environmental and cultural well-being of Wales. It places a sustainable development duty on most Welsh public bodies to think more about the long-term, working better with people and communities, looking to prevent problems and take a more joined-up approach. At the heart of it is the need to consider the breadth of aspects of well-being through seven well-being goals that cover resilience, equality, prosperity, health, community cohesion and global responsibility. In tandem with the Environment (Wales) Act, which places a duty on public authorities to maintain and enhance biodiversity and promote the resilience of ecosystems, there is a need for all organisations to consider all seven aspects rather than just those within their remit. The resilience goal is for a biodiverse natural environment with healthy functioning ecosystems that deliver resilience and the capacity to adapt. Understanding the impact on nature is fundamental to this goal.

Crucial to delivering change is the role of the independent Future Generations Commissioner and their oversight of Welsh Government, public bodies and local authority well-being plans. It is now 5-years since the Act took effect and in reviewing progress the Commissioner has identified that some health boards and national bodies are increasingly making the connections between a healthy, natural environment and better health and wellbeing. However, there remains much to change not least that many organisations are still not recognising their potential role in helping achieve nature recovery and healthy, resilient ecosystems but the legislation and Commissioner provides the means to change this.

Box 4.13 Taking a natural capital approach in the English Uplands

The English uplands are important natural capital assets that provide multiple benefits for people including carbon sequestration in peatlands, clean and plentiful water, food through livestock farming, places for recreation and recuperation as well as important areas for biodiversity. But the English uplands are changing: climate change is affecting weather patterns and rainfall, with knock on effects on these natural assets. In 2009, Natural England worked with local communities, farmers, local government decision makers and businesses in two upland areas (Bassenthwaite in the Lake District and the South Pennines) to discuss the communities' future aspirations for their upland areas, in terms of both nature and benefits to people. Information from expert studies and local knowledge were combined, alongside input from agencies and individuals responsible for different aspects of upland management (for example, water companies, local councils, water regulators and farmers) to inform, deliberate and discuss options together. This led to agreement on a shared plan for future ecosystem service provision and nature conservation and land management actions to deliver this plan, with resources allocated through pooled funds across the partnership⁸⁴. In the South Pennines, an economic valuation of the ecosystem services provided by restoration of degraded blanket bog was completed. This demonstrated that restoration of upland habitats was cost effective when compared to providing a new water treatment plant. This ensured ongoing support for land management from the water company⁸⁵. This participatory approach led to a shared understanding of the areas and the associated values of different options. The polycentric governance encouraged innovation, understanding and support from participants as solutions were co-created.

4.4.2 Provide regularly updated evidence on the extent and condition of natural capital

Mainstreaming natural capital into decision-making requires effective monitoring to regularly update information on the extent and condition of our natural assets, as any successful country or business would do for all its built, physical and human assets. There are a number of approaches that have been taken in the UK to do this. In Scotland the Natural Capital Asset index⁸⁶ (NCAI) uses Space Intelligence/ NatureScot SLAM-MAP data⁸⁷ to update and track changes in the capacity of Scotland's terrestrial ecosystems to provide benefits to people. The NCAI does not include monetary values but is composed in a way which reflects the relative contribution of habitats to human well-being. The Natural Capital Asset Index is included as a measure for the National Indicator 'Increase our natural capital' in the Scottish National Performance Framework.

The UK Office for National Statistics produced a number of experimental natural capital accounts, and estimated the asset value of UK natural capital was £921 billion in 2018⁸⁸. In Derry City and Strabane District Council, Northern Ireland, natural capital valuation approaches were used to assess the contribution of greenspaces, and concluded that £22 of benefits were provided for every £1 invested and that greenspaces provided over £500 benefit per adult every year⁸⁹. There is a risk that these accounts over-emphasise types of natural capital that can be attributed a monetary value. Approaches exist to reduce this risk, for example, natural capital accounts for National Nature Reserves in England describe the extent and condition of the stocks of natural capital alongside monetary accounts⁹⁰. The Natural Capital Committee in England recognised the problem of incomplete data and recommended a comprehensive, England-wide environmental census of the stock of natural capital assets⁹¹. Currently the Natural Capital Ecosystem Assessment

is piloting a suite of approaches to develop this data in England. This includes ‘Living England’ a regularly updated satellite-derived habitat map and the England Ecosystem Survey (EES) which will collect information on asset quality such as habitat condition, soils, vegetation and landscape character. Similarly, a Living Map of Northern Ireland is under development to provide systematic and regularly collected data on land cover and habitat classification product, providing robust information on the extent and location of natural capital assets.

The Environment (Wales) Act 2016 requires the publication of a State of Natural Resources Report (SoNaRR) on a 5-yearly cycle. The second report (published in 2020⁹²) provides information for national and local decision makers on the state of natural resources in Wales and on the key drivers of change. It is complimented at a regional scale by production of Area Statements that provide an evidence base to facilitate partnership working that addresses both local well-being needs and environmental issues.

Developing these measures of natural capital requires systematically, regularly collected data to measure change in the stocks and consequential flows of ecosystem services and the value of benefits to people. They also demonstrate that help and guidance in understanding and interpreting the information is required for sectors that have not considered natural capital before. The expertise of the country nature agencies means they are well placed to provide this information and guidance.



5 Protect and Restore Nature, including through Ambitious Targets

One of the main causes for biodiversity loss is that species are being starved of space. Humans are also threatening some species with extinction by over-exploiting them or damaging their habitats. The commitments in this section aim to address these challenges, by protecting more space for nature at land and sea, and by protecting and recovering threatened species. Setting and achieving targets, underpinned by a strong evidence base, guides the type and scale of action required and encourages action by others. Through protecting and restoring nature, we also enhance its ability to provide the essential services upon which we depend.

5.1 Protect 30% of Land and Sea

Summary

Protecting sufficient space for nature on land and at sea is essential for effective biodiversity conservation, restoring the ecosystems upon which we depend, and to help nature and people cope with climate change. In the UK, since less than 30% of the terrestrial area comprises wildlife habitat, our approach needs to include increasing the area of wildlife habitat as well as protecting and better managing what we have. This means:

- Ensuring protected areas on our land and sea are well-managed to enable biodiversity to thrive within them, taking account of climate change.
- Increasing the area of wildlife habitat on land, targeting areas where they will deliver most benefits to biodiversity and people.
- Creating large scale ‘nature networks’ that improve the resilience and protection of ‘core’ wildlife areas and improve the connections between them to enable species to move across the network, and to achieve ecosystem restoration within and between sites.

Our Leaders’ Pledge for Nature commitment

“Significantly increase the protection of the planet’s land and oceans through representative, well connected and effectively managed systems of Protected Areas and Other Effective Area Based Conservation Measures, and to restore a significant share of degraded ecosystems” (LPN commitment 2)

Some countries have subsequently clarified, including the UK through the G7 nature compact²¹, that this commitment is to protect 30% of their own land (including freshwater) and sea area for nature by 2030.

Why this matters

Protected areas are essential for effective biodiversity conservation, as well as securing magnificent landscapes and seascapes, delivering essential ecosystem services for people⁹³ and supporting our efforts to limit climate change⁹⁴. The target to protect at least 30% of land and sea to underpin nature's recovery has a strong scientific rationale, provided the protected areas are located in the right places and appropriately managed⁹⁵. Achieving this target is important for nature and people.

How we can succeed

To achieve the 30by30 commitment, we need more and better protected areas around the world. In May 2021, the global coverage of protected areas and of Other Effective area-based Conservation Measures (OECMs)⁹⁶ was estimated to be 16.6% on land and 7.7% in the marine area⁹⁷.

The current situation in the UK is that the recently established Marine Protected Area network covers 35.9% of UK seas⁹⁸. On land, a total of 27.8% of the UK terrestrial area (including freshwaters) is within some type of national protected area, although only 10.6% is within Sites of Special Scientific Interest (SSSIs) or Areas of Special Scientific Interest in Northern Ireland (ASSIs), which are primarily protected and managed for nature (the SSSI/ASSI designation also underpins most National Nature Reserves, Special Areas of Conservation and Special Protection Areas; both biological and geological SSSIs/ASSIs exist). The remainder of the protected terrestrial and freshwater area comprises National Parks and Areas of Outstanding Natural Beauty (AONB) and, in Scotland, National Scenic Areas (NSA). These protect many of the UK's most treasured landscapes, with nature conservation of secondary importance. Some areas within National Parks, AONBs and NSAs are rich in wildlife, and may be SSSIs/ASSIs (these designations can overlap); other areas currently contribute little or nothing to effective nature conservation. The UK governments are in the process of deciding which terrestrial protected areas and OECMs should count towards the 30% target.

The 30by30 target is not an end in itself: protecting the right spaces for nature and managing the impacts upon those places properly is essential if we are to reverse biodiversity loss. In the UK, the 30by30 target on land is a particular challenge because less than 30% of our terrestrial area comprises wildlife habitat and this remaining habitat is often highly fragmented. Consequently, we need a response which combines making our protected areas richer in wildlife; identifying and enhancing important areas of remaining wildlife habitat outside protected areas (such as through OECMs); creating more habitat; and increasing connectivity. Approaching this through the framework of a nature network to achieve coherence and resilience provides our best chance of success. Thus, to make the 30by30 commitment count for nature and people we need to:

5.1.1 Ensure protected areas are effective for biodiversity and resilient to climate change

Areas protected for biodiversity need to be effective in delivering this purpose. This is about ensuring these areas are well managed, working with natural processes, so that sites are “big enough, messy, complex and dynamic”⁹⁹. Currently, many of the UK's approx. 7000 SSSIs are

not meeting their conservation objectives: just 50% of SSSIs/ASSIs are assessed as in good ('favourable') condition. All countries of the UK have, or are developing, an information system for SSSIs/ASSIs management that identifies the requirements and negative impacts on each site, to underpin improvement plans which can be effective in enhancing these areas for biodiversity¹⁰⁰; these plans need to be implemented, while taking account of the need to accommodate changes due to climate change, and thinking beyond their boundaries to address external sources of harm.

SSSIs/ASSIs were selected as a representative sample of the best habitats and most important species assemblages. Consequently, significant amounts of wildlife habitat persist outside these nationally recognised areas, including many which are of SSSI/ASSI quality. Some of these wildlife patches are within or close to urban settings, providing important green infrastructure for local communities (see section 4.1). These unprotected areas of wildlife habitat are at risk, for development, food production or other uses. They do, however, have the potential to play an important role towards our 30by30 commitment (and as parts of nature networks), provided they are appropriately managed and protected.

The UK's National Parks and AONBs/NSAs have high potential for nature conservation and to make a significant contribution to 30by30, but much of their area is currently not wildlife habitat (protected landscapes encompass large areas of agriculture and include urban developments). A recent review of England's protected landscapes recommended that delivering more for nature should become a central aspect of the revitalisation of designated landscapes, such as by improving and expanding the amount of wildlife habitat within them¹⁰¹.

In the marine environment, many of our marine ecosystems are not in good condition¹⁰² and, although we now have an extensive Marine Protected Area (MPA) network across the UK (see Box 5.1), many MPAs do not yet have the management in place necessary to fulfil their conservation objectives. Developing and implementing these is a high priority for effective delivery of our 30by30 commitment at sea. A recent report to Government has recommended the designation of Highly Protected Marine Areas (HPMAs)¹⁰³ in which extractive and otherwise damaging activities would be prohibited. The government has committed to designating pilot HPMAs in England by the end of 2022.

5.1.2 Increase the area of wildlife habitat on land

Due to the past and ongoing trends of habitat loss in many parts of the UK, we need to significantly increase the current extent of wildlife habitat and ensure it is effectively managed and protected. This is essential if the 30by30 target is to succeed in making a significant contribution to reversing biodiversity loss and is also in line with our Leaders' Pledge commitment to restore degraded ecosystems. Targeting this habitat expansion to maximise the effectiveness of protected areas (for example by increasing the extent of wildlife habitat in National Parks/ AONBs), and to join up or expand small protected areas is likely to be particularly effective. For SSSIs/ASSIs this is particularly important because many are very small (over 75% of the UK's SSSIs are smaller than 100 ha).

The UK has already made commitments, as part of our climate change mitigation response, to significantly expand woodland cover and restore degraded peat (see sections 4.2 and 6.3). Some countries of the UK have also made further commitments, for example England has committed to creating 500,000 ha of new wildlife habitat by 2042⁵⁴. There is an important opportunity to ensure that habitat creation to mitigate climate change also makes an important contribution to 30by30 and reversing biodiversity loss, such as by ensuring much of the new woodland also meets quality standards for wildlife habitat.

5.1.3 Create large-scale 'nature networks'

Protected areas cannot be managed as isolated islands for biodiversity¹⁰¹. The UK's Marine Protected Areas were selected to create a network (see Box 5.1) but this was not the case for terrestrial and freshwater protected areas. In the UK, all countries are now implementing or developing plans for terrestrial nature networks¹⁰⁴ (see Box 5.2). Establishing nature networks involves improving the quality and increasing the size, resilience and number of 'core' nature-rich sites, such as protected areas, and also developing connections to enable species to thrive within sites and move between them. This enables the restoration of broad-scale ecological processes and viable populations of wide-ranging species to be sustained across the network, something that would be impossible in isolated small sites. In this way, nature networks add value and coherence to our 30by30 actions to improve the quality of protected areas and create new habitat by ensuring the whole adds up to more than the sum of the parts.

There is extensive evidence to guide the establishment of nature networks and applying this to the delivery of the 30by30 target can enable nature recovery while using space efficiently and securing multiple benefits for people, such as for recreation and climate change mitigation and adaptation⁹⁹. Effective nature networks also need to be planned at both local and national levels, with a close degree of integration, to ensure local circumstances and priorities are delivered alongside national strategic objectives. They will require the strategic use of different policy tools, for example targeting woodland expansion to where it is most beneficial for nature recovery such as by joining-up fragments of existing ancient woodland.

A key element in the development of a resilient and coherent nature network is to provide large centres of abundant wildlife that will spill over into the rest of the network, i.e. landscape-scale nature recovery areas. Evidence from Europe suggest that these need to be at least c. 5000 ha in size⁹⁹. Large areas are particularly well-suited to low-intervention management techniques, such as rewilding, and delivering multiple benefits through Nature-based Solutions. Large areas of wildlife habitat have proportionately smaller, negative 'edge effects' and generally support larger populations of plants and animals, making them less vulnerable to chance extinctions (for example due to wildfires, disease, extreme winter weather, or droughts). They also create a larger pool of potential colonists capable of moving out into surrounding areas. The long-term benefits of large areas of interlinked habitats are well established in both ecological theory and practice¹⁰⁵.

When establishing nature networks, and landscape-scale spaces for nature, the countries of the UK are not starting from scratch: far from it. For more than three decades, slowly at first, but in the last decade at an accelerating pace, 'consortia of the willing' (including voluntary and statutory conservation agencies, private landowners and utility companies) have been developing approaches that have delivered fantastic gains for nature across the UK, providing an extensive experience to draw upon as we accelerate our action to become Nature Positive (see Box 5.3 on nature transformations).

At sea, connectivity also matters, and securing Good Ecological Status of our wider seas is important for MPAs to function well as a network (see also section 6.2).

Box 5.1 Developing an ecologically coherent and well-managed Marine Protected Area network across the UK

JNCC has been at the forefront of UK Marine Protected Area (MPA) implementation with an explicit statutory advisory role in UK offshore waters (beyond 12 nautical miles), working closely with partners in each of the four countries of the UK, including the other country nature agencies. Implementation has focused on complimenting the existing 'building blocks' of the MPA network, such as Special Areas of Conservation, and guided by a common set of best-practice principles established under the Regional Sea Convention for the North-east Atlantic – OSPAR:

- **Features** - the range of habitats and species for which MPAs are considered appropriate – with a greater proportion of particularly threatened and/or declining features.
- **Representativity** - areas that best represent the range of habitats and species.
- **Connectivity** - MPAs that are well-distributed and take into account linkages between marine systems.
- **Resilience** - include more than one example of a feature in individual MPAs and ensure they are of sufficient size.
- **Management** – adequate protection to deliver conservation outcomes.

JNCC has undertaken network assessments¹⁰⁶ on behalf of the four countries of the UK to ensure MPA decision-making is based on the best-available evidence. Whilst MPA networks are largely complete across the UK, the focus now is on ensuring appropriate management is put in place to deliver conservation outcomes and to safeguard the networks contribution to improving the health and resilience of the wider marine environment.

Box 5.2 Examples of terrestrial nature network approaches in the UK

England is establishing a National Nature Recovery Network (NRN) including 25 large landscape ‘Nature Recovery Areas’, as set out in the 25 Year Environment Plan. The forthcoming Environment Act will require all areas to develop Local Nature Recovery Strategies which will underpin the NRN and ensure that local priorities benefiting nature and people are identified, alongside national aims. By 2042 the NRN, led by Natural England, aims to:

- restore 75% of protected sites on land (including freshwaters) to favourable condition;
- create or restore at least 500,000 ha of new wildlife-rich habitat outside of protected sites;
- recover threatened and iconic animal and plant species by providing more diverse and better-connected habitats;
- support work to increase woodland cover; and
- achieve a range of environmental, economic, and social benefits, such as carbon capture, flood management, clean water, pollination, and recreation.

In Wales, nature networks, or **Resilient Ecological Networks (RENs)** are recognised in the Welsh Government’s Nature Recovery Action Plan¹⁰⁷ as vital for nature recovery. RENs put protected sites at their core, incorporate the four key attributes required for ecosystem resilience (diversity, extent, condition and connectivity) and apply these at an effective and appropriate scale. The **RENs Practitioner’s Guide**¹⁰⁸, an NRW Evidence Report, provides a stepwise, inclusive and evidence-based approach that can be used by any partnership at a variety of scales to design RENs and is based on learning from a wide range of previous projects and initiatives.

In Scotland the terrestrial environment lends itself to “landscape scale” management for nature. Long term initiatives such as Cairngorms Connect¹⁰⁹ and Alliance for Scotland’s Rainforest¹¹⁰ that cover many tens of thousands of ha will provide resilience and connectivity with Protected Areas as ecological nodes and encouraging natural restoration and expansion of habitats over these vast areas. Opportunities to encourage similar locally supported strategic partnerships that work at scale to improve habitat connectivity are being encouraged by government and supported through an enhanced National Planning Framework.

Box 5.3 Nature transformations

It is widely recognised that to address the twin problems of biodiversity loss and climate change will require transformative change. The UK has undertaken a number of inspiring transformative nature restoration projects, some of which are described below. **These projects demonstrate that when we give space to nature biodiversity can rapidly recover and people benefit too.**

The Great Fen is an ambitious 50 year fen restoration project working across 3700 ha of Cambridgeshire to reconnect the two remnant ancient fen habitats of Woodwalton Fen and Holme Fen NNRs. Wildlife is thriving in recently created and restored habitats and the

project is delivering a range of benefits from new footpaths and cycleways for access, to carbon storage and flood-risk reduction.

Cairngorms Connect, the UK's biggest habitat restoration project, is a partnership of neighbouring land managers (public, private and NGO) working collaboratively to enhance habitats, species and ecological processes across an area of over 600 km². It works with committed people, from scientists to deer-stalkers and from farmers to foresters, to deliver a healthier, natural landscape that supports strong, economically vibrant local communities. Partners are working together to create a wilder landscape including by controlling deer numbers to allow forests to expand, naturalising rivers and restoring huge tracts of peatland.

Established in 2007, **the Pumlumon Project** is a radical rethink of how the landscapes of upland Britain could work. Across 40,000 ha of the Cambrian Mountains in Wales, the Montgomeryshire Wildlife Trust is pioneering an upland economy built around wildlife, ecology and long-term sustainability. The project has demonstrated how large-scale ecological restoration can bring economic, social and environmental benefits.

Peatlands Park in Northern Ireland is a remnant of an extensive lowland raised bog complex. The 265 ha site was acquired in 1978 from the Irish Peat Development Company and brought under the management of the Northern Ireland Environment Agency. Designated as an ASSI and SAC, Peatlands Park is today managed to promote and facilitate safe public access to the extensive habitats alongside effective conservation and restoration, with approximately 10 miles of paths, leading visitors through open bog and enclosed woodland. Restoration continues and in recent years has been supported through the INTERREG CANN project to safeguard and enhance this valuable resource for future generations.

Wallasea Island is an inspiring RSPB wildlife reserve located in Essex close to the Thames Gateway. More than 3 million metric tonnes of earth was brought by boats from the tunnels of a large rail infrastructure project to help create 115 ha of intertidal habitats. The reserve now provides 740 ha of rich wildlife habitat, helps to reduce tidal flooding in the Thames estuary and is an important visitor attraction.

In the 1950s, only 1% of Caledonian Forest survived but **Trees for Life** has been working to bring back Caledonian Forests to Scotland. With the help of 10,000 volunteers, 1.7 million trees have been planted rewilding 4,000 ha in total, with 2,750 ha of that at Glen Affric. The charity bought Dundreggan, an old hunting and estate with plantation woods in 2008. Since then it has become a model conservation estate to demonstrate native forest restoration.

Lyme Bay was designated as a Marine Protected Area in 2008 because of its fantastic assemblages of reefs including pink sea fans *Eunicella verrucosa* and king scallops *Pecten maximus*. Despite the importance of the area commercially for fishing, scallop dredging was damaging the reefs and destroying the marine communities. The area was closed to demersal fishing (including dredging) across the reefs. Biodiversity in the bay has rapidly recovered, along with associated crustaceans enabling profitable sustainable fishing to flourish. Produce marketed as from a "Marine Reserve" is attracting a premium price.

5.2 Protect and Recover Species

Summary

Some species, particularly those that have undergone severe declines or are at risk from illegal activities, require specific support to be able to recover. Actions that have proved to be effective are:

- Protect threatened species using regulation and enforcement.
- Prevent further human-induced extinctions or reductions in range through targeted species recovery action.
- Reintroduce species that have been lost, especially where there are wider benefits to nature and people.
- Implement wildlife habitat management approaches that support a greater resilience and diversity of ecosystems, thereby promoting species persistence and colonisation.

Our Leaders' Pledge for Nature commitment

“halt human induced extinction of species... [and] ensure species populations recover” (LPN commitment 2, also relevant to commitment 6)

Why this matters

Human actions threaten more species than ever before, with around one million species already facing global extinction, many within decades¹. In the UK, over 40% of species are in decline; 15% of assessed species are currently threatened with extirpation from Great Britain and 2% are already gone; over the last 50 years there has been a 13% decline in average species' abundance, with signs of a worsening trend in the past decade¹¹. It is also clear that many species in the UK are undergoing rapid changes in range, with the proportion of species showing strong changes in distribution more than doubling in the last 10 years, with good evidence that climate change is a key driver¹¹.

How we can succeed

Site protection, and measures that achieve a greater area of higher quality wildlife habitats are the primary means by which we will achieve the protection and recovery of most species (section 5.1), alongside reducing pressures on wildlife (section 6). Furthermore, work to reconnect habitats through establishing nature networks is critical for many species to be able to adapt effectively to climate change (section 5.1). However, these measures are unlikely to be enough to recover those species with very specific habitat requirements, or those that have suffered local extinctions or severe losses. To recover these species additional focussed regulation and action is often needed.

5.2.1 Protect threatened species

Legally protecting species that are threatened by human actions such as over-exploitation is fundamental to effective nature conservation. For example, a global ban on hunting of most great whales has been key to their survival, while the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) regulates global trade in over 38000 endangered species worldwide. In the UK, wildlife legislation¹¹¹ lists protected species and identifies the type of measures required while the SSSI guidelines inform protection of important sites within species' range (such as through designating them as SSSIs/ ASSIs, see section 5.1), or protect populations of species wherever they occur, or both. Large numbers of species benefit from protected status in the UK including all wild birds and bats. Some protected species are threatened by multiple factors, such as illegal activity and habitat degradation (see Box 5.4).

Protected species often live alongside and interact with people. Usually this coexistence is harmonious but at times there can be conflict such as when the species' presence poses risks to human health or disproportionate economic cost. In the UK these circumstances are managed through a licensing process to permit people to carry out activities impacting protected species, while ensuring effective species conservation. This may, for example, require species to be moved or compensatory habitats to be created. Overall, the aim of protected species licensing work is to enable necessary human activities while avoiding detriment to the maintenance of a favourable conservation status of the species (see Box 5.5).

Box 5.4 Pearls in Peril

The freshwater pearl mussel *Margaritifera margaritifera* is declining dramatically throughout its range across the UK due to pressures from wildlife crime, habitat degradation and declining water quality.

'Pearls in Peril'¹¹² led by NatureScot, was a GB-wide EU LIFE project with 22 partners working to restore freshwater pearl mussel and salmonids (salmon and trout) species and habitat conditions in 21 SAC rivers. Such actions included protecting riverbanks by planting native trees, restoring natural river flows and reducing sedimentation.

The project also worked to safeguard the long-term survival of existing freshwater pearl mussel populations by creating awareness, communicating with local, national and international audiences, tackling wildlife crime and intervening to artificially 'encyst' juvenile salmon and trout.

Freshwater pearl mussels are very slow growing, can live up to 100 years and do not start to breed until they are 12-20 years old. Many of the project's mussel populations are showing early signs of recovery supported by ongoing support actions initiated during the project.

Box 5.5 District Level Licensing for great crested newt

The great crested newt (GCN) *Triturus cristatus* is a protected species that has declined in the UK. Traditionally developments affecting GCN used mitigation licencing which concentrates resources on individual sites to prevent losses. In England, District Level Licensing (DLL) for GCN is a new approach designed to deliver a net benefit to the species' overall conservation status. Developments which may affect GCN pay a conservation payment and this funding is used to deliver compensatory habitat in the best locations for the species. A minimum of four compensatory ponds are delivered for every occupied pond lost to development and the conservation payment ensures that the new habitat is maintained and monitored for 25 years.

To date DLL has created or restored over 1,000 ponds, equivalent to over 190,000m² of aquatic habitat, benefitting wider biodiversity as well as GCN. Environmental DNA (eDNA) techniques are being used to monitor ponds and have shown that they are often quickly colonised, with 34% of the new ponds supporting GCN within a year. In their first year, the DLL schemes operated in Kent and Cheshire contributed to a net increase in both the area and distribution of suitable habitat.

Local steering groups guide delivery of the scheme with membership from over 64 organisations including environmental non-governmental organisations, local planning authorities and Natural England working together to ensure the best outcomes are achieved. As well as delivering outcomes for GCN this approach is also quicker and more straightforward for the development sector.

5.2.2 Prevent further human-induced extinctions or reductions in range through targeted species recovery programmes.

For some species, especially those threatened with extinction, the road to recovery can require research to understand the causes of decline and barriers to recovery, in concert with targeted interventions to build populations to sustainable levels. Species recovery in this context often needs to be planned species by species (see Boxes 5.6 and 5.7). Across the UK, partnerships of NGOs, academics and government agencies have identified the specific requirements for the recovery of many of our threatened species on a case-by-case basis¹¹³. This has provided the foundation for species recovery programmes, which have often excited and engaged the public, and attracted non-government funding.

The benefits and challenges of working to recover several types of species simultaneously have recently been demonstrated by the *Back from the Brink* programme¹¹⁴ (BftB). This England-wide delivery and funding partnership led by Natural England aims to save 20 species from extinction in England and benefit over 200 more across a portfolio of 19 projects, while also engaging the public. For example, widening paths in Rockingham Forest has benefitted a range of butterflies and moths including three priority species, whilst also creating bare ground scrapes for fly orchid *Ophrys insectifera* and using the arisings to form a reptile bank for adders *Vipera berus*. Building on the success of BftB, equivalent programmes are in development in Scotland (Species on the Edge) and Wales (Natur am Byth), while cross-border multi-species recovery projects are underway in Northern Ireland, Ireland and Scotland, through CANN (Collaborative Action for the Natural Network) and CABB (Cooperation Across-borders for Biodiversity).

Box 5.6 Lapwing Recovery - Portmore Lough ASSI

RSPB Northern Ireland established the Portmore Lough Nature Reserve in the early 1990s, in an area identified as having potential for supporting breeding waders (though at the time they were absent) and conducted surveys and research on the 100ha wet grassland area within the reserve. This concluded that invading scrub along the shoreline, was a barrier to lapwings *Vanellus vanellus* breeding at the site. A decision was reached with the Northern Ireland Environment Agency to create conditions for lapwings to breed at Portmore Lough ASSI, by removing 8ha of invading scrub from the south-west shore of Portmore Lough, opening up the wet grassland to the lough shore, while restoring fen and reedbed. The removal of invading scrub took place between 2007 and 2008.

The focused approach worked. The site began attracting breeding lapwings, and now attracts 30 – 40 breeding pairs annually. To help protect nests and chicks from predation, predator proof fencing was erected and is maintained annually on the reserve. Portmore Lough is now a demonstration site for the restoration of wet grassland from invading scrub, for recovery of lapwings/breeding waders around Lough Neagh/Beg.

Box 5.7 Cors Erddreiniog & southern damselfly

Nant Isaf spring field is the jewel in the crown of a fen on Anglesey that is of international importance. This privately-owned part of the Cors Erddreiniog SSSI supports the most northerly UK population of the southern damselfly *Coenagrion mercuriale*. The site also boasts another rarity - one of the largest UK populations of the clubbed general *Stratiomys chamaeleon*, a large and attractive soldier fly *Hermetia illucens*. It used to support several other special invertebrates and plants through grazing management in the 1990s and early 2000s that maintained the open conditions these species need. When grazing was abandoned the southern damselfly population came close to being lost completely. Working with the landowner, NRW introduced ponies in 2017 and employed contractors to remove vegetation. This cooperation resulted in the southern damselfly population recovering along with the reappearance of fly orchids *Ophrys insectifera* and broad-leaved cotton grass *Eriophorum latifolium*. While it will take time for the botanical species composition to fully recover, the work at Cors Erddreiniog shows that if management conditions are right, wildlife will return and thrive.

5.2.3 Reintroduce species that have been lost

A number of species have become extinct in the UK over the past several centuries as a result of habitat loss or persecution. Reintroduction programmes often require long-term interventions and can be expensive, and so are not a panacea for recovering biodiversity. However, at times reintroduction can be an effective way of restoring ecosystem function and rebuilding food webs (for example by reintroducing top predators such as white-tailed eagles *Haliaeetus albicilla*), as well as providing valuable ecosystem services and helping people to feel empowered and reconnected with nature (see Box 5.8).

Box 5.8 Beaver reintroduction to the UK

The European beaver *Castor fiber* was hunted to extinction in Britain around the 16th century but has been successfully reintroduced into Scotland after a comprehensive trial¹¹⁵. As a keystone species, beavers create areas of wetland, locally change tree cover and diversify riparian habitats. The trial showed an overall increase in biodiversity in beaver occupied areas although some species groups, such as internationally significant lichens, were initially negatively impacted¹¹⁶. In England, a 5-year trial on the River Otter (Devon) has recently ended, drawing similar conclusions of an overall positive effect on biodiversity. The reintroduction attracted strong support from the public and provided a Nature-based Solution to reducing both flood risk and water pollution¹¹⁷.

5.2.4 Implement wildlife habitat management approaches that support a greater diversity of species

Across the UK, there is a consistent pattern in which species that require increasingly rare features ('niches') are declining rapidly¹¹. For example, the UK farmland bird index is at 45% of its 1970 value because of significant declines in a range of species (skylarks *Alauda arvensis*, tree sparrows *Passer montanus*, grey partridges *Perdix perdix* etc.) all of which fare badly in our increasingly tidy agricultural landscapes lacking 'messy edges, weedy corners and wet bits'. There is a general simplification of our countryside to make it less diverse.

We need to put structural diversity ('messiness') back into habitats and land use across the UK, through agricultural and woodland support schemes, and within protected areas. Habitat diversity can often be increased whilst restoring ecosystem function and adopting reduced intervention approaches such as rewilding. Rewilding represents a shift towards more extensively managed areas with higher levels of natural function and greater structural diversity (see Box 5.9). Whilst large scale rewilding will obviously not be appropriate in some parts of the UK, nature-friendly components can be inserted into almost any landscape.

Box 5.9 Wilding at Knepp

Rewilding 14 km² at Knepp Castle Estate in southern England has demonstrated just what can be achieved for conservation priority species through a naturalised grazing regime without internal fences and predator control¹¹⁸. In just over 20 years, a number of nationally declining species have flourished there, including birds such as nightingale *Luscinia megarhynchos* and turtle dove *Streptopelia turtur*, and it now supports the UK's largest colony of the nationally rare purple emperor butterfly *Apatura iris* despite this species being absent previously. Tree-nesting peregrine falcons *Falco peregrinus* and ravens *Corvus corax* have colonised naturally – all this within 25 km of Gatwick Airport.

5.3 Evidence and Targets

Summary

Targets define the scale of change needed to successfully achieve our nature goals, thereby informing allocation of resources while also encouraging innovation and buy-in across stakeholders. To be able to deliver national and global targets effectively we need to measure and understand change in biodiversity and ecosystems. This means:

- Surveying and monitoring nature. In the UK, we are fortunate in having an extensive citizen scientist network who monitor different aspects of our biodiversity, and increasingly we are also employing new techniques such as genetics and earth observation to improve our understanding of nature and the benefits it provides us.
- Developing targets that support achievement of our biodiversity goals. In some parts of the UK our nature targets are being made legally-binding.
- Evaluating and adapting. Our journey to becoming Nature Positive will require us to try new things and tackle new problems. We need to learn as we go.

Our Leaders' Pledge for Nature commitment

“[Establish] a set of clear and robust goals and targets, underpinned by the best available science, technology, research ... backed up by a strong monitoring and review mechanism.”
(LPN commitment 2, also relevant to commitment 10)

Why this matters

Goals and targets are important in nature conservation because they define the scale of change needed for success, thereby informing action planning and allocation of resources, while also encouraging innovation and buy-in across stakeholders.

The ability to measure change is fundamental to ensuring that we are able to deliver global targets effectively, and to understand why nature is changing so that we can respond effectively. Survey and monitoring to determine the state of the world's ecosystems is patchy, with decisions on the management of land and of the oceans based on a data poor' evidence base. But it is already abundantly clear that the world's ecosystems are being damaged and diminished and nature is being fragmented and reduced overall. The UK, by comparison to many countries, has a strong evidence base to underpin biodiversity and nature goals and targets.

How we can succeed

5.3.1 Survey and monitor nature to support our goals

Previous sections of this document have stressed the need for effective survey and monitoring of nature to underpin policy and action across sectors, including to support integrated planning on land and seas (section 4.1). JNCC, Natural England, NatureScot, Natural Resources Wales and Northern Ireland Environment Agency work in partnership with a range of NGOs and research

institutes, to monitor and survey a wide variety of wildlife, including birds, bats, marine mammals, butterflies and plants. These schemes are highly dependent on the huge contributions of time and effort provided by a network of tens of thousands of volunteers, who collect, input and validate data every year to produce statistically robust samples. It has been conservatively estimated that this UK volunteer effort is worth at least £8.6 million per year.

This species recording is complemented by monitoring of protected sites and habitats, often led by the country nature agencies. Together with other data measuring pressures on nature and responses, these diverse datasets enable assessments across the suite of UK Biodiversity indicators¹¹⁹ which themselves support UK reporting on our international commitments such as the 'Aichi Targets' under the Convention on Biological Diversity. Making such data and information available across government and more widely in a meaningful and usable way is important to ensure that policies take account of nature and that Nature-based Solutions have a sound basis.

Despite this wealth of monitoring, key gaps in our knowledge exist, notably in our marine environment, but also for certain less-charismatic groups of species (such as fungi) and in the quality of habitats outside protected sites. Increasingly, new technologies are being brought to bear alongside traditional surveys to fill these gaps and improve monitoring efficiency. At one end of the scale, genetic approaches are being used to improve our knowledge of species distribution and community composition through DNA sequencing. In 2019, for example, the extent of the new Leasowes SSSI in the West Midlands, was determined using DNA sampling of the soil to establish the distribution of rare wax cap fungi; this was the first time DNA was used to establish a protected area boundary anywhere in the world. At the other end of the scale, Earth Observation techniques are increasingly being brought to bear to improve our understanding of habitats and environmental change (see Box 5.10).

Our monitoring is also increasing our understanding of the role nature plays in our lives (see also section 4.4). For example, Natural England's People and Nature Survey¹²⁰ uses an online survey to gather data relating to people's enjoyment, access, understanding of and attitudes to the natural environment, and its contributions to well-being. This survey has helped reveal the critical role of access to nature for people's well-being, including during the recent pandemic.

Box 5.10 Using Earth Observation to better monitor nature

Achieving our nature goals and tracking progress towards targets requires information on the extent, state and condition of habitats within and outside protected area networks. Satellite data provides unprecedented opportunities for monitoring but there is a challenge in making the information readily accessible to non-specialists to use for different purposes.

Working in partnership with Historic Environment Scotland, Natural England, Natural Resources Wales, NatureScot, the Northern Ireland Environment Agency and Defra, JNCC have developed approaches which enable more automated change-detection in habitat condition. By combining time-series satellite data with earth observation derived habitat maps, it has become easy to track changes in condition over time such as gross changes (tree felling and upland burning), as well as more subtle changes (e.g. grazing, scrub encroachment, or erosion caused by recreational activities). For example, a wildfire and muirburn monitoring system is being developed to map burnt areas across the whole of Scotland, providing a continually updated dataset. Work is now underway to upscale this work to provide national coverage and explore how it can be enhanced with other data sources such as field data collected by Citizen Science sampling.

The ability to monitor landscape change on an almost daily basis has a wide range of applications which are now being explored, from supporting agri-environment scheme delivery, site management, natural capital assessment and nature network planning to climate emergency and green recovery responses.

5.3.2 Develop SMART targets that support achievement of our nature goals.

The effectiveness of targets in driving action is often improved if they are SMART, i.e. Specific, Measurable, Achievable, Relevant and Time-bound. This framework provides a means of breaking down over-arching goals and visions, such as becoming Nature Positive, into areas of relevant action that can be properly tracked to ensure delivery within expected time frames. The countries of the UK have adopted or are developing a range of SMART targets to support their environmental goals. For example, England's 25 Year Environment Plan includes quantitative targets for habitat expansion, improvements in protected areas and water quality among others¹²¹. UK countries have also adopted or are developing specific targets for woodland establishment and peatland restoration to jointly deliver for nature and climate (see section 4.2).

Global experience tells us that targets are often more effective in driving the right level of action if they have a legal underpinning. For example, global and country commitments to 'Net Zero' have led to the adoption of equivalent (or even more ambitious) targets by diverse stakeholders from businesses to churches to cities, stimulating much-needed action at different scales across sectors. In England, the government has committed to adopting legally-binding targets to underpin the 25 Year Environment Plan, including a legal commitment to reverse the decline of species (i.e. become Nature Positive) by 2030.

5.3.3 Evaluate and adapt

Our journey to becoming Nature Positive will build on a strong evidence-base of conservation success but will also involve employing new approaches and tackling new problems. This requires us to evaluate our actions and learn as we go, adapting our responses according to our level of success. A partnership of academia and delivery bodies, including NGOs and businesses, working together to both build the evidence base and learn from it is needed to ensure efficient and effective use of our resources. These partnerships have worked well before, for example in evaluating the impact of agri-environment schemes, which has led to improvements in their design and deployment.



6 Transition to Sustainable Land and Sea Use

We are depleting nature's resources faster than it can regenerate, leading to negative impacts on people around the world, and undermining opportunities for future generations. We need a rapid transition so that nature's resources are used sustainably and sources of harm are reduced.

6.1 Agriculture

Summary

Agriculture around the world and in the UK is heavily dependent on public subsidies, which support farming systems that often cause declines in nature. This is bad for biodiversity, and also harmful to our long-term food security due to declining health of our soils. We need to:

- Reform agricultural subsidies. The UK governments are in the process of re-directing subsidies so that they pay farmers for delivering public benefits, such as recovering nature and climate change adaptation and mitigation.
- Deliver large-scale creation of habitats, by sparing land for nature and securing other benefits for people.
- Incentivise high nature value farming (HNVF) which helps support biodiversity, enriches our soils and enhances the beauty of our landscapes.
- Improve the efficiency of our farming systems and food supply-chain to avoid increasing our food demands on the rest of the world.

Our Leaders' Pledge for Nature Commitment

“Shifting agricultural policies away from environmentally harmful practices”... “eliminating or repurposing subsidies and other incentives that are harmful to nature, biodiversity and climate while significantly increasing the incentives with positive or neutral impact for biodiversity” ...[and] “adopt practices that regenerate ecosystems” (LPN commitment 4)

Why this matters

Globally, over \$700 billion is spent each year on agricultural subsidies¹²², of which only 15% is targeted at public goods (that is those benefits that are important for society but which are not reflected in market prices, such as biodiversity, capture in soils, clean rivers and beautiful landscapes)¹²³. Land use change, often to convert natural habitats to crops, has had the biggest impact on terrestrial and freshwater biodiversity around the world. Although global food production has increased significantly over recent decades, soil organic carbon and pollinator diversity have declined, indicating that these gains are not sustainable; already land degradation has reduced productivity in 23% of the global terrestrial area¹.

Over 70% of the UK is under some form of agricultural use and farming has shaped many of our iconic landscapes. Practices have, however, changed with shifts to bigger farms and more intensive land-use, leading to declines in farmland biodiversity¹²⁴, pollution of our rivers from nutrient runoff and pesticides, and soil degradation. Many UK farmers are dependent on public subsidy to remain viable¹²⁵, £3.342bn is currently spent on farming subsidies each year in the UK, of which just £501 million is spent on environmentally friendly schemes¹²⁶.

How we can succeed

There is growing evidence that within agricultural landscapes we can achieve the recovery of many species without undermining our ability to produce food through a three-pronged approach: ‘sparing’ some land for nature (i.e. converting it to wildlife habitat and restored ecosystems); ‘sharing’ some land through high nature value farming which both produces food and benefits some species; and having some land under high yield agriculture¹²⁷. The benefits of this approach has recently been advocated in a recent independent review that proposed a National Food Strategy for England, which among many other conclusions pointed out that using the least productive 20 per cent of farmed land primarily for nature conservation and recovery would lead to just a three per cent reduction in food calories produced¹²⁸. This approach does not mean large swathes of the UK being under highly intensive agriculture, rather it envisages a mosaic landscape. Achieving this transition is consistent with four actions needed to deliver our Leaders’ Pledge for Nature commitment:

6.1.1 Reform agricultural subsidies to ensure public money is used for public benefits.

Until recently, the vast majority (c.85%) of the current £3.342 billion in agricultural subsidies provided every year to farmers in the UK was in the form of direct area-based payments, providing income support to UK farmers for doing little more than owning or holding land. In parallel with maintaining the overall level of support, the Government committed to reforming these subsidies so that they are instead directed at a range of public benefits including nature recovery, climate change mitigation and adaptation, water management, air quality improvement, soil management, public access and animal welfare. This transition is now underway.

In England a new Environmental Land Management scheme (ELMs) will have completely replaced the current agricultural support system by 2027. At the end of this transitional period, it is envisaged that an equal third split will be applied to the repurposed budget for environmental land management incentives, covering respectively: farm-level actions, locally-tailored initiatives (such as the establishment of local nature networks) and investments to promote land-use change by creating extensive wildlife habitat. The Welsh Government’s proposed Sustainable Farming Scheme will reward farmers for production of additional non-market goods (improved soils, clean air, clean water, improved habitat condition, actions to reduce global warming) at levels above those set by regulation while a set of National

Minimum Standards will make it easier for farmers to understand the legal requirements with which they must comply. At the start of 2021 the Welsh Government consulted on the legislative framework to support the delivery of future agricultural support, and paying farmers for particular outcomes has been tested (see Box 6.1). In Scotland ‘Piloting an Outcomes-Based Approach’ is testing innovative approaches to delivering environmental outcomes on different types of farms and crofts. In particular, the project is examining the implementation of a less prescriptive, results-based approach in Scotland, where the level of payment received is dependent on the quality of the outcome delivered.

In Northern Ireland, the Future Agricultural Policy Framework Portfolio was published in August 2021. A key outcome of the framework is an agricultural industry that is environmentally sustainable in terms of its impact on, and guardianship of, air and water quality, soil health and biodiversity, while making its fair contribution to achieving net zero carbon targets. In Northern Ireland, pilot projects are being developed to test an outcomes-based approach to future agri-environment support which recognises and rewards the public goods provided by land managers who achieve a verified level of environmental performance.

To achieve nature recovery in the UK, these new types of schemes must form the basis for achieving the changes identified in the next two actions, i.e. delivering large-scale habitat creation and high nature value farmland.

Box 6.1 Llŷn Peninsula - Payment for Outcomes Project.

As part of a Welsh Government funded project on the Llŷn peninsula led by Gwynedd Council, the Llŷn Landscape Partnership has trialled a Payment for Outcomes (PFO) project on farms. The project is learning practical lessons and listening to the farmers involved to inform development of the Welsh Government’s Sustainable Farming Scheme. The selected farms are National Trust tenanted properties of different character where the tenants are open to new approaches on a whole farm basis. Derogations were received to deviate from the standard agricultural payment in favour of taking on an experimental approach. Lessons learned have been exchanged with PFO projects in England to good effect. Central to the approach are agricultural payments that incentivise landowners to produce more benefits for nature. When farmers initially join the scheme they receive modest payments, which then increase in line with nature recovery. Key lessons from Llŷn include the fact that farmers will deliver high nature value benefits where suitable incentives exist; that the whole farm approach means that nature enhancements on one part of a farm do not lead to nature detriments elsewhere; and that the approach works across different habitats. Steps are underway to assess how this pilot project can be expanded and extended elsewhere in Wales.

6.1.2 Deliver large-scale creation of habitats

Establishing large areas of ‘spared’ unfarmed semi-natural habitat is a critical and efficient component of sustainable environmental land management¹²⁹. We need more and bigger spaces for nature. Larger areas support larger, more robust populations, are more physically and biologically diverse and are less sensitive to negative edge effects (see section 5.1). Larger areas are also well suited to delivering multiple benefits for people (Nature-based Solutions) and so may attract private as well as public funding (see Box 6.2). These spaces are likely to become important parts of nature networks, and should be taken into account (and planned for) in integrated spatial frameworks to ensure efficient use of land and to maximise their benefits (section 4.1). There are growing numbers of farms following this approach. For example, the 1600 ha Ken Hill farm in Norfolk is in the process of transforming to a combination of wetland creation, rewilding on formerly unproductive agricultural soils and regenerative agriculture on its productive soils¹³⁰.

Box 6.2 Wild Ennerdale

Located in the iconic Lake District National Park, Wild Ennerdale¹³¹ is a partnership of private and public sectors (the National Trust, Forestry Commission, Natural England and United Utilities) managing 4400 ha of farmland, woodland and moorland cooperatively, pooling their skills and resources and blurring the divisions between landholdings. The project is distinguished by a focus on natural processes shaping the landscape rather than specific objectives, recognising that nature sometimes responds in unpredictable ways. Naturalistic grazing (with controlled numbers of cattle) has replaced intensive sheep grazing across 1500 ha, invasive *Rhododendron ponticum* is being removed, constant-cover forestry is being used along with natural regeneration so that conifer plantations are gradually giving way to native woodland. The valley is an important source of drinking water, but also floodwater which threatens downstream communities, so the restoration of hydrological and fluvial processes in the catchment is an important theme, and this has been effective in reducing flooding (compared to other nearby catchments). This project blurs the boundary between farming and forestry, demonstrating the value of multifunctional land-use and habitat mosaics to achieve optimal ecosystem services.

6.1.3 Incentivise high nature value farming

Important wildlife habitats exist as part of productive farming systems, and some species benefit from certain agricultural practices, such as low-intensity grazing and hedgerow creation. Low intensity farming, supporting the establishment and maintenance of wildlife habitats is often called High Nature Value Farming HN VF, and this has helped create some of the UKs most treasured cultural landscapes. HN VF creates important habitat that can act as stepping-stones and corridors for species to move across the landscape and can help regenerate our soils, locking up more carbon, thereby enhancing soil biodiversity, and helping mitigate climate change. Many of our iconic farmland species (including the flowers of chalk grasslands, hares, ‘common’ farmland birds and upland breeding waders) require some form of continued agricultural management across the landscape to survive¹³².

The production constraints imposed on these low input systems are such that they require bespoke funding arrangements focused on the delivery of public goods, and farmers may also need advice (see Box 6.3). Like “spared land”, the benefits from HN VF are likely to be optimised by careful spatial targeting and coordination, for example by providing buffers around or connectivity between already protected sites and wildlife areas.

Box 6.3 Transition to agroecological approaches, Durie Farms, Leven, Fife

After taking over from his father, Douglas Christie decided to explore ways of future proofing his 570 ha farm. A main objective was to improve soil health, increase soil organic matter and biodiversity. He converted one third of the farm and the livestock enterprise to organic in 2006 and the rest of the conventional arable area has not been ploughed for roughly 20 years.

For the arable enterprise, Douglas tried direct drilling. He incorporated other conservation agricultural principles such as growing cover crops and increasing species grown on the farm for diversity that has led to increased organic matter and improved soil health. Experimentation with companion cropping and intercropping, mixing oilseed rape and cereals with various legumes, such as oats and beans, oilseed rape and peas, vetch and oilseed rape, and peas and barley brought varying degrees of success, he is continuing these practices recognising the greater rewards when they work.

It was difficult getting used to messier fields because it runs against the mainstream norm in farming. For Douglas, it is more important to focus on monitoring the long-term goals of the farm (improving soil fertility by getting more carbon into the soil), rather than short-term profitability, even if there are short-term set-backs, for example in terms of yield. Patience and flexibility are key. Among his new plans, Douglas now wants to further reduce his reliance on artificial nitrogen and other synthetic inputs such as pesticides.

This 'soil-centric' approach to sustainable farming is paying off in a profitable business, with wider environmental benefits.

6.1.4 Improve the efficiency of our farming systems and food chain

Making more space for nature in our landscapes necessarily means intensively farming less land. There is good evidence that this can be done without reducing overall food production. UK agricultural productivity is low compared to most comparator countries and there are huge differences in performance between most and least efficient farm businesses¹³³. If the majority performed nearer the most efficient, similar levels of production could be delivered from less land. Technological developments can deliver further improvements. An assessment of potential yields suggested an upper limit of 1.3% growth per annum, averaged across major UK crop and livestock commodities¹³⁴. Even with projected increases in demand for domestic production, these gains in yield could be sufficient to free-up 4,353,000 ha of land by 2050 across the UK¹³⁵.

Efforts to improve productivity and the opportunities this presents in terms of land sparing/HNVF systems could, however, easily be offset by continuing inefficiencies in the food chain. In the UK about 10 million tonnes of food and drink waste arises post-farmgate each year¹³⁶. The environmental impact of this is significant, both in terms of the land required to produce wasted food (both domestically and imported) and in terms of the additional green-house gas emissions of food disposed of via landfill (annual UK food waste emissions are over 20 million tonnes CO₂e). In future, having an efficient food chain is critical to ensuring that we don't simply 'off shore' the environmental impacts of the food we eat, and achieving that outcome will require action across the whole food system, including the reduction of food waste¹²⁸.

6.2 Fisheries

Summary

Fishing is overexploiting many stocks of fish in the UK and around the world, as well as harming wider marine biodiversity and contributing to climate change. The UK has a new Fisheries Act, which enshrines principles of sustainability that provides us with an important opportunity to change course by:

- Maintaining fish stocks at levels capable of producing *maximum sustainable yield*.
- Reducing wildlife by-catch and entanglement, including of marine mammals and seabirds.
- Ensuring impacts from fisheries are effectively managed throughout UK waters including MPAs to achieve biodiversity and climate outcomes.

Our Leaders' Pledge for Nature Commitment

“Eliminating unsustainable uses of the ocean and its resources, including illegal, unreported and unregulated fishing as well as unsustainable fishing and aquaculture practices... [and] significantly scale-up Nature-based Solutions and ecosystem-based approaches at sea.”
(LPN commitment 4)

Why this matters

Globally, unsustainable fishing (over-exploitation of stock) is the primary cause of biodiversity loss in our seas¹. Around the world, one in three fish stocks that have been assessed are overfished¹³⁷ and unintended by-catch threatens many species such as sharks, seabirds and turtles. A similar situation exists in UK waters, which are home to some of the most important fisheries in Europe, and where over 36% of assessed stocks are reportedly over-fished¹³⁸.

How we can succeed

The UK's Fisheries Act (2020) has eight *Fisheries objectives*¹³⁹ at its heart, six of which have sustainability elements. Two objectives are particularly relevant in the context of the Leaders' Pledge: the *Ecosystem Objective* and the *Climate Change Objective*. The *Ecosystem Objective* expects future fisheries management to be compatible with achieving Good Environmental Status (GES) by not adversely affecting sea-floor integrity, restoring marine food webs, and maintaining commercial fish populations within safe biological limits. *The Climate Change Objective* expects the adverse effects of fishing on climate change to be minimised.

Building on the provisions of the United Kingdom's Fisheries Act (2020), there are a number of important opportunities to achieving sustainable fisheries in the UK.

6.2.1 Maintain fish stocks at levels capable of producing maximum sustainable yield.

In line with The *Precautionary Objective* in the Fisheries Act, catch limits on commercial stocks must be defined so that, once recovered, biomass levels are capable of producing maximum

sustainable yields indefinitely (assuming suitable background conditions). This means achieving the highest possible annual catch that can be sustained over time, by keeping the fish stock at the level producing maximum population growth (enabling the individuals that otherwise would have been added to the population to be harvested). This precautionary approach also needs to be followed to set limits for those fish stocks where we don't have the required time series data, in particular those with currently limited fishing restrictions that are prevalent in UK inshore fisheries. In the case of bluefin tuna *Tunnus Thynnus* the UK is choosing to focus on conservation and evidence generation instead of commercial fisheries (see Box 6.4)

Box 6.4 Bluefin tuna catch and release approach adopted in the UK

The UK has secured a small quota for bluefin tuna as a result of EU exit and subsequent membership of the International Convention for the Conservation of Atlantic tuna. Rather than establishing a commercial fishery for this iconic species, later this year the UK will operate a scientific catch-and-release recreational fishery operating from charter vessels. Skippers will be trained and accordingly licenced to fish, tag and release bluefin tuna. This is a great example of optimising use of our marine biological resource whilst contributing to our scientific understanding of this key species.

6.2.2 Reduce wildlife by-catch and entanglement, including of marine mammals and seabirds

In addition to sustainable harvesting of target stocks, there is a need to manage the impact that fishing has on wildlife species more broadly, whether through capture or entangled in the course of fishing operations or as a result of lost and discarded gear which is a significant contributor to marine plastic litter. These are causes of mortality to a wide range of species both at sea and ashore including through “ghost fishing”¹⁴⁰ (discarded nets continue to catch and kill fish as they drift through the oceans).

Fishing For Litter¹⁴¹ is a UK-wide fishing industry-led initiative to reduce marine litter in our seas by physically removing it and to highlight the importance of good waste management amongst the fleet.

Clean Catch UK¹⁴² and Scottish Entanglement Alliance¹⁴³ are good examples of initiatives that bring together scientists and fishermen to monitor and help reduce the unintended capture of wildlife by commercial fishing vessels, whether through changes in fishing operations and gears or by the use of technological deterrents that may reduce the bycatch of cetaceans, basking shark *Cetorhinus maximus*, turtles and seabirds.

Box 6.5 The Scottish Entanglement Alliance

Entanglement in static fishing gear has been identified as the largest anthropogenic cause of mortality in minke *Balaenoptera acutorostrata* and humpback *Megaptera novaeangliae* whales in Scottish waters. Entanglement also affects basking shark *Cetorhinus maximus* and leatherback turtles *Dermochelys coriacea*. It is of increasing concern from both a welfare and conservation perspective for these species. The Scottish Entanglement Alliance (SEA)¹⁴³ was established to address this through a collaboration between NatureScot, Scottish Marine Animal Stranding Scheme, Scottish Creel Fishermen's Federation, Whale and Dolphin Conservation, Hebridean Whale and Dolphin Trust and British Divers Marine Life Rescue. SEA works closely with the inshore fishing industry to provide a co-ordinated programme of information gathering and engagement to better understand the scale and impact of marine animal entanglements in Scottish waters, and to work towards developing strategies to reduce this.

The work of the SEA has so far:

- Provided an understanding of the distribution, trends and welfare impacts of marine animal entanglements from strandings data;
- Captured fishermen's existing knowledge in relation to fishing operations and the experience of entanglement;
- Gained the fishers' perspective on the issues and potential solutions – including through workshops that were arranged with fishers' from North America to share knowledge and experience.
- Made an assessment of the costs and socio-economic impacts of marine animal entanglement to the Scottish creel fishery.

6.2.3 Ensure impacts from fisheries are effectively managed throughout UK waters including MPAs to achieve biodiversity and climate outcomes.

Marine Protected Areas are a key means of achieving Good Environmental Status in our seas and are the maritime delivery mechanism to achieve the 30by30 target (section 5.1). In terms of geographical coverage the UK has already exceeded the 30% commitment for its seas, but an equally important part of the 30by30 target is that the protected areas are well managed so that they actually deliver their conservation objectives. The development of fisheries management measures for these sites is ongoing in the UK (see Box 6.6).

Under the Fisheries Act, regulators are now provided with the powers to better manage the impact of fishing activities outside MPAs, not just within them. It provides the UK with the powers to make byelaws or orders relating to the exploitation of sea fisheries resources for the purposes of conserving (a) marine flora or fauna, or (b) marine habitats or types of marine habitat and can apply anywhere within the marine area of each country's jurisdiction.

In England, the Marine Management Organisation has acted quickly to use these powers to improve the state of its seas and begun consulting on four MPAs to be managed through this process this year, with another 30+ to follow within three years. This will be an important programme in ensuring that the MPA network is well managed. Here too, the Government has also announced the intention to trial Highly Protected Marine Areas to explore how they can help

with marine ecosystem restoration: such areas could be used to protect essential fish habitats such as spawning or nursery grounds. Also, a large programme referred to as the Revised Approach to Fisheries Management¹⁴⁴ for English waters has led to the introduction of an extensive number of byelaws making fisheries compliant with MPA conservation objectives. Much of the initial focus has been on protecting seabed features such as reef and sandbank, but a logical next step would be to ascertain how much blue carbon is held within MPAs and is also being protected in that network and how fishing impacts on those carbon stores.

In Wales, steps are in place to introduce a new Whelk Order next year to conserve whelk stocks. Whelks are a non-quota non-MPA named species. The order will apply throughout Welsh waters.

To meet the Fisheries Act climate change objective there is a need to minimise the contribution of fishing and aquaculture activities to climate change which could include reducing the release of blue carbon (e.g. as a result of locked-up carbon on the seabed being released by bottom-trawling) inside and outside MPAs. We also need to consider how our MPA network can support species distribution changes as a result of warming seas.

Box 6.6 Fisheries Management measures for Marine Protected Areas

Flapper skate in the Loch Sunart to the Sound of Jura Marine Protected Area

The flapper skate *Dipturus intermedius* is the largest skate in Europe, reaching a length of 2.5m and weighing over 100kg. They are classed as Critically Endangered by the IUCN. They were once widespread and abundant in UK waters but decades of fishing have significantly reduced their numbers and distribution because their shape and size leave them vulnerable to being caught from a young age. In Scotland, flapper skate are mainly restricted to waters off the west coast and around Orkney but are showing signs of recovery throughout their range.

Loch Sunart to the Sound of Jura Nature Conservation MPA was proposed by anglers using tag and release data collected over several decades. The site was designated in 2015 to protect the flapper skate as the area is a stronghold for the species, where resident mature skate may also be breeding. Enhanced fisheries management measures were put in place to provide additional protection. In 2016, it became illegal to fish using towed gears in certain parts of the MPA. In other areas fishing is allowed seasonally, provided tickler chains are removed from trawls to enable fishing whilst protecting the skate.

Research and monitoring using methods such as acoustic tags, photo ID and data provided by charter skippers and anglers through tagging projects dating back more than 30 years has been invaluable in learning more about these skate, their use of the MPA and to support their continued protection.

Restoration of native oysters

Native oysters *Ostrea edulis* are a conservation feature for a number of MPAs and are generally in decline in Northwest Europe. In the Blackwater, Crouch, Roach and Colne Estuaries Marine Conservation Zone in Essex a byelaw has been introduced to protect native oysters and encourage their active restoration e.g. trials of laying culch (broken stones, grit and shells to form new oyster beds) to encourage oyster spat settlement. The Essex Native Oyster Restoration Initiative (ENORI)¹⁴⁵ was formed to support this work and, building on its successes, has since helped establish a UK network for the restoration of native oysters.

6.3 Forestry

Summary

Woodlands have a critical role to play in the UK's transition to a low carbon, high nature and healthy society, while also providing timber. Currently, however, the UK is one of the least-wooded countries in Europe and much of our woodland biodiversity is in decline. We can address this by:

- Increasing the rate of woodland establishment, including via natural regeneration as well as tree planting.
- Ensuring relevant policies, regulations and incentives prioritise nature recovery and other public benefits alongside carbon storage and sequestration.
- Managing and protecting woodlands for nature and making them part of wider nature networks.
- Ensuring more woodland carbon remains locked up, such as by promoting the use of UK wood as construction material.

Our Leaders' Pledge for Nature commitment

“promoting sustainable land and forest management to significantly reduce habitat loss, unsustainable land-use change, deforestation and fragmentation... [and to] significantly scale-up Nature-based Solutions and ecosystem-based approaches”. (LPN commitment 4)

Why this matters

Forests cover 31% of the global land area, about 4.06 billion ha, of which over one-third is primary forest (i.e. naturally regenerating without visible human disturbance). Since 1990, about 420 million ha of forest have been lost through conversion to other land uses, with current rates of loss estimated to be 10 million ha per year¹⁴⁶. These losses are having profound impacts on climate, nature and people. Some experts estimate that forests harbour about 80% of the world's terrestrial species of animals and plants, and over 90% of people living in extreme poverty depend upon forests for at least part of their livelihoods¹.

The UK is one of the most deforested nations on earth. In 1900 woodland covered less than 5% of the land. It now covers 13.2% which is still low compared to the overall European cover of 46%¹⁴⁷, never mind Japan, where the proportion of wooded land is 67%. Today, about half the UK's woodland is comprised of native tree species and about half is planted exotic conifers. Ancient woodland (i.e. woodland that is at least 400 years old), which is often of highest wildlife and cultural value, covers 2.5% of the UK. Many woods are small and isolated, and just 7% are in good ecological condition¹⁴⁸. Consequently, despite the growth in total woodland area, many woodland species are in decline¹¹.

How we can succeed

Woodlands must serve multiple functions: they have a critical role to play in the UK's transition to a low carbon, high nature and healthy society, while also providing timber. The UK government is aiming to increase woodland cover by 30,000 ha per year by 2025 with the ambition of extending woodlands to 18% of our land area by 2050, which would provide annual emissions sequestration of 14 MtCO₂e¹⁴⁹. Woodlands have the highest sequestration rates of any habitat type (although peatlands are the UK's largest natural carbon store, see section 4.2) and their expansion is essential if the UK is to reach net zero.

To succeed in delivering more and better UK woodlands for people, climate and nature we need to:

6.3.1 Increase the rate of woodland establishment, including via natural regeneration as well as tree planting.

Current rates of woodland establishment in the UK are about 13,500 ha per year and this will need to more than double to achieve government targets, through a combination of planting and natural regeneration. To deliver the habitats needed to recover species, we need to create a diversity of woody habitats; ranging from closed canopy woodland and plantations, scrub habitats, hedgerows, orchards, and wood pasture. This will require better integration of trees within our urban and rural landscape, for instance by increased uptake of agro-forestry (see Box 6.7) as well as taking some lower-grade agricultural land out of food production to grow trees. New woodlands can change treasured landscapes, and so involving local communities to secure public support is important (see Box 6.8).

Box 6.7 Agroforestry

Agroforestry involves growing both trees and agricultural/ horticultural crops on the same piece of land. It is designed to provide tree and other crop products while simultaneously diversifying economic opportunities on the farm, improving soil health and enhancing nature. It differs from traditional forestry and agriculture by its focus on the interactions between components rather than just on the individual components themselves.

The Dartington Estate in Devon reports wide benefits from this approach¹⁵⁰:

“Agroforestry increases the overall resilience of our estate. It can provide us with fruit, nuts, timber, biomass and animal fodder in the same space as other crops, increasing the overall yield from the land, and fosters biodiversity through the creation of habitats and food sources. It also builds the economic resilience of farms, as they're able to farm their land vertically as well as horizontally. More trees on the landscape also help improve the soil health of the estate, reducing erosion rates, building up soil organic matter and sequestering carbon, as well as helping manage water more effectively as it moves through the landscape.”

Box 6.8 Black to Green – Community engagement in the National Forest

The National Forest spans over 500km² of England's Midlands and has been created since 1995 by transforming an area formerly characterised by heavy industry and coal mining into a multi-use and accessible forest, so far planting over 8.9 million trees. The landscape around Moira in Leicestershire, in the heart of the National Forest, has seen a dramatic transformation, with abandoned collieries planted with trees to take forest cover from just 1% to nearly 29%. Having targeted forest creation close to communities, the Black to Green project engaged these communities in their transformed landscape (for example, through wildlife recording) developing a strong local ownership of the new woodland, while preserving the legacy of coal mining on which the communities were built. A particular success has been the Youth Landscapers project, which has engaged young people who have no memory of the area's industrial past, using film, photography and sound to interpret their love of the new environment while understanding what came before.

6.3.2 Prioritise nature recovery and other public benefits alongside carbon storage and sequestration.

Policies, regulations and incentives need to ensure the right trees are planted in the right places, and avoiding important existing nature-rich habitats such as species-rich grasslands and peatlands (section 4.2). In some cases, achieving the best combination of benefits for climate change, biodiversity and people is most effectively done by removing trees from the wrong places. For example, the UK is removing plantations from important peatland areas such as Scotland's Flow Country¹⁵¹ to preserve carbon stocks and restore functioning ecosystems. In Wales the National Peatlands Action Programme is funding surveys of afforested peatlands to identify priority areas for restoration, including removing trees. Individual trees outside forests and woodlands can also make an important contribution, for example by enhancing the urban landscape, addressing air pollution, reducing the heat island effect and bringing nature to people (see section 4.1). We must also enlarge existing woodlands and reduce their isolation (section 5.1).

6.3.3 Manage and protect woodlands for nature.

In most cases the ecological condition of woodlands and 'wooded systems' (wood-pastures for example) benefits from management, which replicates the dynamism created by large herbivores in our prehistoric wildwoods (see Box 6.9). To financially support this kind of management, we need to help develop markets for products from a wider range of woodlands to encourage the development of a thriving woodland culture which will bring economic as well as nature recovery benefits. We also need our woods to be robust against climate change, pests and pathogens by selecting resilient native species and genotypes. We can help manage the disease and pest risk through investment in the UK nursery sector, reducing the ingress of new pests and pathogens as well as encouraging natural regeneration. A recent study has shown the rapid establishment of woodlands next to Monks Wood NNR in Cambridgeshire through natural regeneration, partly as a result of acorn hording by birds and rodents¹⁵². Better solutions are required for the damage caused by deer and grey squirrels *Scirius caroliniensis* which have a devastating impact on the ability to grow high quality timber. Deer damage to woodland regeneration especially in the uplands is severe, due to the absence of any natural predators (such as wolves or lynx) landscape-scale control of deer by shooting or fencing is usually necessary to establish new woodland. Domestic stock may also have to be excluded from these areas to allow tree growth.

Box 6.9 Celtic Rainforests

This pan-Wales project¹⁵³, a partnership of Snowdonia National Park, RSPB, the National Trust, Coed Cadw (Woodland Trust) with Natural Resources Wales and Dŵr Cymru supported by EU-LIFE funds works to improve the conservation status of mainly acidic western oak woods (the Celtic Rainforests) across five SACs at a landscape scale.

The project is clearing invasive Rhododendron (which smothers natural woodland regeneration) on 8000 ha of land including nearly 1000 ha of protected sites and is restoring 180 ha of ancient woodland from conifer plantations. A key element is the integration of forestry and agriculture by re-instating traditional light grazing in woodlands that mimics the original dynamic wood-pasture of the prehistoric landscape, producing patches and periods of reduced scrub and understorey to foster internationally important communities of lower-plants (bryophytes and lichens). Celtic Rainforest will leave a legacy of knowledge, local skills and guidance and will influence the development of policy and rural land-management support across Wales.

6.3.4 Ensure more woodland carbon remains locked up.

The carbon benefits of new woodland depend on a wide range of factors, including site conditions, management approach and longevity of the trees and of harvested wood products¹⁵⁴. Fast growing conifers clearly have an important role to play in increasing the supply of domestic timber and sequestering carbon. Their contribution to climate change mitigation is greatest when the wood products store carbon for the long-term or replace carbon intensive alternatives. Presently much UK timber is used in short-lived products, so there is a recognised need both to increase markets for quality UK wood that locks up carbon in the long term and to ensure supply from new forests. Native broadleaved woodlands continue to capture carbon over centuries with important benefits for biodiversity and other ecosystem services, although the rate varies with tree species, age, soil and climate. Old woodlands are also important carbon stores, much of it in the soil, so their protection is vital.

6.4 Pollution and Harmful Chemicals

Summary

Environmental pollution is a major cause of biodiversity loss around the world and in the UK. The main opportunities for progress in the UK are to:

- Tackle atmospheric ammonia and nitrogen deposition through coordinated national and local action, backed by legal limits.
- Reduce diffuse water pollution from agriculture in particular through catchment-level action and coordination across sectors.
- Reduce pesticide impacts and risks, taking account of direct, indirect and sub-lethal effects.
- Ensure evidence-based risk assessment and risk management for chemicals, including legacy risks from industry and from manufactured chemicals that are harmful to our environment.
- Reduce marine plastic through stronger regulation and promoting clean-up of our marine environment including through community action.

Our Leaders' Pledge for Nature commitment

“Significantly reduce pollution in the air, on land, in soil, freshwater and the ocean, in particular by eliminating plastic leakage to the ocean as well as pollution due to chemicals, excess nutrients and hazardous waste”. (LPN commitment 4)

Why this matters

Environmental pollution is one of 5 main global drivers of biodiversity loss, affecting the quality of air, freshwater, soils and seas¹, and many types of pollution are on the increase. For example, plastic in oceans has increased tenfold since 1980, affecting globally 86% of marine turtles, 44% of seabirds and 43% of marine mammals¹. This is bad for nature and people because pollution can have profound impacts on human health, due to harmful substances in the water we drink, the food we eat and the air we breathe¹⁵⁵.

In the UK, we have made mixed progress in tackling pollution. The quality of some rivers and coastal waters has improved in recent years as point-sources of pollution from wastewater treatment plants and industry have been addressed through a combination of regulation and investment from the water industry¹⁵⁶. Excess atmospheric nitrogen deposition (accumulated annual exceedance) across UK habitats has fallen by over 30% since 1996 although the majority of protected areas continue to receive damaging levels of nitrogen deposition¹⁵⁷. However, most rivers and canals across the UK fail to meet the criteria for good or high ecological status, and surveys show increasing amounts of plastic from land and sea-based sources being deposited on UK beaches¹⁵⁸ and on our sea floor¹⁵⁹.

How we can succeed

6.4.1 Tackle ammonia and nitrogen deposition

Ammonia and other active compounds of nitrogen are released into the atmosphere by agriculture, both from the fertiliser we put on our fields, and from intensive livestock units (particularly those rearing pigs, hens and cattle). When this atmospheric nitrogen returns to our land, freshwater systems and seas it is like putting nitrogen fertiliser directly on to natural ecosystems, leading to changes to natural communities where a few species (nettles *Urtica dioica*, brambles *Rubus fruticosus* and some coarse grasses for example) respond vigorously and out-compete many less vigorous species of conservation concern – wild orchids for instance. Atmospheric nitrogen deposition is now the most significant and widespread air pollutant in the UK and is a significant pressure or threat to 87.9% of our Special Areas of Conservation and 57.6% of nitrogen sensitive habitat is thought to be exceeding its critical load (the amount of nitrogen above which damage to the habitat becomes inevitable)¹⁵⁷. Sources of air pollution (particularly ammonia from agriculture) contribute to high background levels as well as having local impacts. To manage these impacts and restore habitat condition, action is needed at international and national level as well as more targeted action at local level. Specifically:

(i) Ambitious and legally binding pollution reduction targets backed by enforcement and a supporting action plan to drive down emissions. In the UK, there is a commitment in the Environment Bill to introduce legally binding air quality targets to protect the environment and human health. The mechanisms to meet targets and deliver reductions will require actions at local and national level, such as the development in Scotland of a national nitrogen budget¹⁶⁰.

(ii) Coordinated action at local or regional level to address impacts on sensitive habitats and sites. Shared Nitrogen Action Plans (see Box 6.10) are being piloted to involve stakeholders in identifying and progressing action locally. Advice and incentives are needed to address ammonia released into the atmosphere from agriculture. Reformed agricultural support schemes across the UK (see section 6.1) are expected to include measures that tackle agricultural air pollution at source, alongside targeted advice from, for example, Catchment Sensitive Farming initiatives¹⁶¹.

Box 6.10 Shared Nitrogen Action Plans

‘Shared Nitrogen Action Plans’ (SNAPs) are currently being piloted in England and a similar approach is being pursued in other UK countries such as the Assessing and Addressing Atmospheric Nitrogen Impacts on Natura 2000 Sites (AAANIS) programme in Wales¹⁶². These approaches involve partnership working with relevant authorities and intensive stakeholder engagement to raise awareness of the issue, to co-design an action plan and identify appropriate measures and to support implementation along feasible timescales. At a site level, they integrate:

- National and international measures which reduce background nitrogen deposition;
- Knowledge of nitrogen deposition rates, including attribution of sources;
- Locally targeted measures that reduce nitrogen emissions close to protected sites, or that intercept deposition to the site, supported by advice and potentially incentive payments; and
- Habitat restoration measures that mitigate the impact of historic and on-going deposition.

6.4.2 Reduce diffuse water pollution from agriculture

The UK habitats with the greatest proportion of protected sites in ‘unfavourable condition’ are water-dependent with rivers and streams being in the worst condition overall. A key driver for this poor condition is diffuse water pollution (DWP) from agriculture including nitrates, phosphates, sediment and pesticides. Polluted water from rivers can also contaminate coastal waters, harming the marine environment. As is the case for air quality, action is needed at national as well as targeted action at local level. The solutions generally lie at the catchment level and there is a need for a layered response, with regulation essential to tackle risky and negligent practices, and advice to direct and encourage the use of high-impact incentives. Action is needed across different sectors and there is emerging evidence for the opportunity for multiple environmental gains through different sectors working together. For example, nutrient trading schemes based on the buying and selling of nutrient allowances between farmers and other stakeholders are under development in the Poole Harbour and the Solent catchments. Nutrient trading schemes set an annual cap on the total amount of leaching of pollutants from land into water to achieve the desired water quality targets. Trading platforms can allow trading between regulated point sources and unregulated non-point sources, such as agriculture. In situations where, to meet the nutrient targets, all relevant stakeholders (such as farmers) need to become fully compliant with mitigation measures, extra tools may be needed to increase uptake, either through increased incentives or through regulation

Advice, for example through Catchment Sensitive Farming, has a role alongside incentives but evidence points to the effectiveness of better enforcement of existing regulation (See Box 6.11). In many catchments, however, further action is needed beyond that achieved through the regulatory baseline, potentially including land use change to achieve the reduction in pollution (especially nutrients) required¹⁶³. Targets for water quality are currently under development as part of the Environment Bill, and these should help drive ambition and adoption of measures to address nutrient pollution from agriculture and wastewater.

Box 6.11 River Axe

The River Axe Special Area of Conservation (SAC) is in unfavourable condition from nutrient enrichment and sediment pollution. Despite over a decade of advisory visits in the period up to 2016, the catchment continued to decline and evidence showed widespread failure to comply with water regulations. The Environment Agency carried out a regulatory farm visit campaign from 2016 to 2019 and, as a result, farmers in the catchment are in the process of constructing 33 slurry stores, 3 silage clamps, 10 fuel stores and have carried out 21 infrastructure repairs, often with government support.

The regulatory approach taken in this catchment could be transferred to other priority catchments in the country to generate similar improvements. A wider modelling exercise has suggested full compliance with baseline regulations could achieve typical reductions in annual average diffuse agricultural losses of 21% for nitrate, 29% for phosphate and 33% for sediment across catchments in England¹⁶⁴.

6.4.3 Reduce pesticide impacts and risks, taking account of direct, indirect and sub-lethal effects

Pesticides can have direct, lethal and sub-lethal effects, as well as indirect effects on wildlife. For example, neonicotinoid insecticides can impact non-target species such as bees¹⁶⁵ and aquatic invertebrates¹⁶⁶. Environmental risks are also apparent for other types of chemicals entering the environment like biocides and veterinary medicines¹⁶⁷.

This year (2021) the UK will publish a National Action Plan for the Sustainable Use of Pesticides, which will have an important role to play in setting meaningful targets and promoting integrated pest management in the UK, to minimise use of pesticides¹⁶⁸. The development of a Pesticide Load Indicator for the UK will provide a potentially important means of evaluating the success of pesticide risk reduction measures, by taking account of data on toxicity and environmental fate (amount of substance applied, potential of harm and likelihood of impact due to persistence or bio-accumulation). Continued, long term environmental monitoring is required to inform decisions by users of pesticides, veterinary medicines and other biocidal products (all of which can find their way into the environment with potential detrimental effects), and the regulatory processes¹⁶⁹. This monitoring needs to include wider environmental impacts (for example, see Box 6.12).

Box 6.12 The Predatory Bird Monitoring Scheme

The Predatory Bird Monitoring Scheme (PBMS)¹⁷⁰ is a long-term national monitoring scheme run by the Centre for Ecology and Hydrology (UKCEH) that examines a range of contaminants in tissues and eggs of certain birds of prey in Britain. PBMS evidence for the high frequency of contamination by second generation anticoagulant rodenticides (SGARs) in key bird of prey species¹⁷¹ has been used to inform the planning and implementation of an industry-led stewardship scheme to encourage the safe use of rodenticides by all professional users¹⁷². A key indicator for the performance of the rodenticide stewardship scheme is the occurrence of residues in sentinel birds of prey species, for example red kites *Milvus milvus* and barn owls *Tyto alba*. Industry has committed to a reduction in levels of wildlife contamination as a goal of the stewardship scheme. The stewardship programme and its associated wildlife contaminant monitoring are now coming close to the point where statistically significant reduction in wildlife exposure as a result of the stewardship campaign may start to become apparent.

6.4.4 Ensure evidence-based risk assessment and risk management for chemicals

Many countries, including the UK, have a legacy of chemicals that are persistent, highly toxic and have the potential to amplify up food chains, with harmful consequences for human health and biodiversity. This includes chemicals produced as part of industrial activity and manufactured chemicals whose impacts were often poorly understood when they were approved for use, and have since caused considerable harm (such as PCBs). We need to learn from these mistakes by ensuring that the environmental risks associated with the development, use and disposal of chemicals (both existing and those developed in the future) are better managed. An appropriate policy and regulatory framework, with risk assessment processes would:

- be based on the precautionary principle;
- have clear links to biodiversity recovery and other environmental goals;
- consider both direct (including sub-lethal) and indirect effects on biodiversity and ecosystem function;

- consider effects at the landscape level;
- be underpinned by a robust evidence base; and
- be underpinned by comprehensive environmental monitoring.

An example of where collaborative action is addressing historic pollution challenges is Wales' Metal Mine remediation programme (see Box 6.13).

Box 6.13 Metal Mine remediation programme

Natural Resources Wales are collaborating with industry experts to carry out remediation of metal mine pollution on numerous abandoned mines in mid and north Wales. Work took place at Frongoch Mine in Ceredigion to reduce concentrations of zinc, lead and cadmium by >80% in the Frongoch Stream, a tributary of the River Ystwyth. Contaminated mine waste dumps were re-shaped and capped with clay and soils to prevent water ingress and to encourage re-vegetation. Drainage channels were built to carry the clean surface water into a series of ponds, creating new wetland habitats. Steeper slopes were hydroseeded with experimental mixtures including biochar and nutrients, and key areas for calaminarian habitat (a rare type of grassland that develops on nutrient poor soils with high levels of heavy metals) and mineralogy were left undisturbed.

The main aim was to improve water quality, but the scheme was designed to maximise biodiversity, through safeguarding of calaminarian habitat and rare lichens as well as creation of new wetlands. Revegetation will also increase carbon capture, while ongoing feasibility studies are considering the use of renewal energy sources for treatment of residual pollution from the mine.

6.4.5 Reduce marine plastic by regulation and promoting community action

In the UK and elsewhere, policy and legislative changes have been effective in reducing plastic waste. For example, litter surveys of the UK's seafloor¹⁵⁸ have shown a decrease in plastic bags following the introduction of a charge for single-use carrier bags. In recent years, UK governments have introduced further bans on plastic microbeads in rinse-off personal care products and some single-use plastic items such as straws and cotton buds. These measures have received considerable support from a public mobilised by the visible harmful effects of plastic waste. Building on these proven approaches, there are a range of opportunities to further reduce marine pollution from plastics:

- Further regulation to reduce single-use plastics in objects like plates and cups, and the introduction of measures to reduce the release of microplastics from car tyres and washing clothes. This could include requiring changes in product materials, or water filtration methods.
- Improved long term monitoring to ensure policy measures are effective, including measures to find and prevent the erosion of former rubbish dumps into rivers or sea.
- Support and expand grass roots and community initiatives determined to tackle plastic waste. Examples exist across the UK including:
 - The ReFill scheme¹⁷³, which has created a network of places across the UK and in

other countries for people to refill drinking bottles, potentially saving over 100 million single-use plastic bottles.

- A movement to be ‘Plastic Free’¹⁷⁴, which has been joined by over 800 communities.
- Coastal communities and visitors mobilising to clean beaches.
- Diving groups taking action to retrieve abandoned fishing nets, such as Fathoms Free¹⁷⁵ and Ghost Fishing UK¹⁴⁰.

6.5 Invasive Non-Native Species (alien species)

Summary

Invasive non-native species are increasing in number and spreading within the UK, causing significant harm to native biodiversity and costing the UK economy an estimated £1.8bn per year. We can reduce this impact by:

- Preventing the introduction of new Invasive Non-Native Species (INNS); this is our top priority because it is far cheaper and better for biodiversity and our economy to prevent INNS from arriving than tackling them afterwards.
- Maintaining early detection and surveillance mechanisms for new INNS and responding rapidly to new incursions.
- Targeted control of established INNS, focussing on those with greatest impact on biodiversity and on our economy.

Our Leaders’ Pledge for Nature commitment

“Enhancing our efforts to reduce the negative impacts of invasive alien species.”
(LPN commitment 4)

Why this matters

Introductions of species to places outside their native ranges are primarily a result of increasing globalisation and associated travel and trade. A minority of animals and plants have escaped from captivity or from gardens, and in the past some were deliberately released by people. Some of these species cause harm, for example by transmitting new diseases or out-competing native species. These ‘invasive non-native species’ (INNS) are a major and increasing driver of biodiversity loss globally, with significant impacts on the economy and human health^{176, 177}.

Within Great Britain, there are an estimated 2,010 non-native species established in the wild¹⁷⁸ although only about 10-15% of these cause significant adverse impacts¹⁷⁹. The number and spread of INNS are both increasing, especially in marine and freshwater environments, and they are estimated to cost the UK economy £1.8 billion per year.

How we can succeed

6.5.1 Prevent the introduction of new Invasive Non-Native Species (INNS) species

Prevention is our top priority; it is far cheaper and better for biodiversity to prevent INNS from arriving than tackling them after this has occurred. In the UK, we have identified key pathways for introduction into the UK and are producing Pathway Actions Plans (PAP)¹⁸⁰ for those seen as highest risk. Many of the key pathways for INNS involve specific groups of people such as gardeners, anglers and boaters. Public awareness campaigns ‘Be Plant Wise’¹⁸¹ and ‘Check Clean Dry’¹⁸² highlight the risks of spread and simple steps that people can take to protect their environment. Prevention is particularly critical for marine species where shipping and recreational boating are inadvertently moving species through hull fouling and ballast water.

6.5.2 Maintain early detection and surveillance mechanisms for new INNS and respond rapidly to new incursions.

Early detection and rapid response are required to manage newly arrived INNS. Non-native species vary in their potential impacts, and the UK’s approach is to follow an interdisciplinary horizon-scanning approach that considers species’ likelihood of arrival and potential to harm the economy and human health alongside their impacts on biodiversity and ecosystems¹⁸³. This enables plans to be put into place to respond to the highest-risk invasions and has proved successful: nine out of the top ten highest risk species identified in a 2014 horizon scanning exercise were detected within the first five years in the UK, enabling rapid preventative action to be taken.

Involving the public in detection efforts has proved successful in the UK, and opportunities exist to significantly increase public awareness and engagement, facilitating early detection of new incursions and responding quickly to outbreaks (see Box 6.14). Genetic approaches have also proven to be successful in early detection of aquatic invasive species¹⁸⁴. Ensuring that there are sufficient resources, capability and appropriate governance structures to act quickly is critical to success.

Box 6.14 Rapid response to tackle Asian hornets

The Asian hornet *Vespa velutina* is an aggressive predator of honeybees and other insects and there is great concern that this species will reach the UK via imported goods or by flying across from continental Europe. The UK has produced a national contingency plan¹⁸⁵ setting out the actions to be taken in response to a suspected or confirmed outbreak of Asian hornets. Between 2016-19, Asian Hornet Action Teams located and destroyed ten nests in England and Wales. A vital part of this success has been making the public aware of the Asian hornet and how to report potential sightings through the Asian Hornet Watch App¹⁸⁶. Without this concerted action it is likely that the predatory hornets would be well on the way to becoming established in the UK, with negative consequences for biodiversity and the economy.

6.5.3 Targeted control of established Invasive Non-Native Species

Once established, INNS are expensive and difficult to manage in the longer-term, unless they can be eradicated from geographically isolated locations, such as islands. Rats have been successfully eradicated from six offshore islands around the UK to protect ground-nesting seabirds, such as puffins *Fratercula arctica* and Manx shearwaters *Puffinus puffinus*. Some of the most ambitious island eradication projects in the world are in Scotland (see Box 6.15), where

this approach has been scaled-up with the aim of removing mink *Neovision vison* from the Outer Hebrides and introduced stoats *Mustela erminea* from Orkney. Plans are also underway for an ambitious eradication programme to remove invasive ferrets and rats from the Rathlin Island, Northern Ireland.

Coordinated action at a landscape-scale can be an effective means of reducing the negative impacts of widely spread invasive species. Examples on the GB mainland include control of mink across the north of Scotland, projects in all four countries to protect red squirrel *Sciurus vulgaris* strongholds from invasion by grey squirrels *Sciurus carolinensis*, and catchment-wide control of invasive plants on rivers throughout the UK. The Scottish Invasive Species Initiative (SISI) is targeting rivers and water courses in partnership with ten fisheries trusts and boards over an area of 29,500 km² of northern Scotland for the next four years to control invasive non-native species¹⁸⁷. The Coastbusters partnership in Kent has undertaken large-scale physical removal of Pacific oysters *Crassostrea gigas* from the most sensitive areas of the shore since 2011 and has been effective at reducing the spread of the species. These projects demonstrate that it is feasible to reduce populations of invasive species to low levels where their negative impacts are reduced. Success has relied on the support of a small army of dedicated volunteers who provide tens of thousands of hours of their time each year.

At times, chemical and mechanical control options are impractical or prohibitively expensive, and the best option is to use nature to help in the fight, through biological control. These approaches typically involve releasing another species that is a specific parasite or predator of the invasive species, following comprehensive screening to ensure no native species will be harmed. Since 2011, the UK has been working with Centre for Agriculture and Bioscience International (CABI) to develop biological control for Japanese knotweed *Fallopia japonica*, Himalayan balsam *Impatiens grandiflora*, Australian swamp stonecrop *Crassula helmsii* and floating pennywort *Hydrocotyle ranunculoides*. This approach is already providing successful in management of the water fern *Azolla filliculoides*¹⁸⁸. In spring 2021, the UK released a biological control agent to suppress the oriental chestnut gall wasp *Dryocosmus kuriphilus*, the most damaging insect pest of chestnut tree species *Castanea spp.* worldwide.

Box 6.15 Eradicating invasive rats from the Shiant Isles

The Shiant Islands, a remote cluster of rugged islands five miles east of the Isle of Lewis and Harris in the Outer Hebrides, is home to one of the most important seabird breeding colonies in Europe, hosting around 100,000 pairs of nesting seabirds each year, including puffins *Fratercula arctica*, razorbills *Alca torda*, and guillemots *Uria aalge*. However, an established population of non-native black rats *Rattus rattus* were eating seabirds' eggs and chicks, having a detrimental impact on their breeding success.

A four-year EU LIFE funded partnership project between the owners, NatureScot, the RSPB and many volunteers assisting the New Zealand-based Wildlife Management International Limited, successfully eradicated the rats to restore the islands as a secure haven for nesting seabirds. No rats have been recorded there since 2018 (two years is the internationally agreed criterion for rat-free status), and the European storm petrel *Hydrobates pelagicus*, a species generally not found on islands with rats, has recently been recorded calling on the Isles for the first time. It is hoped that Manx shearwaters *Puffinus puffinus* will also settle there. The project has played an important role in developing future island restoration and biosecurity methods in the UK.



7 The Time is Now

The Leaders' Pledge for Nature is about change. It's about transforming our relationship with nature from unsustainable exploitation and mutual harm to one of Nature Positive inter-dependence and restoration. It's about reframing how nature, and what it provides, is valued, so that we make better decisions and achieve better outcomes for humankind. We must change from seeing nature as a block on growth, to recognising that investing in nature is not only an 'environmental' priority but essential for sustaining both our society and economy. Our actions for nature and climate change need to work hand-in-hand, in line with the scientific consensus that we need to tackle the biodiversity loss and the climate change crises together, or we will solve neither¹⁸⁹.

Commitments need to lead to action. As described here, the UK already has or is actively developing many of the mechanisms and policies needed to succeed in delivering this agenda of change. There is much cause for optimism that we can succeed in becoming Nature Positive, in particular, by:

- Incorporating green and blue infrastructure alongside 'grey' development to deliver integrated outcomes for health, well-being, nature and our economy. In some parts of the UK, built developments will require net gain for biodiversity.
- Increasing deployment of Nature-based Solutions, notably tree planting, peat restoration and effective coastal and water management, to deliver for climate change and biodiversity.
- Growing financial innovation, including blended approaches where public and private funding can work together to recover nature, and also achieving better traceability and accountability for impacts on nature.
- Improving and expanding our protected areas to underpin nature recovery, improve resilience to climate change, and secure benefits for people.
- Establishing high quality, well-planned nature networks to underpin our 30by30 commitment on land and sea.
- Improving our evidence base to track progress and support better decisions, such as integrated planning on land and at sea, and enabling us to better take account of the value of nature and the services it provides.
- Repurposing harmful agricultural subsidies to ensure that they are directed away from subsidy to payment for the recovery of biodiversity and the delivery of other public benefits.
- Fully implementing the new world-class UK Fisheries Act to achieve an ecosystem-based approach to fisheries management and Good Environmental Status of our seas.
- Introducing legally binding targets in parts of the UK to improve our environment and recover nature.

- Taking a more strategic approach to nature recovery, so that, for example, wider pressures on protected areas arising from distant sources of air and water pollution can be managed alongside the protected area itself, and in so doing achieve better outcomes.

Implemented well, these approaches and delivery commitments have real potential to achieve sustained nature recovery in the UK and more widely in the longer term. However, many of the new approaches we have identified are still under development or being progressively introduced, and so cannot yet be relied upon to deliver a significant contribution towards reversing biodiversity loss by 2030. This is worrying because what happens in the next few years is critical: wildlife habitats are not restored overnight, and newly created habitats will take time to benefit species (and provide other benefits, such as sequestering carbon). Consequently, for species to be increasing by 2030, as much action for habitats as possible needs to be underway in the next 2-3 years. We cannot leave most of the habitat improvements until the end of the decade if we are to succeed.

Does this mean we should just wait and reverse biodiversity loss later than 2030? Absolutely not. Recognising the increasing scale of biodiversity loss and the harm this is causing, we need to focus on taking larger-scale and transformative actions now. It is far easier and cheaper to retain species and their ecosystems, than to re-establish them. Delaying action by a decade would mean it will cost us much more to succeed¹⁹⁰ and over that period much of what we lose will never return. So, delays would mean that our ecosystems become further impoverished and less able to deliver what we need of them. Delay also postpones our ability to benefit: the sooner we invest in restoring our natural capital, the sooner it will pay dividends.

While the transformative changes described in this report are essential in the medium-longer term, becoming Nature Positive by 2030 requires significantly greater action and investment in nature now. There is also a need to ensure the evidence base and necessary frameworks are in place to deliver the more transformational actions. Nine changes can be delivered rapidly, by national and local governments, land owners, businesses and others, that will have particularly high impacts on reversing biodiversity loss this decade (see figure 2):

- 1. Ensure wildlife thrives within SSSIs/ASSIs and Marine Protected Areas** through improving their management and tackling sources of harm. As discussed in this report, many of these special places are currently in poor condition but it will often be much more effective and cheaper to undertake improvements in them – taking account of the need to respond to climate change – than to take action elsewhere. Protected areas will be the beating hearts of nature networks on land and at sea, supporting thriving populations of species that spill out across the rest of the network.
- 2. Better conserve wildlife habitats outside SSSIs/ASSIs, in particular those areas identified as parts of nature networks or as important blue/green infrastructure.** These habitats need better protection and management, and this is needed in both urban and rural settings, securing benefits for people alongside nature.
- 3. Invest in habitat restoration and creation to strengthen nature networks that deliver for biodiversity and climate change.** In particular, we need to create large areas of wildlife habitat with restored ecosystem functions. These areas will often be well-suited to low-intervention management (‘rewilding’) and the delivery of Nature-based Solutions to help mitigate and adapt to climate change, as well as provide other societal benefits. Protected landscapes, such as the UK’s National Parks, are obvious places to start to deliver significant habitat creation, but work must also extend beyond these special landscapes, especially in lowland areas which contain most of the UK’s species but where few large spaces for nature exist.

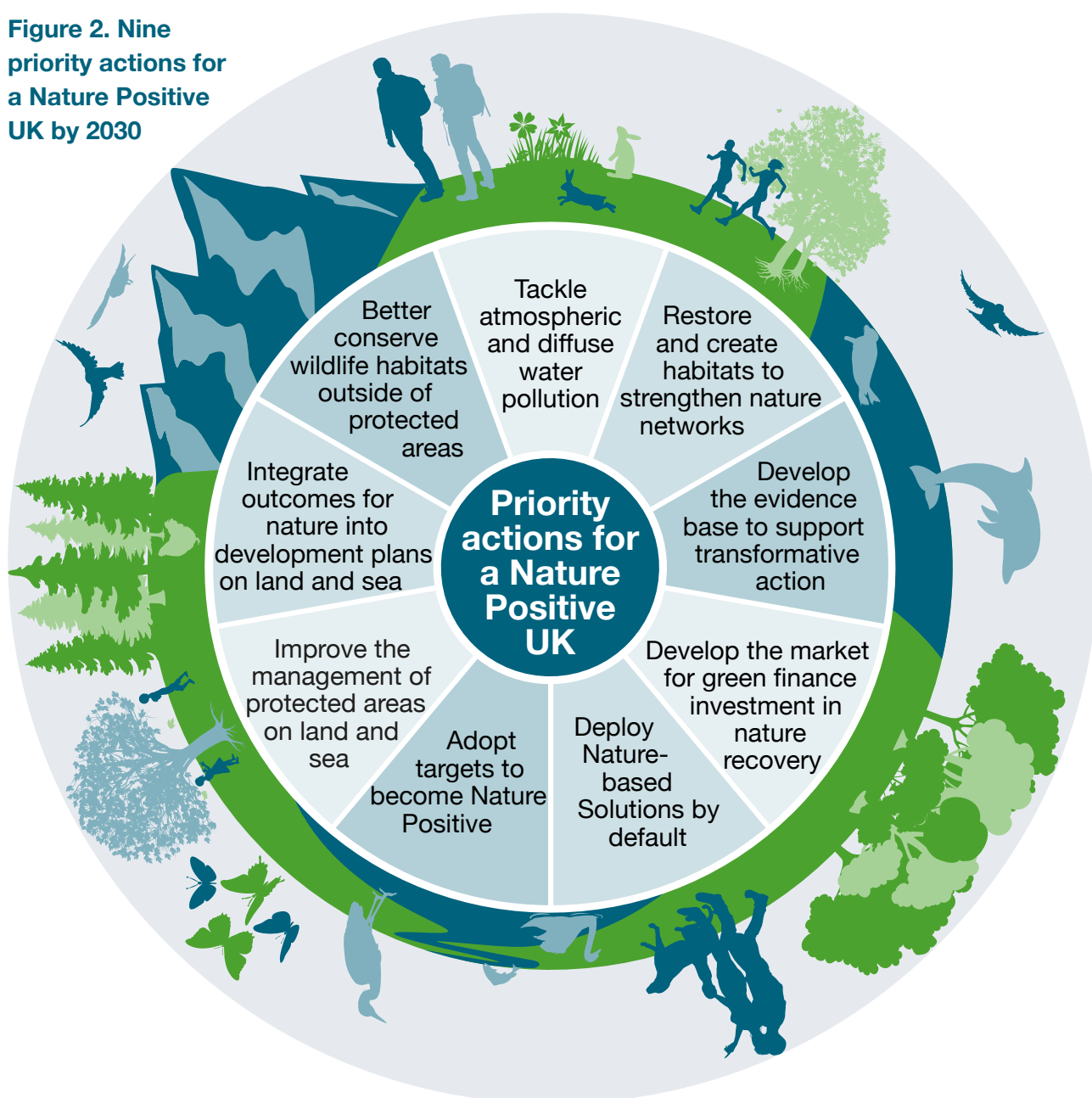
4. **Ensure outcomes for nature are integrated in development plans on land and at sea.** Improve access to nature through the application of appropriate standards for green and blue infrastructure.
5. **Tackle atmospheric and diffuse water pollution, especially from nitrogen and ammonia.** This is driving huge changes across the UK's ecosystems and needs significant coordination of action from agriculture and other sectors.
6. **Develop the market for green finance,** putting in place the frameworks necessary to facilitate private investment in nature recovery, and ensuring there is a supply of investable on-the-ground projects.
7. **Deploy Nature-based Solutions by default.** Decision makers need to ask themselves 'can nature provide a solution?' when seeking to respond to climate change and other societal problems.
8. **Develop the UK's evidence base so that it ready to support the larger, transformative changes underway.** For example, a robust accessible evidence base is essential to enable better integrated planning on land and at sea; facilitate businesses, investors and others to take account of nature's value; and accurately track progress towards our nature goals and targets.
9. **Adopt targets to become Nature Positive.** Nature goals need to be put on an equal footing with climate change ambitions, reflecting the need to tackle the crises of biodiversity loss and climate change together, or we will tackle neither.

We have expanded upon the rationale behind these critical investments in earlier sections, but there are four further points worth making. Firstly, the UK's approach to nature conservation outside protected sites for the past thirty years has, in many areas, been characterised by 'renting' (actually and metaphorically) patches for nature within our farmed landscapes, often for quite short periods of time. This has not worked well for most species, and we now need to invest in maintaining and establishing large spaces for nature and nature networks where more species thrive. Secondly, the nature 'conservation' that we are pursuing is not about going back to a nostalgic point in the past. It is about building a nature-rich future, with restored ecosystems that are more resilient to climate change, and that are better able to help us cope with those changes. Thirdly, becoming Nature Positive by 2030 is not an end-point but an essential milestone on the path to nature recovery. Finally, making space for nature in the UK must not mean taking space from nature in other countries. The UK needs to reduce its global biodiversity footprint, not least by securing sustainable food production in the UK and addressing the considerable inefficiencies in our food supply¹²⁸.

There is good evidence that a decade of concerted action, with an early start, will make a real difference, including numerous examples of dramatic nature recovery over this timescale. For example:

- In less than a decade after beginning to 'rewild' the previously intensively farmed Knepp Estate in Southern England, it supported healthy populations of some of the UK's threatened species, and within two decades it has become widely recognised as an exemplar in nature recovery.
- At Lyme Bay in Dorset, there have been dramatic signs of recovery of sea-bed fauna and flora within ten years of halting bottom-trawling, including the growth of pink sea fans *Eunicella verrucosa*.

Figure 2. Nine priority actions for a Nature Positive UK by 2030



- Woodland management, naturalization of rivers and wetland systems and grazing control through the Cairngorms Connect partnership has led to a rapid recovery of vibrant native flora in huge areas of the Cairngorms National Park.

Changing course quickly to become Nature Positive by 2030 is possible but will require significant investment. Many countries, including the UK, have committed to building back better as we recover from the Covid pandemic. Yet, of the \$15 trillion being mobilised globally to recover from Covid, only 3% is benefitting nature¹⁹¹. Re-focussing more of this recovery investment provides a fantastic opportunity to rapidly recover nature and build a fairer and better future, while also increasing opportunities for ‘green’ employment¹⁹².

In the Foreword of this paper, we heard voices of young people calling for bold and urgent action to recover nature. They have appealed for the world to change course to secure their futures and that of life on our planet. It has never been more important for governments, businesses and others to respond and become Nature Positive. **Nature recovery is within our grasp: we know what to do and how to do it. The time to act is now!**

8 List of Abbreviations

30by30	Protecting 30% of land and sea for nature by 2030
AONB	Area of Outstanding Natural Beauty
ASSI	Area of Special Scientific Interest (Northern Ireland)
AAANIS	Assessing and Addressing Atmospheric Nitrogen Impacts on Natura 2000 Sites
BECCS	Bioenergy with carbon capture
BftB	Back from the Brink programme
BDMLR	British Divers Marine Life Rescue
bn	Billion
CABB	Cooperation Across Borders for Biodiversity
CABI	Centre for Agriculture and Bioscience International
CANN	Collaborative Action for the Nature Network
CCC	Committee on Climate Change
CITES	Convention on International Trade in Endangered Species
CO₂	Carbon dioxide
CO₂ e	Carbon dioxide equivalent, used to compare emissions from various greenhouse gases
COP15	The 15th Conference of the Parties of the United Nations Convention on Biological Diversity (expected to be held in Kunming, China in October 2021 and April-May 2022)
COP26	The 26th Conference of the Parties of the United Nations Framework Convention on Climate Change (expected to be held in Glasgow, UK in November 2021)
CSGN	Central Scotland Green Network
DLL	District Level Licencing
DNA	Deoxyribonucleic acid
DWP	Diffuse water pollution
eDNA	Environmental Deoxyribonucleic acid
EES	England Ecosystem Survey
ELM	Environmental Land Management
ELMs	Environmental Land Management scheme
EMFF	European Maritime and Fisheries Fund
ENORI	Essex Native Oyster Restoration Initiative

EU	European Union
EES	England Ecosystem Survey
GES	Good Environmental Status (marine)
G7	An international intergovernmental economic organization consisting of seven major developed countries: Canada, France, Germany, Italy, Japan, the United Kingdom and the United States.
GB	Great Britain
GDP	Gross Domestic Product
Gt	Gigatons
GHP	Green Health Partnership
GCN	Great Crested Newt <i>Cristatus trituris</i>
ha	Hectares
HWDT	Hebridean Whale and Dolphin Trust
HPMA	Highly Protected Marine Area
HNVF	High nature value farming
IUCN	International Union for the Conservation of Nature
INNS	Invasive Non-Native Species (also known as Alien species)
IPDC	Irish Peat Development Company
JNCC	Joint Nature Conservation Committee
Km	Kilometre
Km²	Square kilometre
LNRS	Local Nature Recovery Strategies
LPN	Leaders' Pledge for Nature
PBMS	Predatory Bird Monitoring Scheme
m³	Cubic metre
MPA	Marine Protected Area
MtC/MtCO₂	Metric Tonnes/ Metric Tonnes of Carbon dioxide
NDC	Nationally Determined Contribution
NbS	Nature-based Solution
NCAI	Natural Capital Asset Index
NCEA	Natural Capital and Ecosystem Assessment
NGO	Non-governmental organisation
NNR	National Nature Reserve
NRN	Nature Recovery Network
NRW	Natural Resources Wales
NSA	National Scenic Areas (Scotland)

OECM	Other Effective area-based Conservation Measures
OSPAR	The Convention for the Protection of the Marine Environment of the North-East Atlantic
OWF	Offshore Wind Farm
PAP	Pathway Action Plans
PCB	Polychlorinated biphenyl
PCC	Peatland Carbon Code
PBMS	Predatory Bird Monitoring Scheme
PFO	Payment for Outcomes
RENs	Resilient Ecological Networks (Wales)
RSPB	Royal Society for the Protection of Birds
SAC	Special Area of Conservation
SCFF	Scottish Creel Fishermen's Federation
SEA	Scottish Entanglement Alliance
SGARs	Second Generation Anticoagulants Rodenticides
SISI	Scottish Invasive Species Initiative
SNAPs	Site Nitrogen Action Plans
SMART	Specific, Measurable, Achievable, Relevant and Time-bound
SMASS	Scottish Marine Animal Stranding Scheme
SMMNR	Sustainable Management of Marine Natural Resources
SoNoRR	State of Natural Resources Report (Wales)
SSSI	Site of Special Scientific Interest
SUD	Sustainable drainage system
TCFD	Task Force on Climate-related Financial Disclosures
TNFD	Task Force for Nature-related Financial Disclosures
UK	United Kingdom
UKCEH	United Kingdom Centre for Ecology and Hydrology
UN	United Nations
WCC	Woodland Carbon Code
WDC	Whale and Dolphin Conservation
WNMP	Welsh National Marine Plan
WG	Welsh Government

9 References and Notes

- 1 IPBES (2019). *Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services*. Bonn, Germany: IPBES secretariat. DOI: 10.5281/zenodo.3553579.
- 2 Bulman, C.R., *et al.* (2007). 'Minimum viable metapopulation size, extinction debt, and the conservation of a declining species', *Ecological Applications*, 17, pp. 1460-1473. DOI: 10.1890/06-1032.1.
- 3 Armstrong, A., *et al.* (2021). Why Society Needs Nature: Lessons from Research during Covid-19. Available at: https://www.forestresearch.gov.uk/documents/8053/Why_Society_Needs_Nature_4FUC2GT.PDF. (Accessed: 10 August 2021).
- 4 Leaders Pledge for Nature (2020). *Leaders Pledge for Nature*. Available at: <https://www.leaderspledgefornature.org/>. (Accessed: 6 July 2021).
- 5 High Ambition Coalition (N.D). Available at: <https://www.hacfornatureandpeople.org/home>. (Accessed: 4 August 2021).
- 6 This report relates to nature conservation in the four countries of the UK (England, Scotland, Wales and Northern Ireland). It does not cover nature conservation in the UK Crown Dependencies or Overseas Territories; however, The UK Joint Nature Conservation Committee (JNCC) will continue to work with them to enable the delivery of effective nature conservation in the years to come.
- 7 JNCC (2021). *Northern Gannet (Morus bassanus)*. Available at: <https://jncc.gov.uk/our-work/northern-gannet-morus-bassanus/>. (Accessed: 12 July 2021).
- 8 WWF (2020). *Living Planet Report 2020 - Bending the curve of biodiversity loss*. Gland, Switzerland: WWF. Available at: <https://f.hubspotusercontent20.net/hubfs/4783129/LPR/PDFs/ENGLISH-FULL.pdf>. (Accessed: 3 August 2021).
- 9 Dasgupta, P. (2021). *The Economics of Biodiversity: The Dasgupta Review*. London: HM Treasury. Available at: <https://www.gov.uk/government/publications/final-report-the-economics-of-biodiversity-the-dasgupta-review>. (Accessed: 3 August 2021).
- 10 Newbold, T., *et al.* (2016). *Dataset: Global map of the Biodiversity Intactness Index*. Natural History Museum Data Portal. DOI: 10.5519/0009936.
- 11 Hayhow, D.B., *et al.* (2019). *The State of Nature 2019*. The state of Nature Partnership. Available at: <https://www.bto.org/sites/default/files/publications/state-of-nature-2019-report-uk.pdf>. (Accessed: 21 July 2021).
- 12 RSPB (2012). *The state of the UK's birds 2012*. Available at: http://ww2.rspb.org.uk/Images/SUKB_2012_tcm9-328339.pdf. (Accessed: 15 August 2021).
- 13 Mathews, F. and Harrower, C. (2020). *IUCN – compliant Red List for Britain's Terrestrial Mammals*. Assessment by the Mammal Society under contract to Natural England, Natural Resources Wales and Scottish Natural Heritage. Peterborough: Natural England, ISBN 978-1-78354-734-0. Available at: <https://www.mammal.org.uk/science-research/red-list/>. (Accessed: 3 August 2021).
- 14 Bar-On Y.M., Phillips, R. and Milo, R. (2018). The biomass distribution on Earth. *Proceedings of the National Academy of Sciences*, 115, pp. 6506-6511. DOI: 10.1073/pnas.1711842115.
- 15 Natural England (2010). *Lost life: England's lost and threatened species*. NE233 Available at: <http://publications.naturalengland.org.uk/publication/32023>. (Accessed: 12 July 2021).
- 16 Friedlingstein, P., *et al.* (2020). Global Carbon Budget 2020. *Earth Syst. Sci. Data*, 12, pp. 3269–3340. DOI: 10.5194/essd-12-3269-2020.
- 17 United Nations Environment Programme (2020). *Emissions Gap Report 2020*. Nairobi: UNEP. Available at: <https://www.unep.org/emissions-gap-report-2020>. (Accessed: 3 August 2021).
- 18 IUCN (2021). *Nature-based Solutions for people and planet*. Available at: <https://www.iucn.org/theme/nature-based-solutions>. (Accessed: 7 August 2021).
- 19 United Nations Environment Programme (2018). *Inclusive Wealth Report 2018: Measuring Sustainability and Well Being*. Available at: <https://www.unep.org/resources/report/inclusive-wealth-report-2018#:~:text=Inclusive%20Wealth%20Report%202018%2021%20November%202018%20The,sustainability%20of%20economy%20and%20wellbeing%20of%20their%20people>. (Accessed: 12 August 2021).
- 20 JNCC (2012). *UK Post-2010 Biodiversity Framework (2012–2019)*. Peterborough: JNCC. Available at: <https://hub.jncc.gov.uk/assets/587024ff-864f-4d1d-a669-f38cb448abdc>. (Accessed: 12 July 2021).
- 21 G7 Cornwall UK (2021). *G7 2030 Nature Compact*. Available at: <https://www.g7uk.org/wp-content/uploads/2021/06/G7-2030-Nature-Compact-PDF-120KB-4-pages.pdf>. (Accessed: 23 July 2021).

- 22 Convention on Biological Diversity (2020). *Post 2020 Documents*. Available at: <https://www.cbd.int/conferences/post2020/post2020-prep-01/documents>. (Accessed: 7 August 2021).
- 23 World Health Organisation (2021). *Nature, biodiversity and health: an overview of interconnections*. Copenhagen: WHO Regional Office for Europe. Available at: <https://apps.who.int/iris/bitstream/handle/10665/341376/9789289055581-eng.pdf?sequence=1&isAllowed=y>. (Accessed: 12 July 2021).
- 24 Settele, J., et al. (2020). *COVID-19 Stimulus Measures Must Save Lives, Protect Livelihoods, and Safeguard Nature to Reduce the Risk of Future Pandemics*. Available at: <https://ipbes.net/covid19stimulus>. (Accessed: 12 July 2021).
- 25 Lovell, R., Depledge, M. and Maxwell, S. (2018). *Health and the natural environment: A review of evidence, policy, practice and opportunities for the future*. London: DEFRA. Available at: <http://hdl.handle.net/10871/36923>. (Accessed: 12 July 2021).
- 26 Royal College of Physicians (2018). *Reducing air pollution in the UK: Progress report 2018*. Available at: <https://www.rcplondon.ac.uk/news/reducing-air-pollution-uk-progress-report-2018>. (Accessed: 14 July 2021).
- 27 Wang, H., et al. (2019). Efficient Removal of Ultrafine Particles from Diesel Exhaust by Selected Tree Species: Implications for Roadside Planting for Improving the Quality of Urban Air. *Environ. Sci. Technol*, 12, pp. 6906–6916. DOI: 10.1021/acs.est.8b06629.
- 28 Knight, T., et al. (2021). How effective is ‘greening’ of urban areas in reducing human exposure to ground-level ozone concentrations, UV exposure and the ‘urban heat island effect’? An updated systematic review. *Environ Evidence*, 10, 12. DOI: 10.1186/s13750-021-00226-y.
- 29 Susdrain (2021). *The benefits of distributed SuDS in London*. Available at: https://www.susdrain.org/files/resources/briefings/2105_briefing_the_benefits_of_distributed_suds_in_london_final.pdf. (Accessed: 4 August 2021).
- 30 Belfast City Council (2020). *‘Belfast Green and Blue Infrastructure Plan 2020’*. Available at: https://www.pacni.gov.uk/sites/pacni/files/media-files/BCC-AD-GBIP_0.pdf. (Accessed: 4 August 2021).
- 31 Natural England (2010). *‘Nature Nearby’ Accessible natural greenspace guidance*. Available at: www.ukmaburbanforum.co.uk/documents/other/nature_nearby.pdf. (Accessed 16 August 2021).
- 32 Natural Resources Wales (2021). *Green spaces*. Available at: <https://naturalresources.wales/about-us/what-we-do/green-spaces/?lang=en>. (Accessed: 4 August 2021).
- 33 Central Scotland Green Network (2021). Available at: <http://www.centralscotlandgreennetwork.org/>. (Accessed: 4 August 2021).
- 34 Greater Manchester Combined Authority (2020). *Greater Manchester Strategy- Our people, Our Place*. Available at: <https://www.greatermanchester-ca.gov.uk/what-we-do/greater-manchester-strategy/> (Accessed: 10 August 2021).
- 35 Greater Manchester Combined Authority (2019). *Five-Year Environment Plan*. Available at: https://www.greatermanchester-ca.gov.uk/media/1975/5_year_plan_exec_summ_digital.pdf. (Accessed: 10 August 2021).
- 36 Greater Manchester Combined Authority (2021). *The Places for Everyone Joint Development Plan- Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford, Wigan Publication Plan*. Available at: <https://www.greatermanchester-ca.gov.uk/what-we-do/planning-and-housing/strategic-infrastructure/>. (Accessed: 10 August 2021).
- 37 Scottish Government (2020). *Sectoral marine plan for offshore wind energy*. Available at: <https://www.gov.scot/publications/sectoral-marine-plan-offshore-wind-energy/>. (Accessed: 20 July 2021).
- 38 Welsh Government (2019). *Welsh National Marine Plan*. Available at: https://gov.wales/sites/default/files/publications/2019-11/welsh-national-marine-plan-document_0.pdf. (Accessed 13 August 2020).
- 39 Public Health England (2020). *Improving access to greenspace A new review for 2020*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904439/Improving_access_to_greenspace_2020_review.pdf. (Accessed: 13 July 2021).
- 40 White, M.P., et al. (2019). Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Scientific reports*, 9, 7730. DOI: 10.1038/s41598-019-44097-3.
- 41 The Ramblers’ Association (2021). *The grass isn’t greener for everyone: why access to green space matters*. Available at: <https://www.ramblers.org.uk/news/latest-news/2020/september/the-grass-isnt-greener-for-everyone.aspx>. (Accessed: 4 August 2021).
- 42 Europarc Federation (2021). *Health parks healthy people*. Available at: <https://www.europarc.org/nature/healthy-parks-healthy-people-europe/>. (Accessed: 14 July 2021).
- 43 The Ramblers’ Association (2021). *Walking for Health*. Available at: <https://www.walkingforhealth.org.uk/>. (Accessed: 20 July 2021).
- 44 United Nations (2015). *Paris Agreement*. Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf. (Accessed: 23 July 2021).
- 45 IPCC (2021). *Summary for Policymakers*. In: *Climate Change 2021: The Physical Science Basis*. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://www.ipcc.ch/report/ar6/wg1/downloads/report/IPCC_AR6_WGI_SPM.pdf. (Accessed: 10/08/2021).
- 46 Gregg, R., et al. (2021). *Carbon storage and sequestration by habitat: a review of the evidence*. Natural England Research Report NERR094. York: Natural England. Available at: <http://publications.naturalengland.org.uk/publication/5419124441481216>. (Accessed: 3 August 2021).

- 47 Climate Change Committee (2020). *The Sixth Carbon Budget The UK's path to Net Zero*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/12/The-Sixth-Carbon-Budget-The-UKs-path-to-Net-Zero.pdf>. (Accessed: 13 August 2021).
- 48 IPCC (2019). *Special Report on the Ocean and Cryosphere in a Changing Climate*. Available at: www.ipcc.ch/srocc/. (Accessed: 11 August 2021).
- 49 Office for National statistics (2016). *UK Natural Capital: Experimental carbon stock accounts, preliminary estimates*. Available at: <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapital/experimentalcarbonstockaccountspreliminaryestimates>. (Accessed: 23 July 2021).
- 50 Artz, R., et al. (2020). *The State of UK Peatlands: an update*. Available at: https://www.iucn-uk-peatlandprogramme.org/sites/default/files/2020-01/IUCN_S~1.PDF. (Accessed: 11 August 2021).
- 51 NatureScot (2020). *Peatland ACTION plan*. Available at: <https://www.nature.scot/climate-change/nature-based-solutions/peatland-action-project>. (Accessed: 11 August 2021).
- 52 Cairngorms National Park (2021). *Mountains & Moorlands Work*. Available at: <https://cairngorms.co.uk/caring-future/cairngorms-landscapes/landscape-conservation/mountains-moorlands/>. (Accessed: 11 August 2021).
- 53 Natural Resources Wales (2020). *National Peatland Action Programme, 2020-2025*. Available at: <https://cdn.cyfoethnaturiol.cymru/media/692545/national-peatlands-action-programme.pdf>. (Accessed: 13 August 2021).
- 54 Department for Environment, Food & Rural Affairs (2021). *England Peat Action Plan*. Available at: <https://www.gov.uk/government/publications/england-peat-action-plan>. (Accessed: 21 July 2021).
- 55 Climate Change Committee (2021). *Progress in adapting to climate change 2021 Report to Parliament*. Available at: <https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-adapting-to-climate-change-2021-Report-to-Parliament.pdf>. (Accessed: 23 July 2021).
- 56 Stafford, R., et al. (eds) (2021). *Nature-based Solutions for Climate Change in the UK: A Report by the British Ecological Society*. London, UK: British Ecological Society. Available at: <https://www.britishecologicalsociety.org/policy/nature-based-solutions/read-the-report/>. (Accessed: 23 July 2021).
- 57 McAlinden, M. (2015). *Managed realignment at Alkborough Flats, Lincolnshire*. Available at: <https://www.ice.org.uk/knowledge-and-resources/case-studies/managed-realignment-at-alkborough-flats-lincoln>. (Accessed: 7 August 2021).
- 58 Connswater community greenway (2012). Available at: <http://www.connswatergreenway.co.uk/>. (Accessed: 4 August 2021).
- 59 Betts, R.A. and Brown, K. (2021). 'Introduction' in: *The Third UK Climate Change Risk Assessment Technical Report*. London: Climate Change Committee. Available at: <https://www.ukclimaterisk.org/wp-content/uploads/2021/06/Technical-Report-The-Third-Climate-Change-Risk-Assessment.pdf>. (Accessed: 23 July 2021).
- 60 Natural England and RSPB (2020). *Climate Change Adaptation Manual*, (NE751). York: Natural England. Available at: <http://publications.naturalengland.org.uk/publication/5679197848862720>. (Accessed: 23 July 2021).
- 61 Duffield, S.J., Le Bas, B. and Morecroft, M.D. (2021). Climate change vulnerability and the state of adaptation on England's National Nature Reserves. *Biological Conservation*, 254, 108938. DOI: 10.1016/j.biocon.2020.108938.
- 62 OECD (2020). *A Comprehensive Overview of Global Biodiversity Finance*. Available at: <https://www.oecd.org/environment/resources/biodiversity/report-a-comprehensive-overview-of-global-biodiversity-finance.pdf>. (Accessed: 4 August 2021).
- 63 Waldron, A., et al. (2020). 'Protecting 30% of the planet for nature: costs, benefits and economic implications'. Available at: https://www.conservation.cam.ac.uk/files/waldron_report_30_by_30_publish.pdf. (Accessed: 4 August 2021).
- 64 JNCC (2020). 'E2. Expenditure on UK and international biodiversity' in JNCC (ed.) *UK Biodiversity Indicators 2020*. Available at: <https://jncc.gov.uk/our-work/ukbi-e2-biodiversity-expenditure/>. (Accessed: 4 August 2021).
- 65 RSPB, The National Trust and The Wildlife Trusts. (2019). 'Paying for public goods from land management: How much will it cost and how might we pay?'. Available at: <https://www.wildlifetrusts.org/sites/default/files/2019-09/Paying%20for%20public%20goods%20final%20report.pdf>. (Accessed: 4 August 2021).
- 66 Griscom, B.W., et al. (2017). 'Natural climate solutions', *Proceedings of the National Academy of Sciences*, 114(44), pp. 11645 - 11650. DOI: 10.1073/pnas.1710465114.
- 67 Scottish Environmental Protection Agency and Scottish Wildlife Trust (2020). *The 1 Billion Challenge*. Available at: https://naturalcapitalscotland.com/docs/070_553_202001_1_billion_challenge_document_final_1600442580.pdf. (Accessed: 4 August 2021).
- 68 Green Finance Institute, Finance Earth and Broadway Initiative (2020). *Financing UK Nature Recovery: Putting nature onto a sustainable financial path in 2021*. Available at: <https://financingnaturerecovery.uk/>. (Accessed: 10 August 2021).
- 69 International Monetary Fund (2019). *Global Financial Stability Report: Lower for Longer*. Washington, DC: IMF. Available at: <https://www.imf.org/en/Publications/GFSR/Issues/2019/10/01/global-financial-stability-report-october-2019>. (Accessed: 3 August 2021).
- 70 UNEP Finance Initiative and PRI (Principles for Responsible Investment) (2019). *Fiduciary Duty in the 21st Century: Final Report*. Available at: <https://www.unepfi.org/wordpress/wp-content/uploads/2019/10/Fiduciary-duty-21st-century-final-report.pdf>. (Accessed: 10 August 2021).
- 71 Task Force on Climate-related Financial Disclosures (2021). *Proposed Guidance on Climate-related Metrics, Targets, and Transition Plans*. Available at: https://assets.bbhub.io/company/sites/60/2021/05/2021-TCFD-Metrics_Targets_Guidance.pdf. (Accessed: 20 July 2021).

- 72 HM Treasury (2020). *Chancellor sets out ambition for future of UK financial services*. Available at: <https://www.gov.uk/government/news/chancellor-sets-out-ambition-for-future-of-uk-financial-services>. (Accessed: 20 July 2021).
- 73 Taskforce on Nature-related Financial Disclosures (2021). *TFND*. Available at: <https://tnfd.info/>. (Accessed: 20 July 2021).
- 74 Science Based Targets Network (2020). *We enable companies and cities to play a vital role in creating an equitable, nature positive, net-zero future using science-based targets*. Available at: <https://sciencebasedtargetsnetwork.org/>. (Accessed: 20 July 2021).
- 75 For example see: https://www.climatebonds.net/files/reports/policy_taxonomy_briefing_conference.pdf; <https://www.unpri.org/policy/eu-sustainable-finance-taxonomy>. (Accessed: 9 August 2021).
- 76 HM Treasury (2021). *New independent group to help tackle 'greenwashing'*. Available at: <https://www.gov.uk/government/news/new-independent-group-to-help-tackle-greenwashing>. (Accessed: 11 August 2021).
- 77 World Economic Forum (2020). *Nature Risk Rising: Why the Crisis Engulfing Nature Matters for Business and the Economy*. Available at: <https://www.weforum.org/reports/nature-risk-rising-why-the-crisis-engulfing-nature-matters-for-business-and-the-economy>. (Accessed: 23 July 2021).
- 78 UK National Ecosystem Assessment (2011). *The UK National Ecosystem Assessment Technical Report*. Cambridge: UNEP-WCMC. Available at: <http://uknea.unep-wcmc.org/Resources/tabid/82/Default.aspx>. (Accessed: 3 August 2021).
- 79 Yorkshire Water (2021). *The Six Capitals in our Decision-Making Framework*. Available at: https://www.yorkshirewater.com/media/yvfkhdq/yorkshire_water_dmf_website_case_study.pdf. (Accessed: 23 July 2021).
- 80 Water Industry Forum (2020). *NATURAL CAPITAL PRINCIPLES FOR THE WATER INDUSTRY*. Available at: http://www.waterindustryforum.com/documents/uploads/WIF_Natural_Capital_Principles_for_the_Water_Industry.pdf. (Accessed: 4 August 2021).
- 81 Lear, R., et al. (2020). *Natural Capital Atlases: Mapping Indicators for County and City Regions, Natural England Commissioned Report*, 318.
- 82 OxCam Local Natural Capital Plan (2021). *Local Natural Capital Plan for the Oxford to Cambridge Arc*. Available at: <https://www.oxcamlncp.org/>. (Accessed: 23 July 2021).
- 83 HM Treasury (2020). *The Green Book*. Available at: <https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-government/the-green-book-2020>. (Accessed: 23 July 2021).
- 84 Waters, R. D., et al. (2012). *Delivering the ecosystem approach on the ground – an evaluation of the upland ecosystem service pilots*. *Natural England Research Reports*, 046.
- 85 Clarke, S.J., et al. (2015). *Valuing the ecosystem service changes from catchment restoration: A practical example from upland England*. *Ecosystem Services*, 15, pp. 93-102.
- 86 NatureScot (2020). *Natural Capital Asset Index*. Available at: <https://www.nature.scot/professional-advice/planning-and-development/social-and-economic-benefits-nature/natural-capital-asset-index>. (Accessed: 23 July 2021).
- 87 Space Intelligence (2021). *We've just published the first ever Scotland-wide high resolution habitat maps, for free*. Available at: <https://www.space-intelligence.com/2021/04/01/weve-just-published-the-first-ever-scotland-wide-high-resolution-habitat-maps-for-free/>. (Accessed: 4 August 2021).
- 88 ONS (2020). *UK Natural Capital Accounts: 2020 – Estimates of the financial and societal value of natural resources to people in the UK*. Statistical Bulletin. Available at: <https://www.ons.gov.uk/economy/environmentalaccounts/bulletins/uknaturalcapitalaccounts/2020>. (Accessed 18 August 2021).
- 89 Vivid Economics, Derry City and Strabane District Council and Carnegie Trust (2019). *Derry City and Strabane District Council's Owned Green & Blue Spaces Natural Capital Account*. Available at: <https://www.derrystrabane.com/getattachment/Subsites/Parks-and-Open-Spaces/GI/v1-NCA-Final-Report.pdf>. (Accessed: 4 August 2021).
- 90 Sunderland, T., et al. (2019). *Accounting for National Nature Reserves: A natural capital account of the National Nature Reserves managed by Natural England*. *Natural England Research Report*, 78.
- 91 Natural Capital Committee (2020). *Final Response to the 25 Year Environment Plan Progress Report*. Available at: <https://www.gov.uk/government/groups/natural-capital-committee>. (Accessed 18 August 2021).
- 92 Natural Resources Wales. 2020. *State of Natural Resources Report (SoNaRR)*. Natural Resources Wales. Available at: <https://cdn.cyfoethnaturiol.cymru/media/693209/sonarr2020-executive-summary.pdf>. (Accessed 18 August 2021).
- 93 Watson, J.E.M., et al. (2014). 'The performance and potential of protected areas', *Nature*, 515, pp. 67–73. DOI: 10.1038/nature13947.
- 94 De Lamo, X., et al. (2020). *Strengthening synergies: how action to achieve post-2020 global biodiversity conservation targets can contribute to mitigating climate change*. Cambridge, UK: UNEP-WCMC. Available at: <https://www.unep-wcmc.org/resources-and-data/strengthening-synergies>. (Accessed: 3 August 2021).
- 95 Dinerstein, E., et al. (2019). 'A Global Deal For Nature: Guiding principles, milestones, and targets', *Science Advances*, 5(4), eaaw2869. DOI: 10.1126/sciadv.aaw2869.
- 96 Other Effective area-based Conservation Measures (OECMs) are areas that may be managed for many different objectives but must deliver effective nature conservation. In the UK, OECMs include areas where biodiversity is a primary focus, such as nature reserves managed for the long-term by environmental organisations, and may include other areas where nature is a secondary consideration such as military training areas.
- 97 UNEP-WCMC and IUCN (2021). *Protected Planet Report 2020*. Cambridge UK: UNEP-WCMC and IUCN. Available at: <https://livereport.protectedplanet.net/>. (Accessed: 9 June 2021).

- 98 JNCC (2020). 'C1. Protected areas' in JNCC (ed.) *UK Biodiversity Indicators 2020*. Available at: <https://jncc.gov.uk/our-work/ukbi-c1-protected-areas/>. (Accessed: 21 July 2021).
- 99 Crick, H.Q.P., et al. (2020). *Nature Networks Evidence Handbook*. Natural England Research Report NERR081. York: Natural England. Available at: <http://publications.naturalengland.org.uk/publication/6105140258144256>. (Accessed: 11 August 2021).
- 100 Natural England (2015). *Improvement programme for England's Natura 2000 sites (IPENS): Summary report*. ISBN 978-1-78367-185-4. Available at: <https://www.gov.uk/government/publications/improvement-programme-for-englands-natura-2000-sites-ipens-summary-report>. (Accessed: 10 August 2021).
- 101 Glover, J. (2019). *Landscapes review*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/833726/landscapes-review-final-report.pdf. (Accessed: 17 August 2020).
- 102 Department for Environment, Food & Rural Affairs (2019). *Marine strategy part one: UK updated assessment and Good Environmental Status*. Available at: <https://www.gov.uk/government/publications/marine-strategy-part-one-uk-updated-assessment-and-good-environmental-status>. (Accessed: 21 July 2021).
- 103 Department for Environment, Food & Rural Affairs (2020). *Benyon review Into Highly Protected Marine Areas: Final report - executive summary*. Available at: <https://www.gov.uk/government/publications/highly-protected-marine-areas-hpma-review-2019/benyon-review-into-highly-protected-marine-areas-final-report-executive-summary#fn:1>. (Accessed: 21 July 2021).
- 104 Duigan, C., et al. (2020). *Terrestrial Nature Networks in the UK – A Review*. JNCC Report No. 659. Peterborough: JNCC. Available at: <https://data.jncc.gov.uk/data/e78e5e3c-e506-40d8-a3f8-a3e49f2bc29d/JNCC-Report-659-FINAL-WEB.pdf>. (Accessed: 3 August 2021).
- 105 Hanski, I. (1999). *Metapopulation Ecology*. Oxford University Press, Oxford.
- 106 JNCC (2020). MPA network assessments. Available at: <https://jncc.gov.uk/our-work/mpa-network-assessments/>. (Accessed 13 August 2021).
- 107 Welsh Government (2020). *The Nature Recovery Action Plan for Wales 2020 – 21*. Available at: <https://gov.wales/sites/default/files/publications/2020-10/nature-recovery-action-plan-wales-2020-2021.pdf>. (Accessed: 11 August 2021).
- 108 Natural Resources Wales (2021). *Practitioners' guide to Resilient Ecological Networks*. Available at: <https://naturalresources.wales/guidance-and-advice/environmental-topics/land-management/practitioners-guide-to-resilient-ecological-networks/?lang=en>. (Accessed: 11 August 2021).
- 109 Cairngorms Connect (2021). Available at: www.cairngormsconnect.org.uk. (Accessed: 11 August 2021).
- 110 Alliance for Scotland's Rainforest (N.D). Available at: <https://savingscotlandsrainforest.org.uk>. (Accessed: 11 August 2021).
- 111 Species are listed on the schedules of the Wildlife and Countryside Act (1995), as amended, for England, Scotland and Wales and The Wildlife (Northern Ireland) Order 1985 (the Order) and The Wildlife (Amendment) (Northern Ireland) Order 1995, as amended, for Northern Ireland.
- 112 NatureScot (2020). *Perils in Peril*. Available at: <https://www.nature.scot/professional-advice/protected-areas-and-species/protected-species/life-nature-and-biodiversity-projects/pearls-peril>. (Accessed: 11 August 2021).
- 113 Natural England (Biodiversity 2020 - Terrestrial Biodiversity Group) (2014). *Section 41 Species - Priority Actions Needed (B2020-008) - Priority Actions Spreadsheet*. Available at: <http://publications.naturalengland.org.uk/publication/4958719460769792>. (Accessed: 11 August 2021).
- 114 Back from the brink (2021). *The Projects*. Available at: <https://naturebftb.co.uk/>. (Accessed: 21 July 2021).
- 115 Stringer, A.P. and Gaywood, M.J. (2016). The impacts of beavers *Castor* spp. on biodiversity and the ecological basis for their reintroduction to Scotland, UK. *Mammal Review*, pp. 270-283. DOI: org/10.1111/mam.12068.
- 116 NatureScot (2021). *Beaver Management Report for 2020*. Available at: <https://www.nature.scot/doc/beaver-management-report-2020>. (Accessed: 13 August 2021).
- 117 Devon Wildlife Trust (2021). *Beavers in the wild*. Available at: <https://www.devonwildlifetrust.org/beavers-wild>. (Accessed: 4 August 2021).
- 118 Tree, I (2019). *Wilding: The return to Nature to an English Farm*. Picador, London. ISBN 9781509805105.
- 119 Department for Environment, Food & Rural Affairs, The Scottish Government, Department of Agriculture, Environment and Rural Affairs and Welsh Government (2020). *UK Biodiversity Indicators 2020*. Department for Environment, Food and Rural Affairs, London. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/926506/UKBI-2020-A.pdf. (Accessed: 7 August 2021).
- 120 Natural England (2020). *The People and Nature Survey*. Available at: <https://www.gov.uk/government/collections/people-and-nature-survey-for-england>. (Accessed: 7 August 2021).
- 121 Department for Environment, Food & Rural Affairs (2019). *At a glance: summary of targets in our 25 year environment plan*. Available at: <https://www.gov.uk/government/publications/25-year-environment-plan/25-year-environment-plan-our-targets-at-a-glance>. (Accessed: 7 August 2021).
- 122 OECD (2020). *Agricultural Policy Monitoring and Evaluation 2020*. Paris: OECD Publishing. Available at: https://www.oecd-ilibrary.org/sites/928181a8-en/1/2/1/index.html?itemId=/content/publication/928181a8-en&csp=_2101acf3044857a6975685747086cf09&itemIdGO=oecd&itemContentType=book. (Accessed: 21 July 2021).

- 123 The Food and Land Use Coalition (2019). *Growing Better: Ten Critical Transitions to Transform Food and Land Use*. Available at: <https://www.foodandlandusecoalition.org/wp-content/uploads/2019/09/FOLU-GrowingBetter-GlobalReport.pdf>. (Accessed: 21 July 2021).
- 124 Department for Environment, Food & Rural Affairs (2018). *Health and Harmony: the future for food, farming and the environment in a Green Brexit*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/684003/future-farming-environment-consult-document.pdf. (Accessed: 21 July 2021).
- 125 Department for Environment, Food & Rural Affairs (2018). *Moving away from Direct Payments*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/740669/agri-bill-evidence-slide-pack-direct-payments.pdf. (Accessed: 21 July 2021).
- 126 Department for Environment, Food and Rural Affairs; Department of Agriculture, Environment and Rural Affairs; Welsh Government, Knowledge and Analytical Services; The Scottish Government, Rural and Environment Science and Analytical Service (2020). *Agriculture in the United Kingdom 2019*. pp. 103–104. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/950618/AUK-2019-07jan21.pdf. (Accessed: 21 July 2021).
- 127 Feniuk, C., Balmford, A. and Green, R.E. (2019). 'Land sparing to make space for species dependent on natural habitats and high nature value farmland'. *Royal Society*, 286(1909). DOI: 10.1098/rspb.2019.1483.
- 128 National Food Strategy (2021). Available at: <https://www.nationalfoodstrategy.org/>. (Accessed: 4 August 2021).
- 129 Finch, T., et al. (2019). *Assessing the utility of land sharing and land sparing for birds, butterflies and ecosystem services in lowland England*. Natural England Commissioned Report 280. York: Natural England. Available at: <http://publications.naturalengland.org.uk/publication/6157279470813184>. (Accessed: 3 August 2021).
- 130 Wild Ken Hill (2020). Available at: <https://wildkenhill.co.uk/>. (Accessed: 4 August 2021).
- 131 Wild Ennerdale (2021). Available at: <http://www.wildennerdale.co.uk/>. (Accessed: 4 August 2021).
- 132 Finch, T., et al. (2020). 'Evaluating spatially explicit sharing-sparing scenarios for multiple environmental outcomes', *Journal of Applied Ecology*, 58(3), pp. 655–666. DOI: 10.1111/1365-2664.13785.
- 133 Thirtle, C., et al. (2004). 'Explaining the decline in UK agricultural productivity growth', *J. Agricultural economics.*, 55, pp. 343–366. DOI: 10.1111/j.1477-9552.2004.tb00100.x.
- 134 Lamb, A., et al. (2016). 'The potential for land sparing to offset greenhouse gas emissions from agriculture', *Nature Climate Change*, 6, pp. 488–492. DOI: 10.1038/nclimate2910.
- 135 Lamb, A., et al. (2019). 'The consequences of land sparing for birds in the United Kingdom', *Journal of Applied Ecology*, DOI: 10.1111/1365-2664.13362.
- 136 WRAP (2017). *Estimates of Food Surplus and Waste Arisings in the UK (2017)*. pp. 13. Available at: <https://wrap.org.uk/resources/report/estimates-food-surplus-and-waste-arisings-uk-2017>. (Accessed: 23 July 2021).
- 137 Food and Agriculture Organization of the United Nations (2018). *The state of world fisheries and aquaculture 2018: Meeting the sustainable development goals*. Rome, Italy: FAO. Available at: <https://reliefweb.int/sites/reliefweb.int/files/resources/I9540EN.pdf>. (Accessed: 12/07/2021).
- 138 OCEANA (2021). *UK Fisheries Audit 2021*. Available at: <https://europe.oceana.org/en/uk-fisheries-audit-2021>. (Accessed: 4 August 2021).
- 139 The eight Fisheries objectives are: sustainability, precautionary, ecosystem, scientific evidence, bycatch, equal access, national benefit and climate change.
- 140 Ghost Fishing UK (N.D). Available at: <https://www.ghostfishing.co.uk/>. (Accessed: 26 July 2021).
- 141 Fishing for Litter (N.D). Available at: www.fishingforlitter.org.uk/what-is-fishing-for-litter. (Accessed: 11 August 2021).
- 142 Clean Catch UK (2021). Available at: <https://www.cleancatchuk.com/>. (Accessed: 4 August 2021).
- 143 Scottish Entanglement Alliance (2018). Available at: <https://www.scottishentanglement.org/>. (Accessed: 4 August 2021).
- 144 Marine Management Organisation (2014). *Revised approach to the management of commercial fisheries in European Marine Sites: overarching policy and delivery*. Available at: <https://www.gov.uk/government/publications/revised-approach-to-the-management-of-commercial-fisheries-in-european-marine-sites-overarching-policy-and-delivery>. (Accessed: 11 August 2021).
- 145 Essex Native Oyster Restoration Initiative (2021). Available at: <https://essexnativeoyster.com/>. (Accessed: 4 August 2021).
- 146 Food and Agriculture Organization of the United Nations and United Nations Environment Programme (2020). *The State of the World's Forests 2020*. Forests, biodiversity and people. Rome, Italy: FAO. DOI: 10.4060/ca8642en.
- 147 Forest Research (2015). *Forest cover: international comparisons*. Available at: <https://www.forestresearch.gov.uk/tools-and-resources/statistics/forestry-statistics/forestry-statistics-2018/international-forestry/forest-cover-international-comparisons/>. (Accessed: 23 July 2021).
- 148 Reid, C., et al. (2021). *State of the UK's Woods and Trees 2021*. Grantham: Woodland Trust. Available at: <https://www.woodlandtrust.org.uk/state-of-uk-woods-and-trees/>. (Accessed: 26 July 2021).
- 149 Climate Change Committee (2020). *Land Use: Policies for a Net Zero UK*. Committee on Climate Change. London, UK. Available at: <https://www.theccc.org.uk/publication/land-use-policies-for-a-net-zero-uk/>. (Accessed 11 August 2021).
- 150 Dartington Trust (2020). *Agroforestry at Dartington*. Available at: <https://www.dartington.org/about/our-land/agroforestry/>. (Accessed: 11 August 2021).

- 151 The Flows (Bringing LIFE Back to the Bogs) (2021). Available at: <https://www.iucn-uk-peatlandprogramme.org/projects/flows-bringing-life-back-bogs>. (Accessed: 6 August 2021).
- 152 Broughton, R.K., *et al.* (2021). 'Long-term woodland restoration on lowland farmland through passive rewilding', *PLoS One*, 16(6), e0252466. DOI: 10.1371/journal.pone.0252466.
- 153 Celtic Rainforest Wales (2021). Available at: <https://celticrainforests.wales/>. (Accessed: 6 August 2021).
- 154 Morison, J., *et al.* (2012). *Understanding the carbon and greenhouse gas balance of forests in Britain*. Edinburgh: Forestry Commission. Available at: <https://www.forestresearch.gov.uk/documents/953/FCRP018.pdf>. (Accessed: 3 August 2021).
- 155 Sutton, M.A., *et al.* (2011). *The European Nitrogen Assessment*. Cambridge Univ. Press, Cambridge UK.
- 156 The Environment Agency (2020). *River basin planning: Challenges and Choices consultation*. Available at: https://consult.environment-agency.gov.uk/environment-and-business/challenges-and-choices/supporting_documents/Challenges%20and%20Choices%20PDF.pdf. (Accessed: 12 August 2021).
- 157 Rowe, W., *et al.* (2019). 'Trends Report 2019: Trends in critical load and critical level exceedances in the UK. Report to Defra under Contract AQ0843, CEH Project NEC05708. Available at: http://www.cldm.ceh.ac.uk/sites/cldm.ceh.ac.uk/files/2019%20TRENDS%20Report_corrected.pdf. (Accessed: 14 September 2021).
- 158 Nelms, S.E., *et al.* (2017). 'Marine anthropogenic litter on British beaches: A 10-year nationwide assessment using citizen science data', *Science of the Total Environment*, 579, pp. 1399 – 1409. DOI: 10.1016/j.scitotenv.2016.11.137.
- 159 Maes, T., *et al.* (2018). 'Below the surface: Twenty-five years of seafloor litter monitoring in coastal seas of North West Europe (1992–2017)', *Science of the Total Environment*, 630, pp. 790 - 798. DOI: 10.1016/j.scitotenv.2018.02.245.
- 160 Scottish Government (2021). *Establishing a Scottish Nitrogen Balance Sheet: consultation analysis*. Available at: <https://www.gov.scot/publications/establishing-scottish-nitrogen-balance-sheet-analysis-responses-public-consultation/pages/8/>. (Accessed: 26 July 2021).
- 161 Natural England, Department for Environment, Food & Rural Affairs and Environment Agency (2021). *Catchment Sensitive Farming: reduce water and air pollution*. Available at: <https://www.gov.uk/guidance/catchment-sensitive-farming-reduce-agricultural-water-pollution>. (Accessed: 6 August 2021).
- 162 Carnerll, E.J. and Dragosits, U. (2015). *Assessing and Addressing Atmospheric Nitrogen Impacts on Natura 2000 Sites in Wales (AAANIS) Project Report*. Available at: <https://naturalresources.wales/media/674560/life-n2k-aaanis-report.pdf>. (Accessed: 15 August 2021).
- 163 Environment Agency (2020). *River basin planning: Challenges and Choices consultation*. Available at: https://consult.environment-agency.gov.uk/environment-and-business/challenges-and-choices/supporting_documents/Challenges%20and%20Choices%20PDF.pdf. (Accessed: 19 August 2021).
- 164 Gooday R., *et al.* (2020). 'Regulatory Measures to Tackle Diffuse Agricultural Pollution at Natura 2000 Sites (Defra-Funded Project Wt15109)'. *Department of Environment Food and Rural Affairs*, ADAS, WRc. Pp 77.
- 165 Woodcock, B.A., *et al.* (2016). Impacts of neonicotinoid use on long-term population changes in wild bees in England. *Nature Communications*, 7, pp 291 - 303. DOI: 10.1038/NCOMMS12459.
- 166 Morrissey, C.A., *et al.* (2015). Neonicotinoid contamination of global surface waters and associated risk to aquatic invertebrates: A review. *Environment International*, 74, pp. 291 -303. DOI: 10.1016/j.envint.2014.10.024.
- 167 Perkins, R., *et al.* (2021). 'Potential role of veterinary flea products in widespread pesticide contamination of English rivers', *Science of the Total Environment*, 755 (1), 143560. DOI: 10.1016/j.scitotenv.2020.143560.
- 168 Department for Environment, Food & Rural Affairs (2020). *Consultation on the 'Revised National Action Plan for the Sustainable Use of Pesticides (Plant Protection Products)'*. Available at: https://consult.defra.gov.uk/pesticides-future-strategy/sustainable-use-of-pesticides-national-action-plan/supporting_documents/NAPConsultationDocument.pdf. (Accessed: 26 July 2021).
- 169 Milner, A.M. and Boyd, I.L. (2017). 'Toward pesticidovigilance', *Science*, 357, pp. 1232 – 1234. DOI: 10.1126/science.aan2683.
- 170 Predatory Bird Monitoring Scheme (N.D). Available at: <https://pbms.ceh.ac.uk>. (Accessed: 11 August 2021).
- 171 Shore, R.F., *et al.* (2017). *Second generation anticoagulant rodenticide residues in barn owls*. Wallingford, UK: CEH. Available at: https://pbms.ceh.ac.uk/sites/default/files/stewardship-2017-owls_FINAL.pdf. (Accessed: 26 July 2021).
- 172 Think Wildlife (N.D). *Stewardship*. Available at: <https://www.thinkwildlife.org/stewardship-regime/>. (Accessed: 7 August 2021).
- 173 Refill (2020). *Life with less plastic, made easy*. Available at: <https://www.refill.org.uk/>. (Accessed: 26 July 2021).
- 174 Surfers Against Sewage (2021). *Plastic Free Communities*. Available at: <https://plasticfree.org.uk>. (Accessed: 26 July 2021).
- 175 Fathoms Free (N.D). Available at: <https://www.fathomsfree.org/ghostgear>. (Accessed: 26 July 2021).
- 176 Díaz, S., *et al.* (2019). 'Pervasive human-driven decline of life on Earth points to the need for transformative change', *Science*, 366, eaax3100. DOI: 10.1126/science.aax3100.
- 177 Seebens, H., *et al.* (2017). 'No saturation in the accumulation of alien species worldwide', *Nature communications*, 8, 14435. DOI: 10.1038/ncomms14435.
- 178 JNCC (2020). 'B6. Pressure from invasive species' in JNCC (ed.) *UK Biodiversity Indicators 2020*. Available at: <https://jncc.gov.uk/our-work/ukbi-b6-invasive-species/>. (Accessed: 26 July 2021).

- 179 Department for Environment, Food & Rural Affairs (2015). *The Great Britain Invasive Non-native Species Strategy*. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/455526/gb-non-native-species-strategy-pb14324.pdf. (Accessed: 26 July 2021).
- 180 GB Non-native species secretariat (2021). *Pathway Action Plans*. Available at: <http://www.nonnativespecies.org/index.cfm?pageid=586>. (Accessed: 26 July 2021).
- 181 GB Non-native species secretariat (2021). *Be plant wise*. Available at: <http://www.nonnativespecies.org/beplantwise/>. (Accessed: 26 July 2021).
- 182 GB Non-native species secretariat (2021). *Check, Clean, Dry*. Available at: <http://www.nonnativespecies.org/checkcleandry/index.cfm>. (Accessed: 26 July 2021).
- 183 Roy, H.E., Peyton, J. and Rorke, S. (2019). *Horizon-scanning for invasive alien species with the potential to threaten biodiversity and ecosystems, human health and economies in Britain*. Wallingford, UK: Centre for Ecology & Hydrology. Available at: <http://www.nonnativespecies.org/index.cfm?pageid=611>. (Accessed: 26 July 2021).
- 184 Blackman, R.C., Hänfling, B. and Lawson Handley, L. (2018). *The use of environmental DNA as an early warning tool in the detection of new freshwater invasive non-native species*. CABI Reviews, 12. Wallingford, UK: CABI. DOI: org/10.1079/PAVSNNR201813010.
- 185 Animal Plant and Health Agency (N.D) *Beebase, Contingency planning*. Available at: <https://nationalbeeunit.com/index.cfm?pageid=206>. (Accessed: 10 August 2021).
- 186 GB Non-native species secretariat (2021). Asian Hornet. Available at: <http://www.nonnativespecies.org/alerts/index.cfm?id=4>. (Accessed: 26 July 2021).
- 187 Scottish Invasive Species Initiative (N.D). Available at: <https://www.invasivespecies.scot/about-us>. (Accessed: 15 August 2021).
- 188 Department for Environment, Food & Rural Affairs, Welsh Government, Natural England and CABI (2020). *Progress with Weed Biocontrol Projects*. Available at: <https://www.cabi.org/wp-content/uploads/CABI-weed-biocontrol-Public-Summary-WFD-Jan-2020final.pdf>. (Accessed: 7 August 2021).
- 189 IPBES and IPCC (2021). *Biodiversity and climate change: Scientific outcome*. Available at: https://ipbes.net/sites/default/files/2021-06/20210609_scientific_outcome.pdf. (Accessed: 26 July 2021).
- 190 HM Treasury (2021). *The Urgency of Biodiversity Action*. Available at: https://www.nhm.ac.uk/content/dam/nhmwww/our-science/our-work/biodiversity/predicts/the_urgency_of_biodiversity_action.pdf. (Accessed: 7 August 2021).
- 191 UNEP (2021). *Green shoots: Are COVID-19 recovery funds helping the environment?* Available at: <https://www.un.org/africarenewal/news/green-shoots-are-covid-19-recovery-funds-helping-environment>. (Accessed: 26 July 2021).
- 192 Edgar, J., et al. (2021). *Green Renewal – The Economics of Enhancing the Natural Environment*. Middlesex, England: WPI Economics Limited. Available at: https://green-alliance.org.uk/resources/Green_renewal_WPI.pdf. (Accessed: 26 July 2021).

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