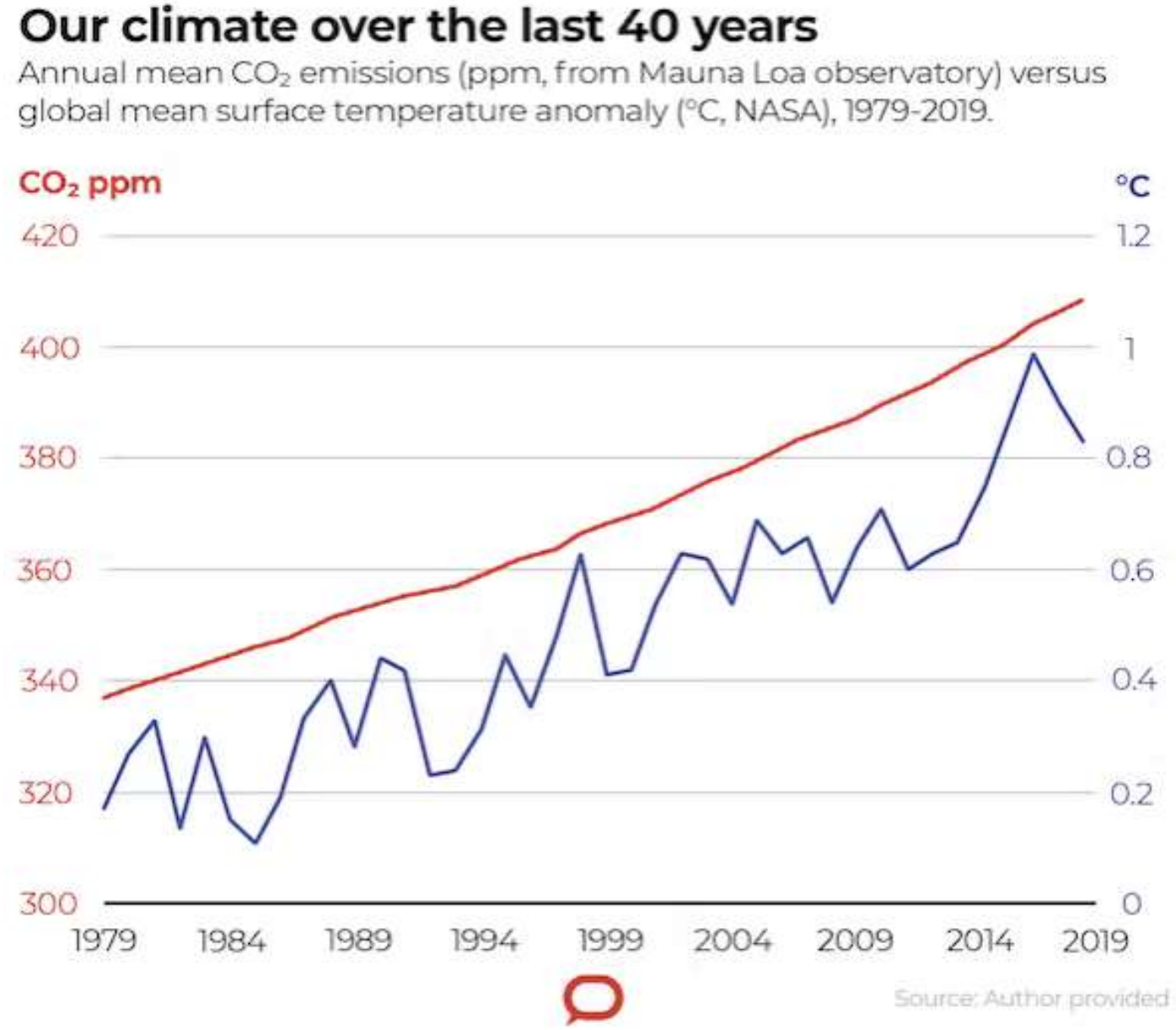
Climate, Biodiversity and Health

Kate Bailey 25 November 2022

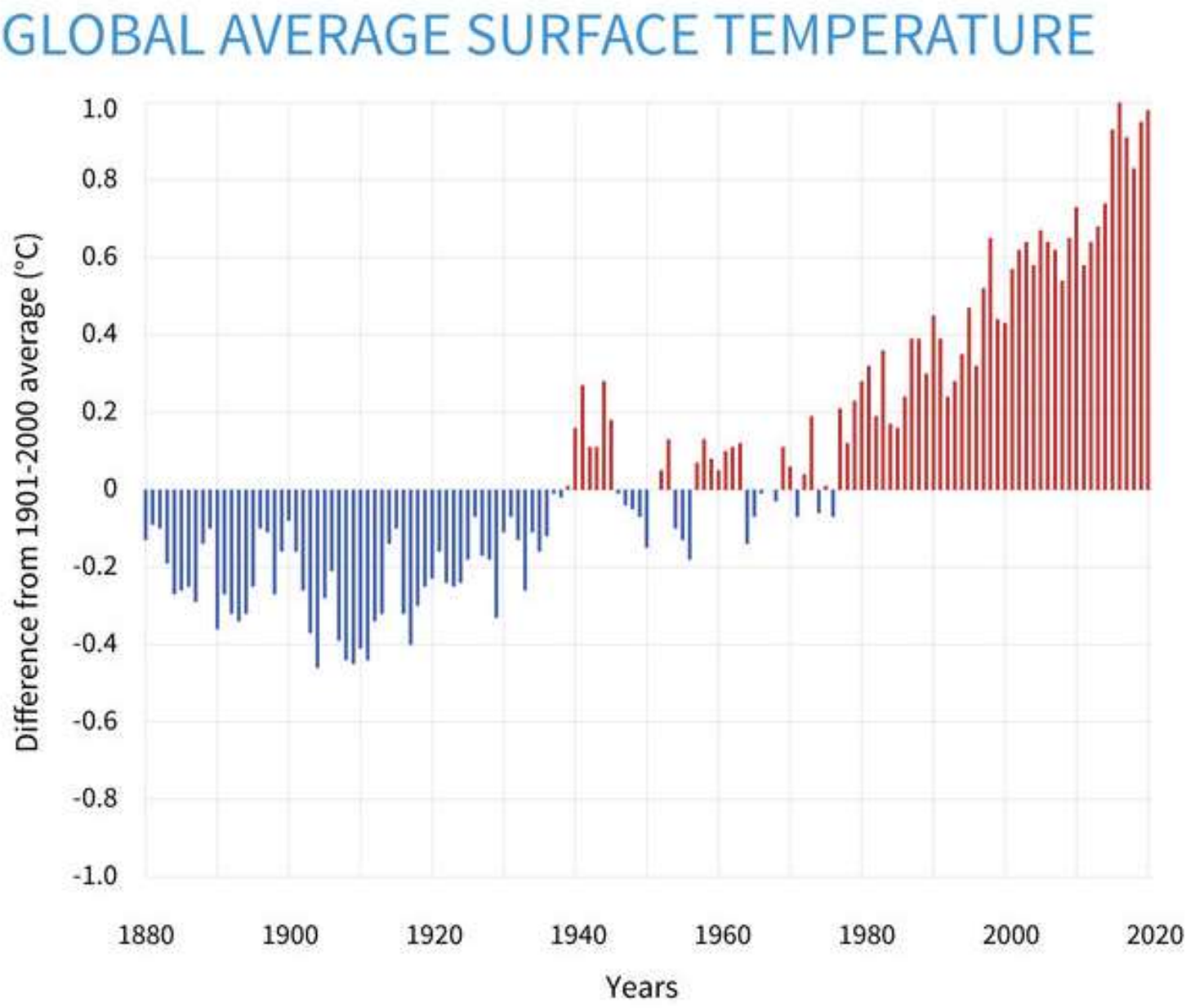
Climate, Biodiversity and Human Health

Hello, I'm Kate Bailey, a mostly retired Landscape Planner – now living in the Upper Eden Valley in the North Pennines AONB
This is a quick introduction to the topic of practical solutions to the current climate and biodiversity emergencies - briefly outlining the direct connections between climate change, human interventions and nature depletion.

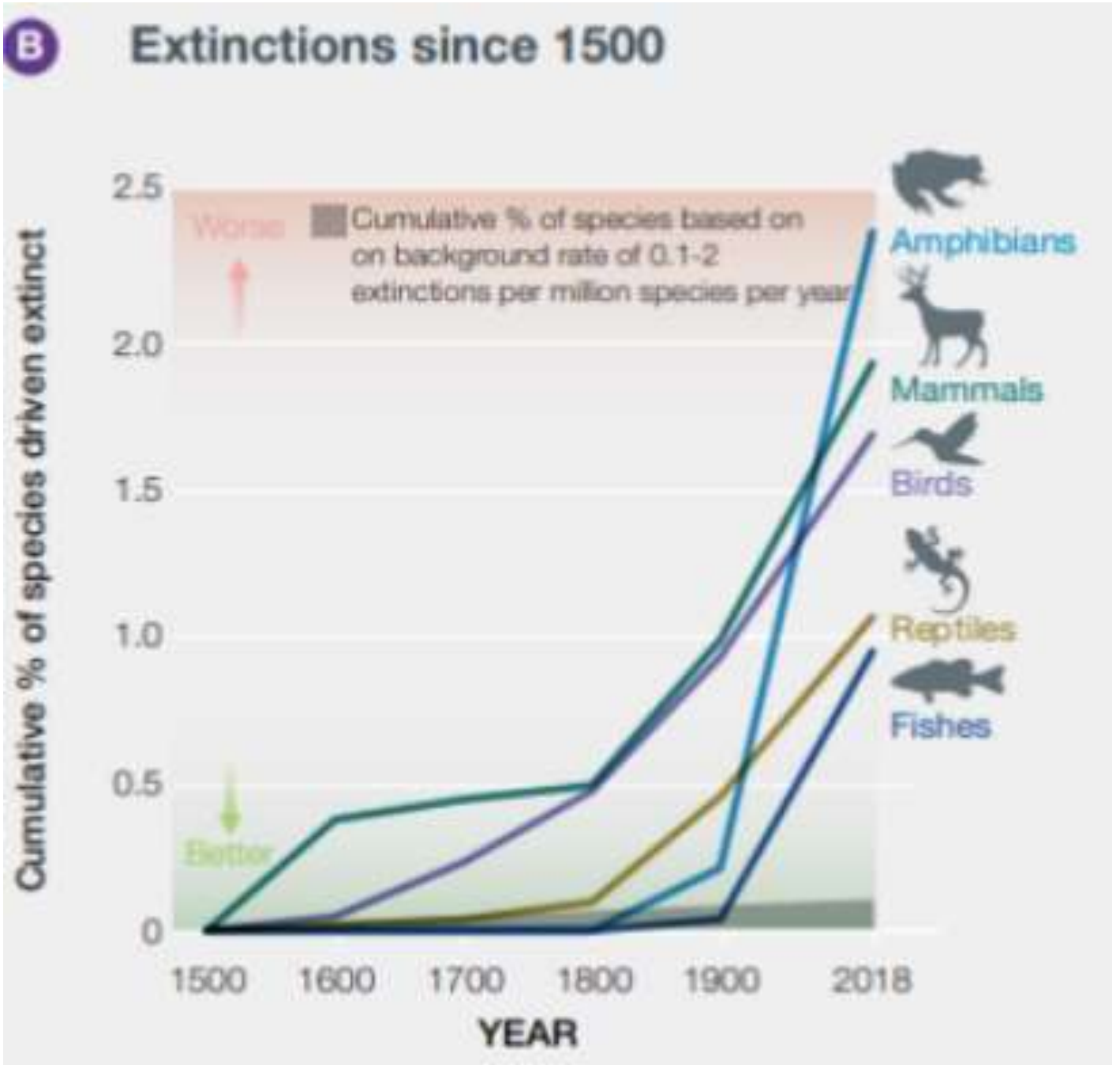
As the climate changes ...



...and average surface temperatures rise ...



… more species go extinct



Species Survival

According to the World Economic Forum (WEF) Global Risks Report 2022 - “*”Biodiversity loss is one of the biggest dangers we face…. We cannot derive fundamentals for life as we know it - fresh food, water and medicine - without a rich and flourishing biodiversity”*

Similar warnings have come from the 2005 '*The Millennium Ecosystem Assessment*', the UK-ONS '*Natural Capital Accounts*' for November 2021

- and more recently from Christiana Figueres, leader of COP21 in Paris, who puts it very forcefully:

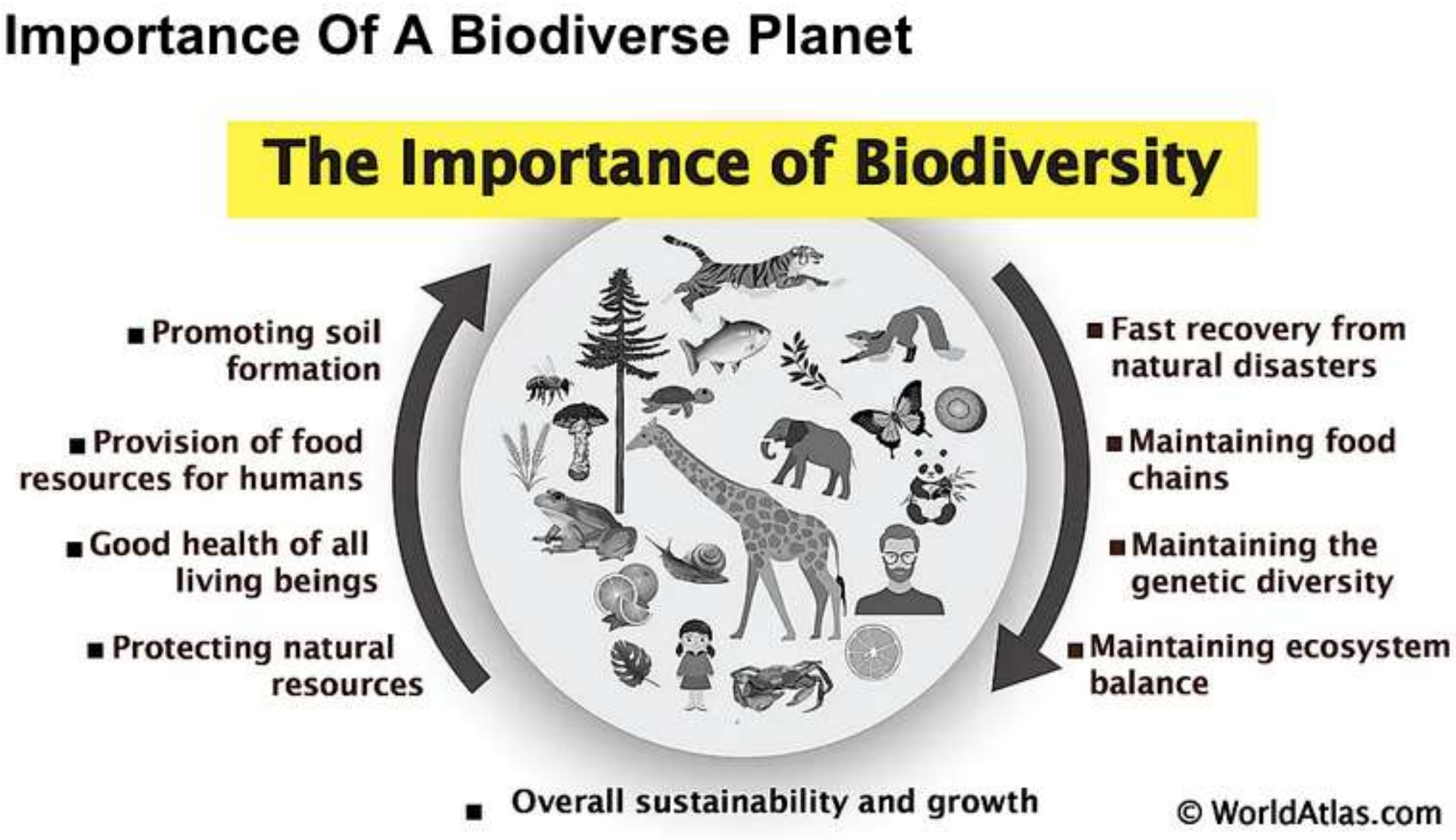
"*If we keep abusing nature it will collapse, taking us with it.*"

Species Survival

Humans are part of nature, a component in the rich and diverse global biosphere;
But in the western world we forget that our own species' ultimate survival depends on nature, and on the goods and services provided by the natural environment
– air, soils, fresh water, as well as the regulation of the climate

The World Land Trust estimates that currently only 15% of land on earth is protected from human exploitation.

In the natural world everything is connected to everything else ...



We can only achieve net zero by making the world's carbon-absorbing ecosystems work better

Definitions:

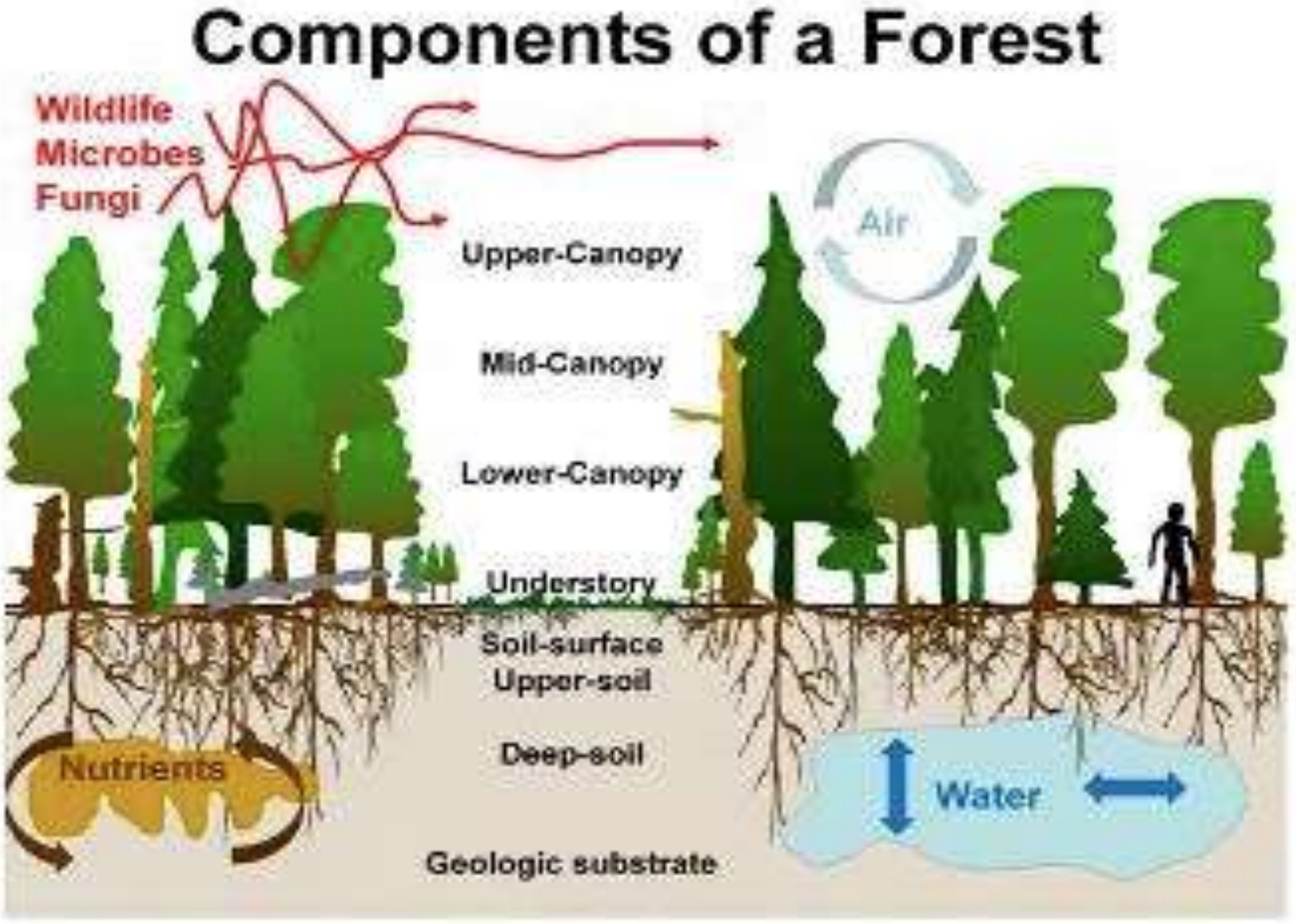
'**Biodiversity**' is used to describe the rich variety of biological life on planet Earth; all the living species that live on and in the earth's crust, blanketed by our protective atmosphere (the biosphere).

'Eco-systems' - Ecological systems are classified according to their geographical/ geological locations. They consist of all the organisms and species and other components of the particular physical environment within which they interact.

Ecosystems provide 'Goods and Services' such as fresh water, fertile soils, crops, timber, clean air ...

'Natural Resources/ Natural Capital assets' - In any ecosystem every component is inter-dependent on every other - trees cannot thrive wherever they are planted, they are totally dependent on the biological and fungal life in the soil, as well as on sunlight, water and air.

Ecosystem Mechanisms -> CO2 absorption and conversion by photosynthesis in plants -> sequestration and storage of carbon in soils



Evolution of Nature-based Solutions

WWF: "*Nature-based solutions are based on the notion that when ecosystems are healthy and well-managed, they provide essential benefits and services to people*" …

Natural systems on the planet absorb and store carbon and moderate the rise of CO2 and methane. So nature-based solutions are a vitally important part of the climate solution but NOT a substitute for phasing out fossil fuels.

The most recent IPCC report explains that removing CO2 from the atmosphere is an essential element of meeting our climate goals and that trees and soils, together with the oceans, sequester (lock away) up to 60% global fossil fuels emissions each year.

Human health, Human survival

Nature is our life-supporting safety net, making a liveable world for humanity and forming the basis of the global economy, our livelihoods, food security, health, and quality of life.

However, the unsustainable consumption of natural resources by the wealthiest nations is a major driver of biodiversity loss. 2022 World Health Organisation quote - the burning of fossil fuels is an "*act of self-sabotage and environmental vandalism*".

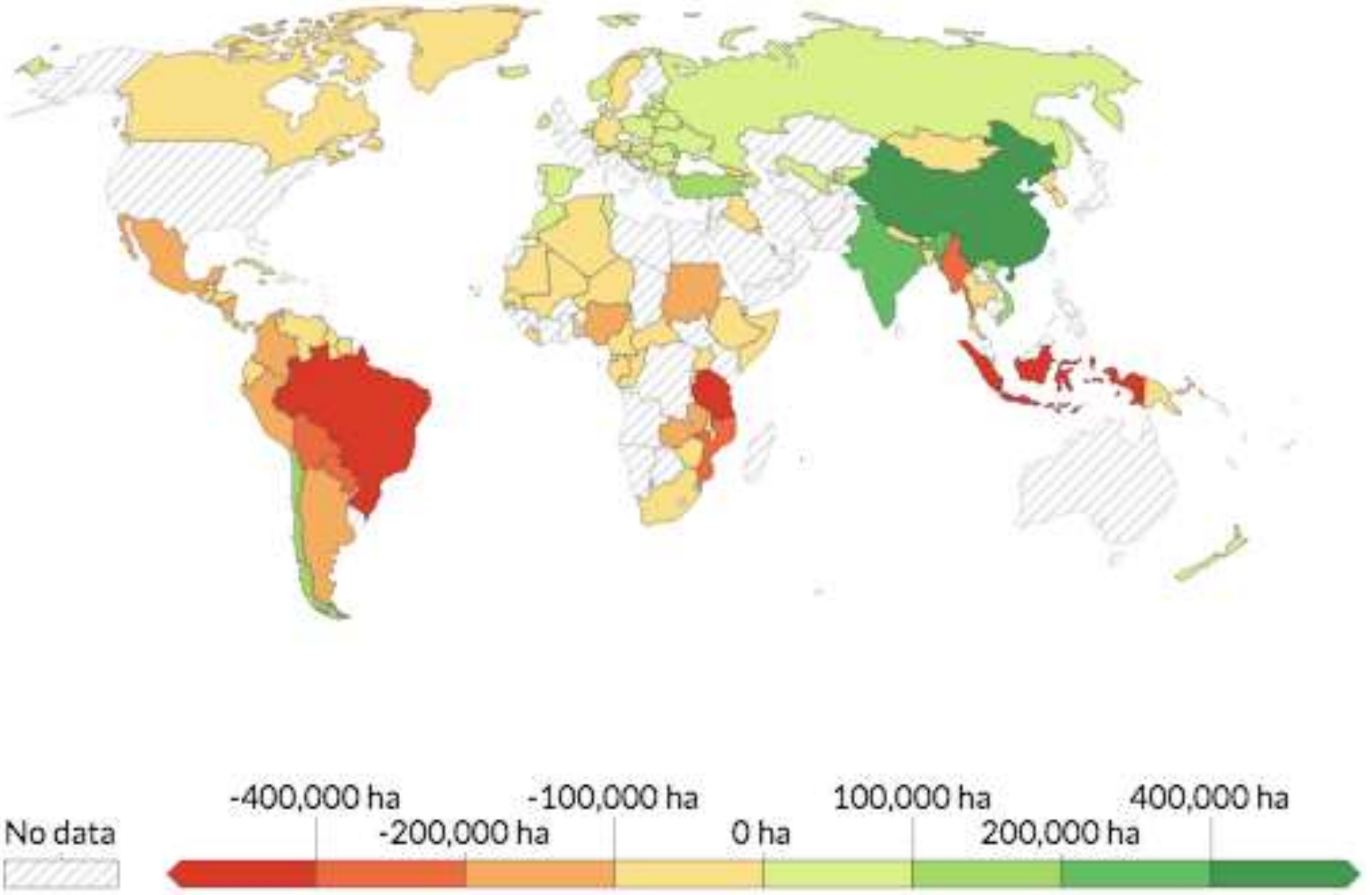
Forests are rightly described as the lungs of the planet, absorbing CO2, emitting oxygen, cooling the ground and even, in some cases, absorbing water vapour from the air to irrigate dry land. But we continue to destroy them.

Annual change in forest area, 2015

Net change in forest area measures forest expansion (either through afforestation or natural expansion) minus deforestation

Our Wor in Data

World



Source: UN Food and Agriculture Organization (FAO). Forest Resources Assessment.

Tree cover loss

Annual tree cover loss has been rising in recent years, from 13.4 million hectares in 2001
to 25.3 million hectares in 2021
(map shows green = regrowing forests faster than losing them; red = losing more forest than can be restored)

Wildfires in over-heated, drought-ridden forests contribute to climate change, biodiversity loss, pollution and waste. There is a direct correlation between land clearance and desertification

Heatwaves, drought and human interventions

Global populations of mammals, birds, fish, reptiles and amphibians have declined by almost 70% on average since 1970, according to the 2022 Living Planet Index.

Freshwater species are going extinct more rapidly than terrestrial or marine species.

Connecting climate change and biodiversity loss

The 2019 UN Global Assessment Report on Biodiversity and Ecosystem Services warned that, "*thanks to human pressures, one million species may be pushed to extinction in the next few years.*"

It is clear that the planet's biosphere is moving towards a different equilibrium that needs a different response from our so-called leaders.

Chris Packham said recently "We are so disconnected from nature now, through everyday life, and from how we obtain food, we don’t recognise that it is nature that we are surviving on."

However, we tend to underestimate the power of nature to recover - abandoned land soon regenerates with new habitats for wildlife.

A former dumping ground which has been transformed into a wildlife haven has been officially designated a nature reserve in Denbighshire.

Global Agreements

1992 UN Convention on Biological Diversity

UN Leaders Pledge for Nature 2020 (30% UK land will be protected for nature recovery by 2030)

2021 UN General Assembly declaration 2021-2030 is UN Decade on Ecosystem Restoration

2022 COP27 'debt-for-nature' deals for Seychelles, Belize, Barbados, Equador/Galapagos …

UN COP15 (Montreal, Dec 2022) aims to give biodiversity and ecosystems the same international protection as the climate

Proposed Global Diversity Framework 2022-32 including 21 targets for urgent action such as ensuring that at least 30% of land and sea areas are protected;

EU/UK policies

Closer to home, the EU is looking at carbon absorbing methods such as expanding forests, marshes and other 'carbon sinks' such as soil, biomass and using timber in building construction. In the UK, government agencies like Defra and Natural England have been thinking about ways of working with nature, not against it, by restoring ecosystems, adapting agriculture for climate-resilient food systems and using nature based solutions to create a sustainable future for our grandchildren.

As a result of the Environment Act 2021, new policies such as Biodiversity Net Gain, Environmental Land Management Schemes (to replace EU-CAP payments), England Trees Strategy and Nature Recovery Networks are being rolled out.

Functioning ecosystems need protecting - once lost, Ancient Woodlands can't be replanted

Generic Solutions

There are many practical, affordable and scaleable solutions that are readily available now.

First and foremost it's vitally important that we **protect, restore and rejuvenate all the functioning ecosystems we have left**, in particular important threatened habitats and fragmented wildlife reserves.

Rising temperatures in oceans and on land disrupt what we consider to be predictable seasonal weather patterns.

Habitat losses and fragmented ecosystems also mean that many species are struggling to alter the timing of hibernation, migration and reproduction as the seasons change.

Unpredictable seasonal weather means insects may not be available when fledglings hatch

But we can help species to adapt by increasing plant diversity in meadows, hedgerows and domestic gardens

UK Key Ecosystems – priorities for action

Priority 1. Protect/ conserve/ restore functioning ecosystems that hold water

Peatland restoration is a UK priority - peatlands (globally) store twice as much carbon as all the world's forests put together

Returning water flows in peatlands and other wetlands to 'natural' pre-drainage levels restores their ability to store carbon and allows ecosystems to recover. Over time water tables rise and bog plants and wading birds re-colonise the land.

Restoring peatlands for carbon capture; when water tables rise, bog plants and wading birds recolonise the land

Wetlands contain the most endangered ecosystems that face pollution from agri-chemicals, plastics and sewage, over-extraction of water and being drained for agriculture.

Wetland ecosystems

Healthy wetland ecosystems recharge ground-water, cool the climate and provide habitats for fish, amphibians and other wildlife.

As well as summer drought, winter flooding is a major risk for wildlife, washing away nests and dens and smothering plants.

Natural remedies include 'slowing the flow' of upland water courses to reduce flood risk downstream … with rocky weirs, leaky dams, meandering streams, planting trees and vegetation to stabilise banks … and in a few places, the reintroduction of beavers ...

Biodiversity loss in drought conditions – Environment Agency to the rescue !

Beavers have been reintroduced in pilot projects in Scotland, Devon and Cornwall

UK Key Ecosystems

Priority 2. Restore Soils to safeguard biodiversity and food supplies

Soil biodiversity provides a vast range of functions and services, including retention and filtration of rainwater, nutrient cycling, carbon storage ... as well as sustaining plant, animal and human health.

Insects form the basis of many thousands of food chains and their disappearance is the principal reason why Britain's farmland birds have more than halved in number since 1970.

Human interventions -> intensive agricultural practices result in depletion of soil fertility, loss of soil ecology, soil erosion and reduced crop productivity. Michael Gove, when he was UK Environment Minister, said "*The UK is 30 to 40 years away from the eradication of soil fertility in parts of the country*"

2. Soil biodiversity:

A quarter of all species on earth live in soils – a typical, healthy soil sample may contain hundreds of species of vertebrate animals, earthworms, mites, insects, nematodes, fungi, microbes and bacteria

Healthy Soils

Carbon dioxide is removed from the atmosphere through photosynthesis and deposited in the soil through plant roots, earthworms and other organisms and the decomposition of vegetation.
Earthworms in particular are vitally important in keeping soils healthy by aerating them, capturing moisture and maintaining complex soil ecosystems ('ecosystem engineers' – Charles Darwin).

Healthy soils

Ploughing, digging, trampling and compaction of soils destroys soil networks and soil structure and as a result more carbon and nitrogen is lost to the atmosphere.

Soil erosion from croplands is estimated at 25–40 billion tonnes of topsoil every year.

Regenerative agriculture can revive the land, rebuilding the organic carbon stores and the plants and micro-organisms that soak up water and maintain the natural fertility of the soil.

Healthy soils mean healthy crops mean healthy people

Regenerative agriculture produces more nutritious crops by increasing organic matter in undisturbed soils, recycling organic waste, focusing on sustainable crop production and helping native habitats to recover

Rewilding is a more controversial approach

Rewilding projects such as Knepp Estate in Sussex, Ennerdale in Cumbria, Bunloit and Beldorney Estates in the Scottish Highlands, aim to support and protect flourishing wildlife.

In some places missing species are reintroduced – for example Storks at Knepp.

Landowners allow natural regeneration to restore the land with few human interventions.

UK Key Ecosystems

Priority 3. Incorporate biodiversity gains in all land use changes

All development sites need to make space for nature - Covid-19 demonstrated how important outdoor spaces are for human health.

Too often development starts with clear felling and clearance of trees and hedges on sites; it's important to retain existing healthy ecosystems and incorporate them into Green and Blue infrastructure networks.

We also need to change the way we drain development sites – SuDS (Sustainable [urban] Drainage Systems) (including rain gardens, swales, tree trenches and stormwater storage ponds), can hold stormwater on site and create 'natural' water courses that provide habitats for plants and wildlife.

Site with planning permission for housing ? Can we afford to build on flood plain land when insurers no longer want to pay for flood damage ?

Biodiversity Net Gain is being incorporated into planning requirements for developers, as is more green space around housing, multi-purpose Green and Blue Infrastructure networks to link habitats, nature-rich cycling and walking routes for health, green roofs etc

Rain gardens can be created to absorb water in domestic gardens ...

… and at landscape-scale to capture storm water in a Singapore park

Conclusions and lessons learned ...

The nature-based solutions approach offers huge potential to restore biodiversity in the UK. Cumulatively the UK's residential gardens cover a greater area than all the National Nature Reserves combined.

Landscape-scale commercial solutions can be successfully adapted for domestic gardens, allotments, community parks, etc. Regional Wildlife Trusts and the RHS offer helpful advice on gardening for wildlife.

Anyone who is interested to learn more can support international campaigns (WWF, World Land Trust), join UK groups (Wildlife Trusts, Woodland Trust, Rivers Trusts, RSPB, etc) and/or become actively involved in wildlife restoration schemes in their area.

Lessons learned – teach children about nature and join campaigns for nature ...