Healthy Planet, Healthy People

Philanthropy briefing on the intersection of the environment and human health

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Environmental Funders Network

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Foreword

The links between planetary health and human health are increasingly and overwhelmingly clear. And we know we urgently need to tackle the climate crises to a create a world in which children can survive and thrive, both now and in the future. A healthy climate and environment will significantly improve life chances, particularly for the most vulnerable. All funders should consider investing into environmental solutions to meet their long-term goals. As this report explains, they can deliver big impacts for people as well as the planet. The opportunities to get involved are vast and scope for greater action remains huge.

Hugh Mehta, Children's Investment Fund Foundation

The climate and nature crises are urgent and affect us all. So any funder or charity that wants to maximise its impact must engage with them and understand how they will affect the people and communities they serve. As this guide shows, one of the most profound links is between human health and climate change, with the most marginalised likely to be worst affected. If we don't act on these challenges now, we will only embed inequalities further. Of course, governments must take the lead. But as COP26 showed, government action will not be enough. We need to unleash the best of our philanthropy community, to use its agility and pace to support campaigners, researchers, and communities to drive faster action, and in doing so, improve the environment and the health of people around the world.

Dan Corry, New Philanthropy Capital

The health of the environment underpins most issues of concern to philanthropists, but its connections to human health are so numerous and entwined as to be hard to ignore. The environment provides life support: it is the air we breathe, the water we drink, the food we grow and the natural systems—climatic, ecological—that protect our very ways of being. It is shocking therefore that so little philanthropic funding is directed towards environmental causes, although levels are starting to rise: our recent research report Where the Green Grants Went 8 showed that, after years of stagnation, UK foundation funding for environmental issues almost doubled over a three-year period, and there are signs that the trend will continue. The figures remain small compared to the scale of the challenge, however, and much more is needed in these next crucial years. I hope this guide will help funders better identify the multiple connections between our health and the environment, and mobilise significantly more funds at this crucial intersection.

Florence Miller, Environmental Funders Network

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Who is this briefing for?

This philanthropy briefing is for funders (individual donors and funding organisations) as well as philanthropy advisors who want to better understand the links between human health and environmental issues, and what they can do to create positive benefits for both.

We've written this guide primarily for health and social issue funders, but we believe that environmental funders would benefit from this advice as well. This briefing will also interest fundraising organisations, wider stakeholders, and other funders around the world with a shared interest in human health and the environment.

Many of the examples provided are from the UK. However, the barriers and opportunities to improving the environmental determinates of health are relevant worldwide.

How to use this briefing

This briefing has been designed so funders can either read it as a whole or just focus on the challenges most relevant to them.

Section 1: Why the intersection between the environment and health matters (p 9): In this section we outline the key connections and the urgency of the need for funding the intersection between the environment and health.

Section 2: Environmental challenges and their health impacts (p 15): In this section we present a series of briefings on different environmental issues and how they affect human health and different social groups. The table at the start of this section indicates which briefings will be most relevant to funders interested in different health issues and social groups.

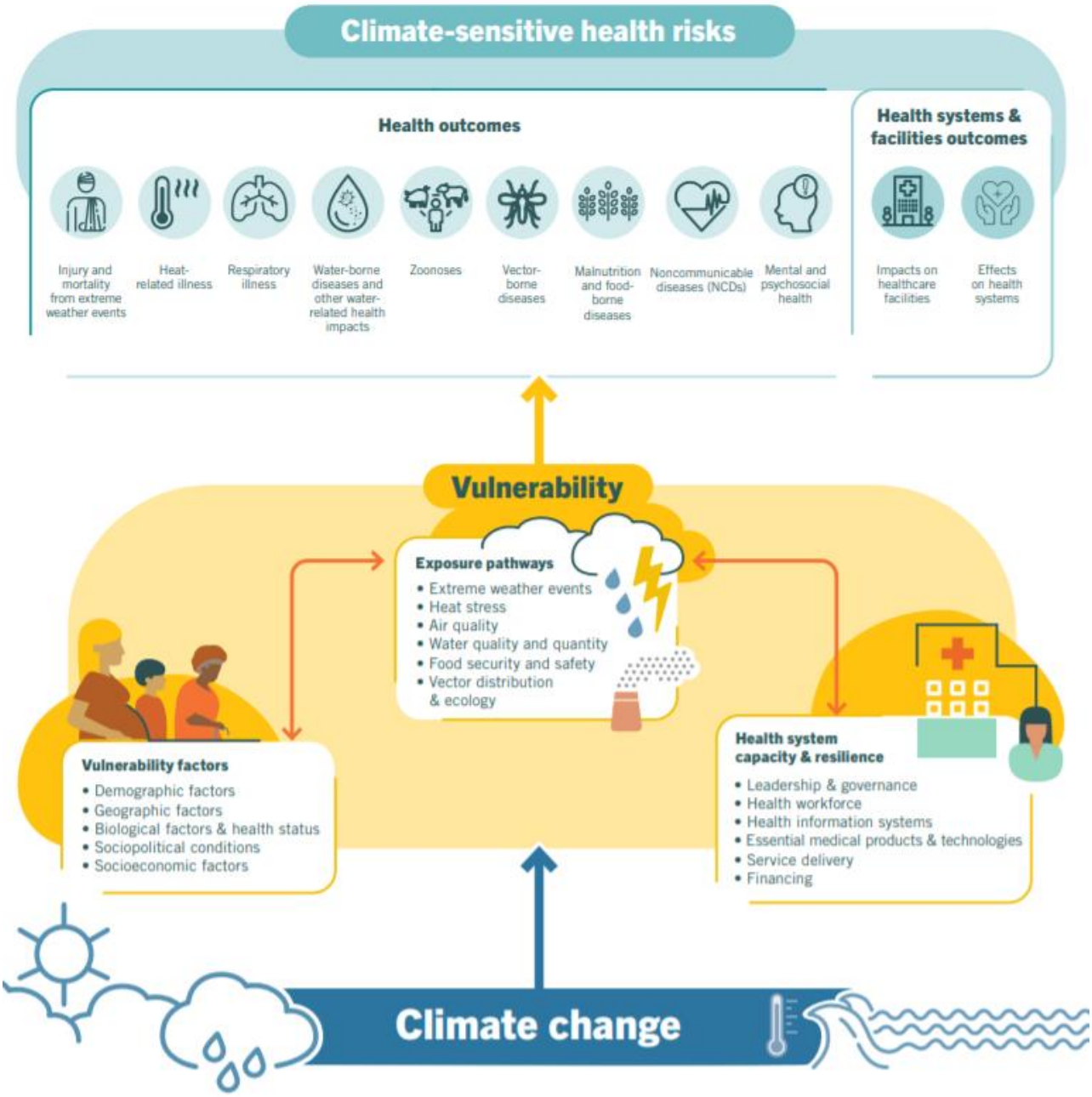
Section 3: How to take action (p 50): In this section we outline what steps we can take now to tackle the climate, nature, and pollution crises.

Climate change is a cross-cutting theme

Climate change is a cross-cutting theme that affects all the issues covered in the individual sections, as well as having direct impacts. For example, one direct impact of climate change is heatwaves, and indirectly heatwaves can lead to food insecurity and malnutrition. The direct and indirect impacts of climate change will affect individuals and communities differently depending

upon a range of vulnerabilities and the resilience of the health system to cope with the effects. The World Health Organisation (WHO) outlines these connections clearly in their overview of climate-sensitive health risks (see fig 1 below). In this briefing we do not explore in depth the issues around health systems' capacity and resilience, however we look in detail at the links between vulnerability factors and climate sensitive health outcomes.

Fig1: World Health Organisation (2021) An overview of climate-sensitive health risks, their exposure pathways and vulnerability factors. Climate change impacts health both directly and indirectly, and is strongly mediated by environmental, social and public health determinants.[1]



Migration and potential for civil unrest

Climate change is increasingly making some geographies harder, or impossible, to inhabit as a result of increased temperatures, extreme weather events, reduced capacity for food production and reduced access to clean water. People are being forced from their homes.[2] Figures of up to one billion people displaced by 2030 have been predicted by some, however such increases are uncertain.[3] Where increased migration takes place, challenges relating to access to food, water and health care can follow; and where camps are set up disease often spreads easily.

'The forced movement of larger numbers of people around the world will clearly increase the potential for conflict and insecurity'

United Nations Secretary-General António Guterres (2021)[4]

1. Why the intersection between the environment and health matters

Protecting our environment protects all of our health

'The greatest threat to global public health is the continued failure of world leaders to keep the global temperature rise below 1.5C and to restore nature'

British Medical Journal, backed by over 200 medical journals from around the world, 2021[5]

Leading medical bodies worldwide agree that planetary health is critical. The term 'planetary health' describes the way in which our own health depends upon the health of the environment we inhabit.[6] There are safe environmental limits within which human life can flourish. Cross them, and our ability to thrive, and even survive, diminishes. Humanity is increasingly crossing those limits. Medical and humanitarian professionals have long called for action on climate change and wider environmental degradation to safeguard human health; and as these environmental crises escalate under insufficient action, calls to action have strengthened:

- In August 2021, the United Nations International Children's Emergency Fund (UNICEF) published the first UNICEF child-focused climate risk index, highlighting that globally one billion children are at 'extremely high risk' of the impacts of the climate crisis.[7]
- In September 2021, over 200 health journals called on world leaders to address 'catastrophic harm to health' from climate change. The simultaneously published editorial referenced the decades of inaction in response to health professionals' warnings and demanded that the environmental crisis now receive a similar emergency response to Covid-19.[8]
- In October 2021, The World Health Organization (WHO) published a 'healthy climate prescription' for the world. Over 450 organisations representing over 45 million health workers, together with over 3,400 individuals from 102 different countries, wrote an open letter to heads of state around the world, calling for urgent climate action to protect people's health.[9] The World Health Organization simultaneously launched its 'WHO COP26 Special Report on Climate Change and Health', which issued ten calls to policymakers to safeguard

human health to inform discussions at the 26th Conference of the Parties (COP26) of the United Nations Framework Convention on Climate Change (UNFCCC).[10]

WHO Climate and Health Recommendations, 2021

1. **Commit to a healthy recovery.** Commit to a healthy, green and just recovery from Covid-19.
2. **Our health is not negotiable.** Place health and social justice at the heart of the UN climate talks.
3. **Harness the health benefits of climate action.** Prioritize those climate interventions with the largest health-, social- and economic gains.
4. **Build health resilience to climate risks.** Build climate resilient and environmentally sustainable health systems and facilities, and support health adaptation and resilience across sectors.
5. **Create energy systems that protect and improve climate and health.** Guide a just and inclusive transition to renewable energy to save lives from air pollution, particularly from coal combustion. End energy poverty in households and health care facilities.
6. **Reimagine urban environments, transport and mobility.** Promote sustainable, healthy urban design and transport systems, with improved land-use, access to green and blue public space, and priority for walking, cycling and public transport.
7. **Protect and restore nature as the foundation of our health.** Protect and restore natural systems, the foundations for healthy lives, sustainable food systems and livelihoods.
8. **Promote healthy, sustainable and resilient food systems.** Promote sustainable and resilient food production and more affordable, nutritious diets that deliver on both climate and health outcomes.
9. **Finance a healthier, fairer and greener future to save lives.** Transition towards a well-being economy.
10. **Listen to the health community and prescribe urgent climate action.** Mobilize and support the health community on climate action.

COP26 Special Report on Climate Change and Health: The Health Argument for Climate Action, WHO, October 2021.

Health professionals are supported by the scientific community worldwide. One of the leading figures, eminent scientist Professor Dr Johan Rockström, joint director of the Potsdam Institute for Climate Impact Research, led work that identified nine 'planetary boundaries' as explained in the Netflix documentary *Breaking Boundaries, The science of our planet (2021)*. Four of the nine planetary boundaries have now been crossed as a result of human activity, say an international team of 18 researchers; these are: climate change, loss of biosphere integrity, land-system change and altered biogeochemical cycles (phosphorus and nitrogen). The boundaries for climate change and biosphere integrity (the integrity of the narrow zone of the earth where land, water and air interact with each other to support life) are what the scientists call 'core boundaries', which if significantly altered can *'drive the Earth System into a new state'*.[11] Yet the process may be reversible, so we can protect our health and environment by coming back within the planetary boundaries.

The climate, nature and pollution crises are all jeopardising our health. Our greenhouse gas emissions are warming the atmosphere and the oceans; melting the ice caps, glaciers, and permafrost, raising sea levels; and increasing rainfall and hail. All these changes are causing more extreme weather events with more frequency.[12] When these changes combine with other breaches of planetary boundaries, including diminishing biodiversity and proliferating chemical pollution, the impact on human health is profound.

'The world is warming at an alarming rate, and if nothing is done we will continue to see an increase in climate change related disasters, including droughts, flooding, extreme heat, famines, and the spread of infectious diseases in new locations. The health implications of these and other issues are far reaching, and yet 'Planetary Health' is under-studied and under-funded. I believe that the top priority for addressing this challenge must be to invest in institutions that are; equipped to deliver multi-disciplinary and collaborative research, adept at translating research into policy and impact on the ground, and focused on developing strategies to protect health in the face of climate change.'

Professor Alan Dangour, Director of London School of Hygiene and Tropical Medicine's (LSHTM) Centre for Climate Change & Planetary Health, 2021

Protecting our environment reduces health inequalities

'Health and equity are central to achieving the goals of the Paris Agreement and to making COP26 a success. Protecting health requires action well beyond the health sector, in energy, transport, nature, food systems, finance and more.'

Nigel Topping, COP26 High-Level Climate Action Champion, foreword to the WHO's COP26 Special Report on Climate Change and Health: The Health Argument for Climate Action, 2021[13]

The climate, nature, and pollution crises harm people's health unequally. Vulnerability factors tend to occur together, which multiplies the risk to health even further. Vulnerability factors include age, gender, ethnicity, employment, socio-economic status, and pre-existing medical conditions.

Globally those at greatest risk from climate challenges[14] are the less industrialised nations of the global south, particularly small island states.[15]

In the UK, low-income groups, often including a disproportionate number of individuals from ethnic minority groups, are most vulnerable to the effects of climate change and wider environmental degradation. This socio-economic inequality means that people of ethnic minority heritage are generally less healthy than the overall population.[16]

People on low incomes, especially in the global north, are more likely to live in towns and cities, with poor access to nature and greater exposure to pollution; even within cities this disparity in access to nature and exposure to pollution exists across income levels. Enduring poor air quality, substandard housing and lack of green space will increase your risk of disease and take years off your life.[17] Lower income groups are ~13% more likely than higher income groups to live with a longstanding health problem or disease.[18]

Moving towards a post-carbon economy gives us an unprecedented opportunity to address historic socio-economic and health inequality through a 'just transition', the move to a fairer, greener future for all.[19] 'Climate justice' is a critical lens through which to view the ethical and political dimensions of climate change, acknowledging the inextricable connections between social and environmental justice challenges and the opportunity for these to be addressed together.

'The environment is humanity's life support. Yet the human systems we have collectively established—economic, industrial, even political—are changing our climate, endangering our fellow species, and diminishing our health and wellbeing. ***Whatever causes you care about and already fund will undoubtedly be impacted by climate change****.'*

Joint statement: MAVA Foundation, The Ecology Trust, Carman Family Foundation, Savitri Trust, Quadrature Climate Foundation, Waterloo Foundation, Tellus Mater, Synchronicity Earth, Oak Foundation, Arcadia Fund, Roddick Foundation, Ashden, Gower Street, European Climate Foundation (2021)

Emergency Health Warning: Climate change is the greatest threat to human health

Professor Hugh Montgomery, Co-chair, the Lancet Countdown and Professor of Intensive Care Medicine, University College London, 2021

When the Lancet Countdown first started in 2016, we said that climate change was the greatest global health threat of the 21st Century. That remains true today. The climate and nature crises threaten the health and future of each child born today.

A child born today is born into a world in which over a billion people will likely be displaced by sea level rise alone during their lifetime, and billions more due to rising temperatures. Greenhouse gases are heating the planet and bringing more frequent and severe extreme weather events—heatwaves, fires, storms, floods, and sea level rises. A child born today is born into a world that contains only a third of the vertebrate animals it did fifty years ago, and in which eight species go extinct every hour. By the time they are 30 years old they could see the climate and nature crises bring further species extinction, widespread disease, unliveable heat, ecosystem collapse and cities menaced by rising seas. A child born today is born into a world in which we are absolutely out of time. I'd encourage every funder to think about what you can do, not for your great, great, great grandchildren, but for yourself and your children alive today. This is about equity today as well as intergenerational equity. It's about what we, as adults, leave to our own children to protect their health and their future. Climate change is a medical emergency, it requires an emergency response. What form will your action take?

The Lancet Countdown, funded by the Wellcome Trust, works to ensure that health is at the centre of how governments understand and respond to climate change. Its work ranges from ensuring policymakers have access to high quality evidence-based guidance, through to providing the health profession with the tools they need to improve public health.

Case study: Children's Investment Fund

We cannot make children healthier without addressing climate change

For the Children's Investment Fund Foundation (CIFF), the world's largest children's foundation, climate action is inextricably linked with improving children's lives.

CIFF has steadily increased its investments over time, and in 2020 disbursed $344m of grants, with almost half ($158m) going to climate action. CIFF make multi-year multi-million-dollar commitments, so the total value of active climate grants is actually much higher, at over $600m.

CIFF began making climate change grants ten years ago when they realised that their desire to solve problems such as child malnutrition and children's health issues could not be achieved without addressing climate change. The climate crisis threatens everything. It cuts across social and economic issues, including poverty, gender, health, justice, and so much more.

As the most polluting industry in the world, coal mining and burning has contributed in a gigantic way to climate change, illness, and early death. CIFF therefore began their climate journey by funding programmes that tackled coal to reform the power sector. The portfolio has evolved to address multiple drivers of climate change, including heavy industry, transport, cities, land use and food systems. CIFF also invests in cross-cutting solutions, such as climate diplomacy, litigation, sustainable finance, communications and campaigns.

CIFF encourages funders of all sizes to engage in climate philanthropy. There are so many entry points and so many ways to make a difference—whatever you care about, climate change is a topic that will be relevant to your giving. The potential to make a difference is immense.

Now is the time for decisive action, we have no time left.

2. Environmental challenges and their health impacts

The following subsections provide briefings on selected areas where human health and the environment intersect. In reality the interconnections are many and complex, and the breakdown applied is intended to support the reader to understand this complexity.

- 2.1. Heatwaves and drought
- 2.2. Intense rainfall and flooding
- 2.3. Air pollution
- 2.4. Loss of biodiversity and access to green spaces
- 2.5. Food consumption and production
- 2.6. Toxics & pollution on land and in water

In each section we explain:

- What is the environmental issue?
- What are the health impacts?
- Which social groups are affected?
- What can funders support?

We've structured the sections in this way so funders interested in funding different health issues and social groups can pull out and read the advice most relevant to them. The table below provides a quick guide on which content is relevant to which issues and groups. Each section describes the most clearly evidenced interconnections; any gaps do not necessarily imply the lack of a connection and more likely indicate a need for further research. For example, little research has been conducted into the impact of a changing climate on individuals living with a disability.

Heart and lung health, and other chronic physical conditions	Health inequalities	Infectious diseases
2.1. Heatwaves and drought 2.3. Air pollution 2.4. Loss of biodiversity and access to green spaces 2.5. Food consumption and production 2.6. Toxics and pollution	2.1. Heatwaves and drought 2.2. Intense rainfall and flooding 2.3. Air pollution 2.4. Loss of biodiversity and access to green spaces 2.5. Food consumption and production 2.6. Toxics and pollution	2.1. Heatwaves and drought 2.2. Intense rainfall and flooding 2.4. Loss of biodiversity and access to green spaces 2.5. Food consumption and production
Maternal and children's health	**Mental health**	**Older people's health, Alzheimer's, dementia, and Parkinson's**
2.1. Heatwaves and drought 2.3. Air pollution 2.4. Loss of biodiversity and access to green spaces 2.5. Food consumption and production 2.6. Toxics and pollution	2.1. Heatwaves and drought 2.2. Intense rainfall and flooding 2.3. Air pollution 2.4. Loss of biodiversity and access to green spaces 2.5. Food consumption and production 2.6. Toxics and pollution	2.1. Heatwaves and drought 2.2. Intense rainfall and flooding 2.3. Air pollution 2.4. Loss of biodiversity and access to green spaces 2.6. Toxics and pollution
Cancer	**Disability and health**	**Minority ethnic groups and health**
2.3. Air pollution 2.5. Food consumption and production 2.6. Toxics and pollution	2.1. Heatwaves and drought 2.2. Intense rainfall and flooding 2.4. Loss of biodiversity and access to green spaces	2.1. Heatwaves and drought 2.2. Intense rainfall and flooding 2.3. Air pollution 2.4. Loss of biodiversity and access to green spaces 2.5. Food consumption and production 2.6. Toxics and pollution

Eco anxiety

In addition to specific health issues that are exacerbated by environmental issues, there is increasing evidence of a rise in related mental health distress about the state of the environment, often called ‘eco anxiety’.

Growing numbers of people are experiencing climate and wider environmental anxiety, depression, and rage (regarding perceived climate inaction).[20] This is not a formal diagnosis (none of these experiences are listed in the Diagnostic and Statistical Manual of Mental Disorders, the agreed classification of mental disorders), but they are increasingly common terms referring to anxiety caused by the uncertainty, unpredictability and existential threat posed by the climate and nature crises. In response, there are growing calls for trauma-informed educational approaches.

Although no prevalence data are available, therapists and counsellors say they’re seeing more people struggling with climate-change-related mental health issues.[21] This includes struggling to process the existential threat that we face and more tangible challenges such as whether to have a baby given the challenges ahead. According to the Royal College of Psychiatrists, more than half of child and adolescent psychiatrists in England are seeing patients distressed about the state of the environment and there may be many more who are not seeking help.[22] [23] The Lancet not only reports that 6 in 10 young people are ‘very or extremely worried about climate change’, but that 4 in 10 are hesitant to have children because of it.[24] Young people are particularly vulnerable given the greater impact climate change will have on their lives and, arguably, as they often have less agency to act than their parents’ generation.[25]

2.1. Heatwaves and drought

Health risks	Health opportunities	Most affected groups
Excess deaths Heat exhaustion / heatstroke Water shortages / dehydration Exacerbation of heart, lung or kidney conditions and diabetes Premature labour Food insecurity / malnutrition Respiratory and cardiovascular issues related to wildfires Changing prevalence and patterns of disease	Minimising health risks	Older people People with chronic health issues Pregnant women People with disabilities People in urban areas People in poor housing People working outdoors People living with mental health conditions

What is the environmental issue?

The climate is warming, with heatwaves becoming more frequent. According to the World Meteorological Organisation (WMO),[26] the past six years have been the warmest on record since 1880; in 2020 the global average reached 1.2°C above pre-industrial era (1880) temperatures. The WMO predicts a 20% probability that average temperatures will temporarily exceed 1.5°C above pre-industrial levels as early as 2024 and without action will permanently do so within as little as 15 years. Via the Paris Agreement (2015), nations agreed that a 1.5°C degree increase above pre-industrial average temperatures to be a level of global heating over which the severity of impacts drastically rises. However, average temperatures and associated impacts are increasing at different speeds everywhere, with warming generally higher over land areas than oceans. The strongest warming is happening in the Arctic during its cool season, and in Earth's mid-latitude regions during the warm season. In many regions, warming has already surpassed 1.5°C above pre-industrial levels and more than one-fifth of all humans live in regions that have already seen warming greater than 1.5°C in at least one season.[27]

In the global north, research identifies the UK to be at particular risk from heatwaves, with predictions that summer temperatures and extreme hot days could rise up to 50% faster than the average rate of global warming.[28] The Met Office projects that by 2070, UK winters will be between 1 and 4.5°C warmer and up to 30% wetter and summers will be between 1 and 6°C warmer and up to 60% drier.[29]

More than half the world's population already endures extreme water scarcity for at least one month a year and estimates predict that by 2040 up to 20 more countries could be experiencing water shortages.[30] In the UK, the Environment Agency predicts that England could run short of water in 25 years if drastic action is not taken.[31] We are depleting water sources at an unsustainable pace already, with a growing population and climate change exacerbating the problem.

What are the health impacts?

Increased heat-related deaths

The Lancet's Planetary Health journal reports that excess deaths from non-optimal temperatures account for almost 10% of global deaths. [32] Research also predicts that, between 2030 and 2050, there will be approximately 250,000 additional deaths per year due to heat related malnutrition, malaria, diarrhoea and heat stress.[33]

In the UK's summer months, it is estimated that for every 1°C above the average daily temperature there are 2% more deaths.[34] The UK's Climate Change Committee reports that if heatwaves double in frequency by 2050 it would triple the number of excess deaths caused by hot weather each year.[35] In the summer of 2020, there were a total of 2,556 excess deaths attributable to heat in England alone.[36] The majority of people in the UK have experienced health effects from hot weather, with 1 in 12 requiring medical treatment as a result.[37] Common experiences include dehydration, overheating (which can exacerbate heart or breathing issues), heat exhaustion and heatstroke.[38]

Threat to life and health from increasing wildfires

Rising temperatures are increasing the risk of wildfires worldwide.[39] 2021 saw the worst July for global wildfires since satellite records began in 2003, with North America, Siberia, Africa, southern Europe and Australia hit particularly hard. Wildfires release large quantities of carbon dioxide, carbon monoxide and fine particulate matter into the atmosphere. The resulting air pollution can cause a range of health issues, including respiratory and cardiovascular problems (see air pollution

p 27), and can increase warming of the atmosphere.[40] Wildfires can drive wildlife out of their natural habitats, disrupting natural ecosystems and increasing the risk of disease, and also lead to loss of crops, affecting nutrition (see food and nutrition p 39). The Food and Agricultural Organisation for the United Nations (FAO) reports that agriculture is the first and most affected sector when drought hits, with multiple impacts on agricultural production, food security and rural livelihoods.[41]

Increased prevalence of diseases

Longer-term, hotter temperatures can affect the prevalence and patterns of diseases. The World Health Organization reports that climatic conditions strongly affect patterns and prevalence of disease; for example, climate change is likely to lengthen the transmission seasons of important vector-borne diseases and to alter their geographic range, such as significantly widening the area of China where the snail-borne disease schistosomiasis (also endemic in sub-Saharan Africa) occurs and expanding the distribution of malaria and dengue-carrying mosquitoes. Malaria kills over 400,000 people every year—mainly children under five years old in certain African countries.[42] [43]

The impact on the UK is as yet unclear. However, the European Environment Agency reports that Lyme Disease, the most common vector-borne disease in the UK, is becoming more common in northern climates due to climate change.[44] Warmer air and water temperatures accelerate the growth rates of pathogens including bacteria, viruses and parasites. Researchers have found evidence suggesting that as the planet warms, cooler climates are likely to see increases in infectious diseases due to ‘thermal mismatch’—where species acclimated to cooler climates face warming temperatures, their risk of infectious diseases increases.[45]

Who is affected?

The impact of rising temperatures is unequally distributed across and within countries with no single measure of impact. For example, the Germanwatch Institute’s Global Climate Risk Index reported in 2020 that based on the impacts of extreme weather events and the socio-economic losses they cause, Japan, the Philippines and Germany were the places most affected by climate change at that time; followed by Madagascar, India, Sri Lanka, Kenya, Rwanda, Canada and Fiji.[46] However, looking at the locations most affected by wildfires in 2020, Turkey, Greece, Italy, France, Algeria, Lebanon, Jerusalem, the USA, Siberia and Australia were hardest hit.[47]

A range of groups are likely to be affected by the increasing frequency of heatwaves. **Older people, infants and children** are most at risk. **Older people** in particular can struggle to regulate their temperature, which means people aged 60 and older experience significantly worse heat-related health outcomes than any other age group.[48] Older adults are particularly at risk of dehydration, due to the body's fluid reserve becoming smaller with age, the sense of thirst becoming less acute, compounding issues such as diabetes and dementia, and mobility problems that limit their ability to obtain water for themselves.[49] Dehydration is one of the risk factors for falls in older people and is associated with pressure ulcers, faecal impaction and cognitive impairment.[50] Over 75s also have an increased likelihood of one or more underlying health issues, making them further vulnerable to the effects of heat.[51]

People living with chronic and underlying health conditions are especially vulnerable to heat. For example, heart, lung or kidney conditions and diabetes can flare up in hot weather; heat exacerbates air pollution causing challenges for those with respiratory or heart conditions; and some medications can also affect temperature regulation, skin sensitivity to sunlight, electrolyte balance and kidney function.[52] **People living with mental health conditions** are more likely to experience severe distress in a heatwave, and heat is linked to greater suicide risk.[53]

Some health issues make it harder to adapt your behaviour during a heatwave. For example, **people with a severe physical or learning disability, limited mobility, Alzheimer's or Parkinson's disease** may be less able to move to a cooler location or may forget to hydrate. [54] [55] [56] Dehydration can be life threatening, but more common complications include heat exhaustion, urinary and kidney problems, seizures, and low blood volume shock.[57]

Pregnant women are more likely to go into early labour in the week following a heatwave and, although the risk is small, are more likely to give birth early and at lower birth weights.[58] [59] There are indications that these risks may be greater for lower socio-economic groups. [60]

People living in urban areas are at greater risk from adverse health effects of heatwaves, for the simple reason that built up areas can be up to 10°C hotter than the surrounding countryside.[61] In a changing climate, green spaces are especially important. They provide cool spaces during heatwaves, support water run-off systems to reduce flooding and reduce air pollution. These benefits are most keenly felt in urban areas. Urban parks are, on average, 1°C cooler than the rest of the city, during both the day and the night, and the cooling effect spreads up to 1km from the park boundary.[62]

Living in poorly adapted housing makes people particularly vulnerable to extreme hot weather, as does living on the top floor, in a south facing property, or in poor-quality housing. One in five

homes in England are already prone to overheating,[63] which will get worse as temperatures rise without remedial action.

In addition, **types of employment** can also make some groups more vulnerable. Outdoor workers, those who already work in hot conditions, and those whose job requires physical exertion or restrictive uniforms are more likely to suffer from heat-related illness. For example, this includes chefs, security guards, construction workers, nurses, people working in manufacturing, and members of the armed forces.[64]

What could you fund?

The majority of work to address the health impacts of increased temperatures is currently focused on **reducing greenhouse gas emissions** to limit future global warming and therefore mitigate associated health risks. This continues to be important for funders to support, be that by funding direct intervention, advocacy, communications, research, campaigning, or litigation to hold companies and governments to account.

Less work is underway to **raise awareness** of the risks of climate change to human health among vulnerable people, or to provide **practical support** to vulnerable people during heatwaves. Funding charities targeting specific social groups or health issues, including **existing grantees**, to work with service users to identify challenges and solutions could address this gap.

You can also fund work to help **places adapt to hotter temperatures**, such as providing more green spaces or better quality housing, which can also contribute towards mitigating climate risks.

2.2. Intense rainfall and flooding

Health risks	Health opportunities	Most affected groups
Physical injury and drowning Mental health issues Disease Wider impacts of natural disasters including impact on mental health and food security	Minimising health risks	People living in maladapted areas People living by rivers or the sea People vulnerable to surface water flooding Older people People with disabilities Low income families

'Some 200 people died in this summer's flooding in Germany. That will happen in [the UK] sooner or later, however high we build our flood defences, unless we also make the places where we live, work and travel resilient to the effects of the more violent weather the climate emergency is bringing. It is adapt or die. With the right approach we can be safer and more prosperous. So let's prepare, act and survive.'

Emma Howard Boyd, Chair of the Environment Agency[65]

'Our world stands at a fork in the road; one no less significant than when the United Nations was formed in 1945. But then the majority of countries here did not exist, we exist now. The difference is we want to exist a 100 years from now … 1.5°C is what we need to survive, 2°C … is a death sentence for the people of Antigua and Barbuda, for the people of the Maldives, for the people of Dominica and Fiji, for the people of Kenya and Mozambique, and … for the people of Samoa and Barbados.'

Mia Mottley, PM of Barbados speaking at COP26[66]

What is the environmental issue?

Climate change brings more intensive rain and hail. Modelling of increased precipitation is less certain than that of temperature rises, however on average warming is expected to result in dry areas becoming drier and wet areas becoming wetter, especially in equatorial regions (although the effects of warming are more complex[67]).[68] Rising temperatures will likely increase precipitation near the equator, particularly in the Pacific Ocean, and in the Arctic and Antarctic; whereas the Mediterranean region is expected to have around 20% less precipitation by 2100, with similar reductions also expected in southern Africa. Western Australia, Chile, Mexico and Central America may all become around 10% drier.[69]

The UK's Meteorological Office reports that, due to climate change, UK rainfall is already 4% higher than the previous fifty years and the wettest days already see 17% more rainfall.[70] This leads to flooding, which is made worse by poorly managed land and poor drainage in urban areas, deforestation, intensive farming and poor soil health.[71] According to the Environment Agency, one in six properties in England are already at risk of flooding, with more than five million people living and working in places at risk of flooding from rivers or the sea.[72]

The risks are uncertain, with estimates of the increased risk of flooding due to climate change varying from 20%-90%.[73] The trajectory however is clear. As the planet warms and our weather patterns change, we can expect more rain and more flooding. In the UK we can expect 10% more rainfall by 2100.[74] Sea level rises from melting ice create additional flood risks, particularly in coastal areas.

What are the health impacts?

Increase in diseases

Water-borne and vector-borne diseases are likely to increase with warmer temperatures and flooding. Water-borne diseases such as leptospirosis can increase with flooding,[75] as can diseases such as rotavirus which causes gastroenteritis.[76] The risk levels are unclear, but we're already seeing disease-carrying mosquitoes becoming widely established across Europe, with subsequent outbreaks of dengue and chikungunya virus in areas previously unaffected.[77]

Increase in injuries

Drowning and injury through accidents are the physical health risks of flooding. Just 15cm of fast-flowing water can be enough to knock somebody off their feet and leave them unable to regain

their footing.[78] A third of flood-related deaths are in vehicles and two thirds of those who die in flood-related accidents are good swimmers.[79]

Wider impacts of natural disasters

Homes and crops can be damaged or lost to increased precipitation with significant long-term implications for both mental and physical health and food security. For example, in 2021 Cyclone Seroja in Indonesia saw 22,000 people displaced[80], over 18,000 people were evacuated as a result of flooding in New South Wales in Australia[81], and record-breaking snowfall in Texas, USA, saw three million businesses and homes left without power.[82] The FAO reports that globally floods are the second gravest disaster for the agriculture sector.[83] Such natural disasters not only impact health directly through physical and emotional trauma and acute disease, but also increase the morbidity and mortality associated with chronic and infectious disease through the longer-term impact on health care systems.[84]

The mental health impacts of flooding are not yet fully understood but, according to the UK's Public Health Register, 'may prove to be the greatest health impact of flooding'.[85]

Who is affected?

Intense rainfall and flooding can be a health **risk to everyone**, in any location and of any age. However, some groups are more vulnerable than others, for example those in geographical areas close to seas or rivers, or with poor surface water drainage. Those who are unable to evacuate quickly, such as **people with disabilities**, the **elderly**, and **those without personal vehicles**, may also be most at risk. In addition, often the **least privileged** in our communities are those hardest hit, for example when New York experienced flooding in the summer of 2021, almost all of those who died where poorer people living in basement flats.[86]

The challenges of flooding and sea level rises are felt across the globe, most especially in **small island nations** facing sea level rises. Places like Fiji, the Maldives and the Solomon Islands, have a low carbon footprint but have already begun to experience severe effects of climate change—flooding, erosion, in some cases, the threat of utter submersion.

What could you fund?

The majority of work to address the health impacts of increased rainfall and flooding is currently focused on **reducing greenhouse gas emissions**, which seeks to limit future global warming and therefore mitigate associated health risks. There are promising **nature-based solutions** to reducing flood risks, including rewilding and restoring or protecting natural ecosystems. Examples include planting more trees and hedges to slow water flows, and restoring natural watercourse channels and floodplains.

Funders can support this work, but also work that provides **practical support** to the most vulnerable, and **support existing grantees** to consider what climate change means for the health issues and social groups they support. Funding may also be needed to **understand and mitigate the risks of increases in diseases** caused by flooding.

2.3. Air pollution

Health risks	Health opportunities	Most affected groups
Excess deaths Cancer (lung) Lung diseases Heart diseases Central nervous system issues Reproductive health Mental health issues Alzheimer's disease and dementia Parkinson's disease Child growth stunting Childhood obesity	Minimising health risks	Children and young people Older people People with chronic health issues Pregnant women People in urban areas Low income families People working in polluting industries

What is the environmental issue?

'Right now, nine out of ten people are breathing air which is damaging to their health ... This isn't about prioritising one issue over another, but clean air can be our secret weapon in tackling a multitude of development issues. If we truly want to tackle climate change, save lives and fight inequality at the same time, addressing air pollution is essential. We need governments and funders to work together to turn the tide on air pollution and deliver the health and climate benefits we need to see.'

Clean Air Fund, 2021[87]

Climate change and air pollution are often described as two sides of the same coin. The substances that cause air pollution come from many of the same sources as greenhouse gas emissions, or are greenhouse gases themselves. For example, nitrous oxide is 300 times more

potent than carbon dioxide in terms of global heating and is mainly produced by road traffic and energy production—it is a major contributor to air pollution, and has significant effects on the body when it is breathed in.[88]

The Clean Air Fund's State of Global Air Quality Funding 2021 report highlights that improving air quality unlocks rapid and substantial health benefits, helps mitigate against climate change, and addresses inequalities. For example, in India, funding is helping promote alternatives to crop residue burning, helping reduce emissions of black carbon, an air pollutant that contributes to climate change and air pollution that affects human health, whilst simultaneously benefiting farmers economically, and improving long-term agricultural productivity.[89]

There are five main air pollutants in the UK: particulate matter (PM or $PM_{2.5}$), ammonia (NH_3), oxides of nitrogen (NO_x including NO and NO_2), sulphur dioxide (SO_2) and non-methane volatile organic compounds (NMVOCS).[90] The UK has legal limits for air pollutants but is in breach of a number of them. For example, around 75% of areas exceed legal limits for NO_2 emissions.[91] The government has also set targets for other pollutants, such as $PM_{2.5}$. Yet despite being less stringent than those recommended by the World Health Organization, a number of predominantly urban areas are in breach of these limits.[92]

The primary sources of air pollution are:

- Transport, particularly road vehicles but also trains, shipping, and aircraft.
- Industry, especially coal power stations (at home and abroad) and industrial furnaces.
- Agriculture.
- Homes and offices, from fossil fuel-burning heating and cooking systems and wood stoves. Wood burning at home is now the biggest cause of particulate pollution in the UK.[93]

What are the health impacts?

Physical health

Around the world, 90% of people breathe unhealthy air,[94] leading to the deaths of an estimated seven million people every year.[95] This is one of the biggest and most pressing public health issues globally. By comparison, the global death toll in the first twelve months of the Covid-19 pandemic was 2.2 million.[96] Air pollution accounts for a high proportion of deaths and disease from lung cancer (29%), respiratory infections (17%), stroke (24%), heart disease (25%) and chronic

obstructive pulmonary disease (43%).[97] There are early indications of links to childhood obesity identified in Europe[98] and India[99], as well as links to child growth impairment ('stunting'), which affects approximately 59 million (34%) children in South Asia and 58 million (33%) children in sub-Saharan Africa, and is associated with poor child development, lower productivity and earnings in adulthood, and increased risk of chronic diseases later in life.[100]

Every year, around 1,850 people are killed on Britain's roads.[101] Yet the pollutants emitted from road vehicles contribute to a far greater 40,000 people dying in the UK each year because of long-term exposure to air pollution.[102] Air pollution is seen by the United Nations Environment Programme[103] and Public Health England[104] as the biggest environmental health risk of our time. The UK's Department for Environment and Rural Affairs reports that air pollution is the fourth greatest threat to public health after cancer, heart disease and obesity (all of which air pollution exacerbates).[105]

Different forms of air pollution affect human health in different, sometimes compounding, ways. The European Environment Agency[106] reports that:

- Particulate matter (e.g. from power generation, domestic heating, vehicle engines) is linked to lung cancer, damage to the central nervous system, irritation of eyes, nose and throat, breathing problems, cardiovascular diseases and damage to the reproductive system.
- Sulphur dioxide (e.g. from heating, power generation and transport) is linked to headaches, anxiety, and cardiovascular diseases.
- Nitrogen oxides (e.g. from vehicles and power plants) are linked to asthma and reduced lung function, and wider breathing problems. As with particulate matter, scientists also theorise that nitrogen oxides might be related to the stunting of growth in children.

Public Health England projected that by 2035 there could be around 2.5 million new cases of coronary heart disease, stroke, lung cancer, childhood asthma, chronic obstructive pulmonary disease, diabetes, low birth weight, and dementia attributable to air pollution if current levels continued.[107] Conversely, academics suggest that reducing air pollution in line with World Health Organization guidelines could potentially add 2-5 years to the lives of those currently living with air pollution.[108]

Fortunately, as people are increasingly encouraged away from fossil fuel intensive travel, the opportunities for more active travel—walking, running, cycling—will have significant health benefits, alongside reducing the negative health impacts of air pollution. More than a third of adults in high income countries such as the UK do not exercise enough.[109] More active travel will reduce greenhouse gas emissions, increase activity levels, and lead to associated health benefits.[110]

Mental health

Air pollution is linked to schizophrenia and other psychotic disorders, and even small increases in air pollution are linked to rises in more common mental health issues such as depression.[111] For example, one study reported that an incremental increase in nitrogen dioxide heightened the risk of common mental disorders by 39%.[112] Another study showed that a relatively small increase in exposure to nitrogen dioxide led to a 32% increase in the risk of needing community-based treatment and an 18% increase in the risk of being admitted to hospital.[113] Separate studies have linked exposure to air pollution in childhood to poor mental health by the age of 18.[114]

Who is affected?

While ambient air pollution affects developed and developing countries alike, **low- and middle-income countries experience the highest burden**, with the greatest toll in Saharan Africa and South East Asia.[115] [116] The burden of air pollution tends to be greater across low and middle income countries for two reasons: indoor pollution rates tend to be high in low-income countries due to a reliance on solid fuels for cooking; and outdoor air pollution tends to increase as countries industrialise and shift from low to middle incomes.[117] The World Health Organization highlighted in 2021 that the disparities in air pollution exposure are increasing worldwide, particularly as low- and middle-income countries' economic development is relying largely on the burning of fossil fuels.[118] For example, Delhi's air pollution level in November 2021 was 76 times the safe level as recommended by the World Health Organization.[119] And for many the situation is getting worse, for example the most populous countries almost all saw increases in air pollution in 2019-2020, the primary driver of this pollution is the burning of fossil fuels.[120] Yet despite the documented health risks, less than 0.01% of total foundation giving globally supports improved air quality.[121]

'Grant funding [for air pollution] is going up, but it's going up from an incredibly small base … the funders that have always funded air quality are funding it more, and the majority of these funders have a climate and environmental focus, there is a particularly lack of health focussed foundations that are working on air quality, which I think is very surprising given the clear health impacts that air quality has.'

Matt Whitney, Clean Air Fund (2021)[122]

In the UK, **people living in urban areas** are the most affected by air pollution. **The least privileged communities** often live in the most polluted areas as well as having generally poorer

health and less access to high quality medical care, all of which increases their vulnerability. Professor Michael Marmot's health inequalities review found that air pollution plays a significant role in worsening health inequalities in the UK. 85% of people living in areas with illegal levels of nitrogen oxide were also the poorest fifth of the population. This group is two-and-a-half times more likely to have chronic obstructive pulmonary disease, twice as likely to develop lung cancer, and 36% more likely to have asthma.[123]

Whilst air pollution is often worse in urban areas, it is not restricted to urban areas. For example, one study from the University of Minnesota suggests that air pollution caused by global production is killing more than 890,000 people per year, including people in **rural and urban communities** exposed via pre-production (land-use change, fertilizer production), production (on-farm energy use, manure management, grazing, fertilizer use, agricultural waste burning) post-production (food industry, retail), distribution, and waste.[124]

Low income families are disproportionately exposed to air pollution.[125] A study in Wales found that overall mortality and respiratory disease mortality were highest in the most deprived areas, as air pollution compounded the effect of deprivation on health.[126] Half of all people in poverty live in a family that includes a **disabled** person and nearly half (46%) of families with a head of household from an **ethnic minority** background live in poverty compared to just one in five (19%) of families where the head of the household is White.[127]

Air pollution can compound **existing health conditions**. For example, patients admitted to hospital with a disabling disease are at a higher risk of mortality if they are admitted on days with high air pollution.[128] Air pollution has similarly been linked to an increase in the risk of hospitalisation from Covid-19 infection.[129] Nearly 3,000 medical centres (37% of all GPs and 29% of hospitals) in England are located in areas of high air pollution from fine particulate matter ($PM_{2.5}$), putting vulnerable groups and healthcare professionals at risk.[130]

More **older people** are admitted to hospitals for cardiovascular and respiratory diseases on high air pollution days,[131] and the mortality rate is higher when admitted to hospital on days with higher levels of nitrogen oxide.[132] Air pollution is also linked to the development of dementia,[133] Alzheimer's disease and Parkinson's disease.[134]

Over a quarter of care homes in England (26%) are located in areas with levels of fine particulate matter ($PM_{2.5}$) over those recommended by the World Health Organisation (WHO), putting older people and those with health conditions at unnecessary risk.[135] Elderly people are more vulnerable to the health impacts of particulate matter, with particular effects on daily cardio-respiratory mortality and acute hospital admissions.[136] Chronic exposure to elevated levels of air pollution has

also been related to the incidence of chronic obstructive pulmonary disease (COPD), chronic bronchitis (CB), asthma and emphysema[137], and may be linked to cognitive decline.[138]

Children and pregnant women are considered to be at greater risk from air pollution. For example, there is evidence that fine particles can cross the placenta, leading to foetal exposure to air pollution before birth.[139] The Royal College of Physicians and the Royal College of Paediatrics and Child Health report that developing organs are at particular risk, with air pollution affecting us from our earliest stage of development in the womb and onward through our lives.[140] There is also evidence that air pollution is associated with stunted growth in children.[141] In the UK, a child is born into dangerously polluted air every two minutes.[142]

Exposure to traffic-related air pollution in childhood has been associated with reduced lung function that extends into adolescence.[143] 98% of state schools in London and 24% outside of London are in areas breaching World Health Organization air pollution limits. This represents 3.1 million school children across England alone.[144]

'Almost weekly new research is published highlighting that the polluted air we breathe all across the UK, from diesel vehicles, woodburning, industry or farming, is significantly contributing to health problems—without cleaner air, it seems unlikely that the next generation will be healthy.'

Jemima Hartshorn, Founder, Mums for Lungs, 2021

What could you fund?

There are a number of **active collaborations** to raise awareness and **campaign** for less polluted air. In addition, activity to **reduce greenhouse gas emissions** can have a simultaneous impact in reducing air pollution, such as by encouraging clean energy, active travel and electric vehicles. **Litigation** work by charities to challenge government targets and activity to meet them has also been successful in the UK.

People are already working on generic and lung-related awareness raising and campaigning on air pollution, but less work is being done to address other specific health impacts—particularly **mental health**, **maternal health**, **older people's health,** and **health inequalities**. Other areas for support include funding **existing grantees** to consider what air pollution means for the social groups / health issues they support; and funding communities to campaign for protection for other vulnerable groups such as people in **care homes**.

Case study: Impact on Urban Health—Tackling air pollution to address health inequalities

At Impact on Urban Health, our ten-year Health Effects of Air Pollution programme explores how people's health is affected by poor air quality, and tests solutions to reduce this harmful impact. Air pollution is more prevalent in cities and towns, and it doesn't affect people in these areas equally. Children, older people and people with heart and lung conditions are more susceptible to its harmful effects than others. Air pollution also intersects with other systemic causes of ill health like unemployment, low income and noise pollution. One of the core principles of our programme is, therefore, equity; we focus on the people whose health and well-being are disproportionately affected by air pollution and who often have done the least to contribute to the problem.

We work in the inner-city London boroughs of Lambeth and Southwark, which have twice the population density of the average London borough, putting them on a par with Cairo or New Delhi. With a population of around 600,000, these two boroughs alone are home to almost as many people as entire cities like Athens, Boston or Stuttgart. Lambeth and Southwark are like other urban areas around the world because of their vibrancy and diversity but also because of their stark health inequalities. These health inequalities are an urgent challenge, so we share the lessons we learn in inner-city London so that they can be applied to other cities.

Working with local government, industry and communities most affected by air pollution, we test interventions and solutions to reduce the health effects of air pollution. We believe that by working collaboratively with the industries that produce air pollution—and the communities that are most affected by that pollution—we can identify effective ways to improve air quality.

For example, we're working with the construction industry to explore how the sector can reduce air pollution on building sites, and with businesses, with one of our projects aimed at encouraging businesses to switch from using polluting freight to cargo bikes. We're working to improve air quality in and around hospital sites. And, crucially, we're working with communities to learn more about people's perceptions of air pollution.

While our Health Effects of Air Pollution programme works to improve air quality for those who are most affected, we will continue to partner with individuals, groups and organisations to learn what works to improve health in inner-city areas.

2.4. Loss of biodiversity and access to green spaces

Health risks	Health opportunities	Most affected groups
Exacerbated health impacts of climate change Infectious diseases Mental health issues	Active travel Healthier immune systems Improved mental health Improved physical health, including reduced obesity, cardiovascular disease, asthma, and diabetes Medication development	Children and young people Low-income groups Older adults People with poor mental health People with underlying health conditions People with disabilities Pregnant women People living in or near grasslands, savannahs, shrublands, forests and woodlands

What is the environmental issue?

The global human population (7.8 billion people) is estimated to represent just 0.01% of the biomass of all living organisms on Earth. Yet, globally, a United Nations-backed panel called the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) reports that around 75% of land and 66% of ocean areas have been 'significantly altered 'by people, driven in large part by the production of food.[145] The current rate of human-induced extinctions is estimated to be between 100 and 1,000 times greater than past natural (background) rates.[146] And one million species, out of an estimated eight million, are at risk of extinction within decades.[147] This global nature crisis is mirrored in the UK, where 15% of species are currently at risk of extinction.[148] The United Nations reports that the number of species, their genetic variation and interaction within complex ecosystems is declining rapidly due to changes in land use (e.g. agriculture or urbanisation), overexploitation, pollution, and climate change.[149]

It is established that, in the words of the European Commission, 'we cannot address biodiversity loss without tackling climate change, but it is equally impossible to tackle climate change without addressing loss of biodiversity. Protecting and restoring ecosystems can help us reduce the extent of climate change and cope with its impact.[150] Ecosystem degradation reduces carbon storage and sequestration capacity, leading to greater greenhouse gas emissions.[151] Healthy ecosystems not only support climate change mitigation, by storing carbon (e.g. in forests and peatlands) and limiting atmospheric greenhouse gas concentrations, but also support climate change adaptation by absorbing flood water and reducing coastal erosion.[152]

'Net zero needs nature. Nature needs net zero. Both need to be resilient to the climate of the future. Nature's fantastic ability to trap carbon safely and provide other important benefits is proven—peatland, woodland, saltmarsh and other wild habitats are vital carbon stores. But these natural places are in decline and face even greater risk of degradation from the extreme climatic conditions that are already inevitable over the next 30 years. It's becoming a vicious spiral of damage—one that has to be stopped right now.'

Craig Bennet, CEO, Wildlife Trusts, 2021

What are the health impacts?

Infectious diseases

Biodiversity protects us from the spread of diseases through the 'dilution effect', where infected species are diluted in diverse ecosystems with naturally functioning pest control mechanisms and intact food chains. Both the number and the variety of species in an ecosystem is important. Each plays a different role, so a shift in the balance can have significant and unpredictable impacts on disease.[153] The UN's Global Biodiversity Outlook report, published during the Covid-19 pandemic, highlighted the links between 'unprecedented biodiversity loss' and the spread of disease.[154]

Around 60% of all infectious diseases and three quarters of emerging infectious diseases are zoonotic.[155] Zoonotic diseases are caused by bacteria and viruses that spread between animals and humans. On average one new infectious disease emerges in humans every four months, and zoonotic pathogens are more than twice as likely to be the source of emerging diseases than non-zoonotic pathogens.[156] Covid-19, HIV, malaria, and some strains of flu (e.g. H1N1) are zoonotic diseases. There is evidence that human degradation of natural environments through destruction of ecosystems and poorly-regulated trade in wildlife may increase the risk of emergence of such diseases.[157]

Mental health

The pollution and toxic chemicals that contribute to loss of biodiversity also directly jeopardise our mental health (see toxics and pollution / page 45). Conversely, access to a thriving natural world supports positive mental health and well-being. For example, The Mental Health Foundation reported that 45% of people in the UK felt that access to green spaces was vital for mental health during the Covid-19 pandemic.[158]

Research shows that levels of stress decrease as green spaces in a neighbourhood increase, and that the frequency of visits to green spaces and views of green space from the home are significant predictors of general health.[159] Specific studies have found that access to high quality green space reduces psychological distress among low-income communities in urban areas[160] and that more biodiverse green spaces are better for our psychological health.[161] Higher levels of green space are also linked to lower stress levels and healthier cortisol levels among unemployed middle-aged men and women in less privileged urban areas.[162] Based on this, the 'social prescribing' movement is starting to prescribe time in nature, with positive results.[163] For example, participants of the Wildlife Trust's volunteering programmes reported that their mental well-being increased by over 8% during the course of their participation.[164]

Increasing the amount of green space people can access and reversing our declining rates of biodiversity could therefore be an answer to delivering health benefits at scale, reducing the burden on the NHS, and improving our environment.

Physical health

If you have access to natural environments you are less likely to develop physical health issues like cardiovascular disease, obesity, diabetes, asthma hospitalisation and early mortality, and the risks of obesity and myopia in children are lower.[165] Evidence suggests that exposure to green spaces also supports healthier immune systems, by encouraging human microbiomes (the microbes that live in the body, including 'good bacteria' in the gut), which are associated with reduced allergies, asthma, and chronic inflammatory diseases; all of which are on the rise in urban areas.[166]

Medications

Loss of biodiversity not only makes the emergence of new diseases more likely, it also threatens our ability to develop treatments. Biodiversity offers genetic resources for the development of many medications and vaccines. For example, the antimalarial drug artemisinin is derived from the sweet wormwood plant, and the heart disease drug digitalis is derived from the foxglove plant. Similarly, 70% of drugs used for cancer are natural or inspired by nature.[167]

Who is affected?

Research shows that globally grasslands, savannahs and shrublands are most affected by loss of biodiversity, followed closely by many of the world's forests and woodlands. Communities in these areas are facing uncertain futures as the level of biodiversity becomes increasingly unable to support them.[168] In 2020, the largest declines in biodiversity were found in some of the **poorest regions of the world**, with a 94% decline in biodiversity in South America and a 64% decline in Africa.[169]

Loss of biodiversity affects **everyone**, in raising the risk of disease, exacerbating climate change, and influencing our physical and mental health wherever we live. Green spaces are also linked to increased social capital, reduced crime rates, reduced violence, and increased community cohesion through fostering interaction between different ethnic groups.[170] Nevertheless, there are especially direct and tangible health links to green spaces for particular groups.

People **with underlying health conditions** can particularly benefit from access to green spaces. So too can **pregnant women**. Exposure to green spaces during pregnancy is associated with reduced exposure to pollution, increased physical activity, reduced stress, and healthier birth weights[171].

People in **less privileged communities** in the global north, where minority ethnic groups are often disproportionately represented, can also particularly benefit from access to green spaces, as it is associated with reductions in health inequalities. For example, access to green space can reduce inequalities in mental well-being between well-off and socially deprived groups by 40%[172] and reduce early deaths in deprived areas.[173]

Children and young people particularly benefit from access to green spaces, with growing evidence of the beneficial effects of nature on the mental health and cognitive development of children. For example, research has found 11-year-old children living in greener urban neighbourhoods had a better spatial working memory,[174] children raised in greener neighbourhoods showed greater cognitive ability at all ages[175] and that green school playgrounds improve well-being and reduce physiological stress in schools.[176] A range of studies have also demonstrated the positive impact of green space exposure on attention deficit hyperactivity disorder (ADHD) and related symptoms.[177]

Older adults can also benefit from access to green spaces. Although research here is limited, studies have identified that living closer to green spaces can contribute to better physical functioning at older ages, slowing decline in walking speed and grip strength.[178]

Green spaces also bring social interaction opportunities to this often sedentary and isolated part of the community.[179] Studies show that green space can reduce social isolation, which is a known predictor of morbidity and mortality.[180]

What could you fund?

Much impactful work is being done to **prevent and reduce loss of biodiversity** and **restore habitats** in the UK and around the world. Yet whilst many countries are now taking action on loss of biodiversity, it has not been sufficient to slow the decline. In response, scientists, environmentalists, animal welfare campaigners, food safety experts and vets have begun to encourage the interdisciplinary approach 'One Health', or more recently 'One Welfare', to designing and implementing programmes, policies, legislation, and research in which multiple sectors communicate and collaborate for better public health outcomes. The scale and pace of this work means further funding is required for it to continue.

Funders can support **projects, advocacy and campaigns that prevent and reduce loss of biodiversity**, including **action on climate change**. Funders can also support increased **access to green spaces** to improve health and well-being, whether protecting or developing green spaces for the whole community or encouraging specific groups to utilise these spaces via **'social prescribing' and similar outdoor engagement programmes.**

2.5. Food consumption and production

Health risks	Health opportunities	Most affected groups
Antibiotic resistance Asthma Bacteria and disease Cancer Cardiovascular disease Depression Fatigue and muscle weakness High blood pressure Obesity Osteoporosis Malnutrition / hunger Exacerbates health impacts of loss of biodiversity and climate change	Improved immunity Improved nutrition Lower blood pressure Reduced cholesterol Reduced obesity Reduced risk of cancer Reduced risk of heart disease and strokes Reduced risk of type 2 diabetes	Children and young people Low-income groups Pregnant women

What is the environmental issue?

Global food production is one of the key drivers behind loss of biodiversity, as well as contributing to a host of other environmental issues such as water pollution. Most critically, it is now widely recognised that it will be impossible to keep global temperatures at safe levels unless we transform food production and consumption.[181]

The Intergovernmental Panel on Climate Change reports that greenhouse gas emissions from our land use, both agriculture and forestry, account for 23% of total emissions, with the bulk of that from agriculture.[182] When you include the supply chain emissions, this figure could rise to around 30% of total emissions coming from the global food system.[183] Livestock farming produces the potent greenhouse gas nitrogen, as well as methane, which has a ‘warming potential’ more than 80

times that of CO_2.[184] A significant proportion of livestock feed is composed of soy, grown in areas cleared of tropical forests, which is ecologically and climatically devastating.

In addition to the climate impacts, the WWF Living Planet Report 2020 found that how we produce and consume food is wiping out nature at an unprecedented rate. Changing land use for food production is the biggest driver of nature loss and already around 50% of the world's habitable land area is used for agriculture—for livestock and for crops that feed both people and livestock.[185] Of particular concern is that pollinators in Britain have declined by over one third,[186] and with an overall insect decline of 75% over the last fifty years, we are heading for an insect apocalypse that could have catastrophic impacts on our ecosystems, our food supply and our health.[187] More than 75% of global food crops rely on animal pollination[188] and the intensive use of chemicals such as pesticides and fertilisers are threatening the pollinators and the health of the soil on which our food security depends (see toxics on land and in water, p 45).[189]

What are the health impacts?

Many of the health impacts of food production and consumption that intersect with its environmental impacts are associated with the changing climate, the consumption of meat, as well as the use of intensive and factory farming methods for food.

Nutrition

Rising CO_2 levels are already driving down the nutritional value of many staple crops including rice and wheat.[190] Research shows that when food crops like wheat, corn, rice, and soy are exposed to CO_2 at levels currently predicted for 2050, the plants lose up to 10% of their zinc, 5% of their iron, and 8% of their protein content. Nutritional deficiencies can lead to a wide range of health issues including reducing the strength of the immune system and reducing development of haemoglobin, which is required to move oxygen in our blood.

Factory farmed meat is bad for the environment and for our health. In addition to the significant contribution it makes to climate change by releasing large amounts of carbon dioxide and methane,[191] factory farmed meat has been shown to have lower nutritional value (higher omega-6 and lower omega-3) than non-factory farmed meat. An inadequate intake of omega-3 and an unbalanced ratio of omega-6 to omega-3 have been linked with cardiovascular disease, cancer[192] and obesity.[193] In contrast, products from animals raised with better welfare practices often contain more antioxidants and iron and less fat.[194] In addition, the rise of mass produced, low-cost meat

has led to overconsumption of red and processed meats, which is linked to obesity, diabetes, and cancer.[195]

Intensive arable agriculture risks reducing soil health and can in turn reduce the nutrients in our food. For example, the magnesium in our food is decreasing,[196] [197] and this has been linked to depression, osteoporosis, fatigue, muscle weakness, high blood pressure and asthma.[198] 95% of our food comes directly or indirectly from the soil,[199] so soil health deterioration is a significant threat to human health. Nature-friendly farming approaches have the potential to provide high quality food for all, assuming predominantly plant-based diets and that the global population remains within a sustainable limit.

Bacteria and disease

Intensively-reared animals often live in overcrowded conditions which encourages the spread of bacteria such as E. coli and salmonella which can cause gastroenteritis. For example, battery-cage farms are six times more likely than non-cage farms to be infected with the strain of salmonella most commonly associated with food poisoning.[200] Overcrowded conditions are stressful for animals, and as stress suppresses the immune system animals raised and transported for food in overcrowded conditions are more susceptible to disease.[201] That leads to the overuse and misuse of antibiotics in factory farming, which in turn contributes to the development of antibiotic resistance (see below).[202]

Intensive production of dairy products poses similar health risks, for example through the spread of bovine leukaemia virus (BLV).[203] The odds of humans developing breast cancer if they are BLV positive is 3.1 times greater than if BLV negative, which is higher than any of the frequently publicised risk factors for breast cancer, including obesity, alcohol consumption and use of post-menopausal hormones. BLV is likely acquired via consumption of dairy products, and whilst transmission risks are unclear it is known that between 83% (herds under 100) and 100% (herds over 500) of dairy operations test positive for BLV antibodies in pooled milk tanks.[204]

While many zoonotic diseases originate in wildlife, livestock often serve as a bridge between wildlife and human infections. This is particularly the case for intensively-reared livestock as their resilience is hindered by limited genetic diversity in herds bred for food production rather than disease resistance.[205] More than 50% of zoonotic diseases, and more than 25% of all diseases, can be traced back to agricultural drivers.[206]

Antibiotic resistance

Antibiotics are vital for modern medicine, but our ability to manage infection is increasingly compromised by antibiotic resistance. According to the World Health Organization (WHO),

antibiotic resistance is one now of the biggest threats to global health.[207] Globally, failure to address the problem of antibiotic resistance could result in ten million deaths every year by 2050.[208] Antibiotic resistance of disease-causing bacteria is known to be, in part, caused by the over-use and misuse of antibiotics in factory farming,[209] which accounts for around half of global antibiotic use.[210] Antibiotics are used extensively in factory farms in order to treat the symptoms of poor animal welfare.

'If we fail to act, we are looking at an almost unthinkable scenario where antibiotics no longer work and we are cast back into the dark ages of medicine where treatable infections and injuries will kill once again.'

David Cameron, former UK Prime Minister, 2014

Climate change is exacerbating the issue

Climate change, including floods, heatwaves, and wildfires, puts food supplies at risk by reducing crop yields and disrupting transportation. Climate change also alters the distribution of pests and diseases, affecting food production in many regions.

'Large swathes of the globe, from Madagascar to Honduras to Bangladesh, are in the throes of a climate crisis that is now a daily reality for millions. The climate crisis is fuelling a food crisis … Conflict is plunging millions into hunger today, but the climate crisis has the potential to dwarf conflict as the main cause of hunger tomorrow. We urgently need to invest in early warning systems and climate adaptation and resilience programmes to avert this looming humanitarian disaster.'

David Beasley, Executive Director of World Food Programme, 2021

A World Food Programme analysis predicts that a 2°C rise in average global temperature from pre-industrial levels will see 189 million additional people in the grips of hunger.[211]

Benefits of low meat diets

As we adapt to climate change and, hopefully, breed more resilient crops with maintained nutrient contents, then a climate-friendly diet, high in locally produced, seasonal fresh fruit and vegetables and low in red meat, should bring significant health benefits. Many people are already making this dietary change, with the number of people adopting a vegan diet in the UK increasing by 40% in

2020 and even more adopting flexitarian, vegetarian and Mediterranean diets, or simply eating less meat.[212]

A reduced meat diet could help to mitigate climate change by reducing greenhouse gas emissions associated with livestock farming and also, by requiring less land to feed the same number of people, freeing land for regeneration of natural ecosystems such as forests or peat bogs that help to reduce atmospheric carbon.[213] Eating less meat has a range of health benefits, including:

- Reduced risk of cancer.[214] [215]
- Lower blood pressure, lower cholesterol, and reduced risk of heart disease.[216]
- Reduced risk of type 2 diabetes[217] (eating plant protein instead may protect against type 2 diabetes[218]).
- Healthier immune system.[219]
- Reduced risk of stroke.[220]
- Better gut health and digestion.[221]

Who is affected?

Across the world climate change is affecting food production. Particularly drought, but also flooding is driving a rise in the number of people going hungry. Steep falls in food production means less income for small producers and higher food prices—putting a healthy diet beyond reach for the poorest people. Action Against Hunger reports that across Latin America, South East Asia and Africa severe drought is a leading cause of undernutrition in more than a third of countries that have seen a rise in hunger levels in the last 15 years.[222]

Globally and in the UK, nutritional changes have a disproportionate impact on **low-income groups,**[223] widening existing equity gaps in nutrition and health outcomes.[224] This is particularly the case where increases in food prices may drive low-income households toward lower-cost, less nutritionally valuable food—especially high sugar, high-fat foods.[225]

'Decisions we are making every day—how we heat our homes, what we eat, how we move around, what we choose to purchase—are making our food less nutritious, and imperilling the health of other populations and future generations.'

Sam Myers, Director of the Planetary Health Alliance at the Harvard Chan School, 2018

What could you fund?

Funders can support **nature-friendly farming, sustainable food production** and projects that encourage people to **eat less meat**. It's vital that agriculture-related **pollution and toxics** projects, advocacy, campaigns, and research get the funding they need to continue. Working with **existing grantees** to understand how the health issues and social groups they support are affected is important to raise awareness and address the environmental determinates of health and maximise opportunities for all. More work to understand the impact of the changing climate on food security and nutrition upon the health of **pregnant women, babies and children**, and to address **health inequalities** would be particularly valuable.

2.6. Toxics and pollution on land and in water

Health risks	Health opportunities	Most affected groups
ADHD Blood conditions Cancers Cardiovascular diseases Depression and anxiety Diabetes Kidney disease Neurological damage and lower IQ Parkinson's disease Reproductive issues and developmental toxicity Respiratory conditions Skeletal and bone diseases Gastroenteritis Eye, ear, chest, throat and skin infections Arthritis Inflammatory reactions Metabolic disorders	Mitigating health risks Improved nutrition	People working in related industries People living in or near contaminated sites Children and young people Pregnant women and babies (especially breastfed infants)

What is the environmental issue?

Human behaviour is polluting land and water with a range of man-made toxics including pesticides, industrial waste, chemicals used in agriculture, medications, and redundant products.

The most common human induced contaminates of our soil are the chemicals used in or produced as by-products of industrial activities; domestic, livestock and municipal wastes (including wastewater); agrochemicals; and petroleum-derived products.[226] Heavy metals such as cadmium, arsenic and mercury enter our soils through mining, smelting, industry, agriculture, burning fossil fuels and poor disposal of redundant products such as paint, electronic waste and sewage.[227]

The Environment Agency reports that all of England's rivers, streams and lakes are polluted, with the most concerning pollution coming from sewage, farming, and industrial chemicals.[228] Rainwater can wash chemical pollutants, including those listed above, from the soil into waterways. Pollution ultimately reaches our oceans, with 80% of marine pollution originating on land—be that chemical pollution in the water or plastic debris blowing or washed out to sea.[229] In addition, wastewater and sewage contaminate our water systems. Sewerage networks, particularly after heavy rain, discharge overflows of untreated effluent and storm water into rivers.[230] Without appropriate measures, the increased precipitation resulting from climate change is likely to exacerbate this issue.

This is a global challenge. The UN estimates that globally as much as 80% of wastewater enters the ecosystem untreated.[231]

What are the health impacts?

Land pollution impacts

Chemical pollution on land can impact human health directly, or indirectly by disrupting the delicate balance of ecosystems on which we depend for our food and more. Many contaminants can be detected at levels dangerous to human health even decades after they were released.

Arising health issues include the following:[232] [233] [234]

- Attention deficit and hyperactivity disorder (pesticides).
- Blood conditions (benzene, lead).
- Cancers (arsenic, asbestos, dioxins, pesticides).
- Cardiovascular diseases (arsenic, lead, mercury).
- Depression and anxiety (pesticides).
- Diabetes (arsenic).

- Kidney disease (lead, mercury, cadmium).
- Neurological damage and lower IQ (lead, arsenic, dioxins, mercury).
- Parkinson's disease (pesticides).
- Reproductive issues and developmental toxicity (arsenic, dioxins, mercury).
- Respiratory conditions, including asthma (pesticides).
- Skeletal and bone diseases (lead, fluoride, cadmium).

The most dangerous health risks are through exposure to multiple chemicals in a 'cocktail effect'. For example, over a third of all fruit and vegetables in the UK test positive for more than one pesticide, including carcinogens and endocrine disruptors.[235] Toxics such as pesticides are linked to depression and psychiatric disorders.[236] We are exposed to many different endocrine disrupting chemicals (EDCs) via our food, water, air, and many common household products[237] such as solvents, non-stick pans, and some plastics.[238] EDCs are thought to be linked with an increase in neuropsychiatric disorders including autism, attention deficit and hyperactivity disorder, learning disabilities, aggressiveness and depression.[239] Other health concerns relating to EDCs include potential impact on fertility, hormone-related cancers, impaired brain development, obesity, and diabetes and breast cancer. [240] [241]

As well as affecting our hormones, toxics can also alter the composition of the microbiome in our gut, which is increasingly suspected to play a role in how we think, feel and act.[242] We already know our gut health is affected by lifestyle factors, and it is suspected that toxics in our diet, toiletries, make-up, and cleaning products—as well as air pollution[243]—can affect our microbiome and in turn our mental health. Sadly, in a more direct link, toxics play a tragic role in suicide, with 15-20% of global suicides per year facilitated through ingestion of pesticides.[244]

In addition to the direct health risks, soil pollution can also affect food security by reducing crop yields or making produce unsafe for consumption by animals and humans. Toxics also affect the health of the wider ecosystem, ultimately leading to further human health risks through loss of biodiversity and climate change (see loss of biodiversity and access to green spaces p 34).

Water pollution impacts

Polluted water can cause gastroenteritis as well as eye, ear, chest, throat and skin infections. Even where wastewater and sewage are 'treated' there remain health risks, for example oestrogen from the contraceptive pill and hormone replacement therapy medications are found throughout the

UK's waters to the extent that it is causing mutations in fish.[245] The health impact on humans is as yet unknown.

Our understanding of the health impacts of ingestion of microplastics that pollute water are still evolving, however studies show they may cause oxidative stress, inflammatory reactions, and metabolic disorders.[246] Recent research suggests that such plastic pollution can exacerbate allergies, arthritis, diabetes and chronic obstructive pulmonary disease (COPD) by causing inflammation.[247]

Who is affected?

Everyone is affected by toxics in our land and water. The majority of the population are exposed to a cocktail of chemicals every day from the food we eat, to the cleaning products and toiletries we use.[248] [249] [250]

The wider impacts of toxics and pollution are not fully understood. For example, more research is needed into the impacts on **pregnant women, babies (especially breastfed infants) children and young people**.

What could you fund?

There are a very small number of charities directly addressing the use of chemicals such as pesticides and endocrine disrupters. A wider range of organisations are working more broadly to protect our rivers, lakes, seas and land from pollution alongside other threats. There are also numerous local community groups addressing specific toxics and pollution issues, such as the illegal release of untreated sewage or the health effects of poorly managed landfill sites.

Funders can support **pollution and toxics projects, advocacy, and campaigns, including litigation** to hold governments and businesses to account. Funders can also support further **research** and **community-led action** to improve the health security of their communities.

Case study: Wellcome Trust

Health research is key to surviving climate change

Our planet is changing in ways that are unprecedented in human history, and which directly threaten human health. But these changes also bring opportunities to protect and improve health—if we can understand them and respond appropriately.

As Britain's biggest research grant funder, Wellcome spends around £1bn each year to support discovery research into life, health, and well-being. In response to the environmental changes threatening humanity's health and well-being, in 2015 we launched the initiative 'Our Planet, Our Health'. Since then, we have invested £70m per year to support researchers to take on the challenges that food systems, increasing urbanisation and climate change pose to our health. We aim to stimulate research excellence and develop global collaborations to drive change.

We believe these areas are key to our future health and well-being because projections show that by 2050, if current trends continue, we will need to produce 60% more food, two-thirds of the world's population will live in cities, and extreme heatwaves could push parts of the world, for example India, China and the Middle East, beyond human endurance.

In addition to our research partnerships, we also support the Lancet Countdown, which tracks progress on the health impacts of climate change, and EAT, a science-based global platform for transforming food systems.

Wellcome developed a new strategy in 2020 / 21, and now focus on taking on three worldwide health challenges—mental health, infectious disease and climate & health—as well as continuing to fund discovery research. The detailed strategy is currently under development. Our vision is a world in which global warming does not harm health in the communities it affects most, where no one is held back by mental health problems, and where escalating infectious diseases are under control in the communities most affected. No part of the world is immune from the harmful effects of climate change on health.

3. How to take action

Strategic considerations

The table below poses a number of questions that funders should ask when thinking about how to address the environmental determinants of health.

	Learn	Act
Current strategy	What are the gaps in our understanding about the environmental determinants of human health in relation to our existing portfolio?	How could our existing portfolio better support the environmental determinants of human health?
Future strategy	How might we better support the environmental determinants of human health in our future portfolio?	How and when can we adjust our strategy to better support the environmental determinants of human health?
Supporting diversity, equity, and inclusion	How are the social groups or communities we support most affected by the environmental determinants of health	Who will we be able to better support by considering the environmental determinants of health and / or related diversity, equity, and inclusion issues?
Working with others	Which health / environment partners might we work with, be that charities, other funders, networks, or existing collaborations?	How and where might we collaborate with charities, other funders, networks, or existing collaborations?
Greening operations	To what extent do our investments and our procurement align with our values and support the environment, including environmental determinants of health?	How might we (further) green our investments and procurement?

What to fund

Philanthropy is a vital force for addressing environmental challenges, helping to incubate solutions, protect habitats, drive policy change and much more. But not nearly enough of it has addressed the environmental determinants of health to date—environmental issues receive just 6% of overall philanthropy, a figure that has only recently risen from even lower levels.[251] Your funding could make a significant impact addressing the environmental drivers of health issues now and for the future.

'I have often found potential philanthropic funders are interested in either health, or climate change and environmental concerns (or one particular area within either topic)—but not as interested in potential areas of collaboration or overlap between these issues. Unfortunately, this leads to proposals being tailored to one area, and opportunities for collaboration and intersection being lost. This is a real challenge and means that work to address the consequences of climate change and environmental degradation on human health is significantly under resourced.'

Mary-Alice McDevitt, London School of Hygiene and Tropical Medicine's Centre for Climate Change and Planetary Health, 2021

The funding advice in Section 2, and the learning and action questions above, can be summarised into three leading funding issues:

1. Prevent intersectional issues from falling through the gaps

Many funding streams remain either health or environment focussed. In doing so we ignore the overlap between issues and miss the opportunities for interdisciplinary knowledge sharing and addressing root causes. Funding at the intersection of health and the environment is a win-win for all.

2. Help your existing grantee partners to consider what the environmental crises mean for them

Many health charities have limited time and resources to improve their understanding of the environmental determinants of health, and what the climate and nature crises—and their potential solutions—mean for them and the people they support. Introducing grantees to resources and experts on the links between health and the environment, and providing them with long-term, unrestricted funding to enable them to embrace new opportunities could create a sea change in the health sector.

3. Help environmental charities to drive transformative change in the UK

Environmental philanthropy is estimated to represent just 6% of total giving from UK trusts and foundations.[252] Funding is not only needed for implementation of practical solutions and advocacy efforts, to encourage their uptake, but also for research and innovation; strategic litigation; public education and much more, from the local to the global level. Philanthropy is vital in the fight against the climate and nature crises, taking forward work that cannot necessarily be supported by governments or the private sector. Philanthropic grants can take risks, catalyse transformative solutions and push for systemic change. There are numerous environmental organisations doing brilliant work at all scales and levels (see page 62), and even comparatively small amounts of funding can have a tangible impact; for examples, see the Environmental Funders Network's 'Stories to Inspire' compilation.

Investing in line with your values

There's little point in philanthropy if the impact of what you give with one hand is undermined by what you invest with the other. Aligning your investments with your mission and values is a critical way in which funders can use all their assets to support positive social and environmental change. This can be achieved through a combination of persuading companies you invest in to stop environmentally damaging activity, and / or disinvesting from environmental damaging companies.

Not only is it worth considering whether it is contradictory to your values to profit from companies that contribute to climate change, loss of biodiversity and pollution, but you may also wish to consider whether it is financially prudent to invest in fossil fuels as their era comes to an end, as well as your fiduciary duty to manage the climate change risks to your investment portfolio.

The Charity Commission published draft guidance on 'responsible investing' for consultation during 2021. Many charities and funders reported the guidance unclear and while the commission's consultation was ongoing, the court gave permission to two charities to bring proceedings seeking clarity about their powers to adopt responsible investment policies which would allow them to exclude investments that are not aligned with those charities' purposes, stating that the proceedings 'would benefit charities generally and inform the commission's guidance'. Therefore, the publication of the final guidance is on hold pending the outcome of those cases.[253]

More information about how to do this can be found from DivestInvest, 350, Divest UK, Share Action, and others such as the Say on Climate campaign, calling for shareholder voting on climate transition plans. You can also sign up to the commitment on responsible asset management, to be

launched by Students Organising for Sustainability UK and Friends Provident Foundation in partnership with the Charities Responsible Investment Network (CRIN) and Responsible Investment Network—Universities (RINU).

Innovative finance alongside grant-making

Innovative finance approaches from funders present a growing range of opportunities to support social and environmental impact. The spectrum of innovative finance options includes:

- **Social and environmental investment approaches**, whereby a form of repayable finance helps an organisation achieve social or environmental impact. The financier is repaid through trading, contracts for delivering public services, grants or donations. The money is then used elsewhere to support another organisation. For example, the Esmée Fairbairn Foundation's partnership with Defra and the Environment Agency, with the support of Triodos Bank UK, supports environmental projects and attracts private sector or other investment to help tackle climate change and restore nature (see the case study on page 55).

- **Impact investing**, whereby funders are willing to take potentially higher risk and sometimes lower financial returns than traditional investors in expectation of social / environmental impact. For example, Guy's and St Thomas' Charity uses impact investing as another means of extending its impact beyond grant-making alone. The charity uses these investments to replenish its endowment and ultimately grow the available resource pot to support its charitable work.

'The environmental sector is evolving, with new models emerging which can attract diverse revenue streams and private capital to sit alongside public sector funding … due to lack of historic investment, the environmental space seems a number of years behind the social investment market … there is a clear demand for environmental investment opportunities—particularly for large institutional investors—so we need to support the development of a range of sustainable environmental models able to access this capital.'

Ben Smith, Head of Social Investment, Esmée Fairbairn Foundation, 2021

Case study: Polden-Puckham Charitable Foundation

Investing faithfully with your values

At Polden-Puckham, we seek to invest our resources responsibly to promote our values and mission, or at the bare minimum not to contradict or undermine them.

We invest in accordance with our mission and Quaker values. We avoid investments in alcohol, weapons, oil, gas and other fossil fuels, mining, nuclear energy, pornography, gambling, tobacco, supermarkets, large banks, and government bonds. We place equal importance on low carbon investment: specifically, investment in companies (including suppliers) aiming to operate within a 1.5°C limit. We have set a target for our portfolio to be fully invested in 'climate sustainable assets' by 2025, by which we mean investments with a major link to climate mitigation technologies or renewable / low-carbon energy development such as directly supporting a low carbon transition.

We recognise that these impact investments may involve more risk in traditional financial terms, but we believe this is worth it for the social and environmental good it achieves, and the damage it avoids.

In addition, our ESG (environmental, social and governance) goals include promoting progressive company behaviour in the companies we invest in. This is not just about environmental issues but also in relation to pay, gender, transparency and other ESG criteria. We endeavour to invest in companies that commit to gender equality, including equal pay.

We believe we should spend as much time and effort on our investment strategy and practice as we do on our grant-making. We are seeking to develop good practice as a foundation, both in relation to transparency concerning the sources of our funds, and an investment policy that does not contradict our grant-giving purposes or compromise our ethical standards.

Case study: Esmée Fairbairn Foundation

Beyond grant-making: Social investment for people and planet

The Esmée Fairbairn Foundation made its first social investment in 1997. Since then, the Foundation has made over 170 social investments using £66m of capital. Esmée Fairbairn's £45m social investment fund recycles all of its returns into new social investment opportunities.

The foundation takes an 'impact-first' approach to making social investments: starting with the social need and tailoring investment by adapting and selecting financial instruments that are most appropriate to create the greatest impact. Esmée Fairbairn's approach is based on the idea of co-designing funding solutions with investees and sharing its learning with the market in an attempt to encourage collaborations.

One example of the foundation's impact-first approach is its £10m Land Purchase Facility. The foundation purchases land of high current or potential conservation values on behalf of partner conservation organisations (the RSPB, the Wildlife Trusts, the Woodland Trust). Once purchased, the land is leased to the partner conservation organisation with the option for them to buy in two years' time at the price paid plus a small interest charge, with all returns reinvested. This gives the partner conservation organisation a window to fundraise. As of September 2021, Esmée Fairbairn's Land Purchase Facility has approved £21.7m of investment into 35 pieces of land and has been 100% successful in transferring ownership to the partner conservation organisation.

The foundation plans to continue to support others through partnerships, particularly with those new to investing. A recent success story is the collaborative pilot formed with Defra and the Environment Agency. This pilot used research and development grant funding to help projects that are delivering environmental improvements to develop business plans and identify additional revenue streams to complement ongoing public sector support.

The projects supported include the River Trust's Wyre catchment Natural Flood Management (NFM) project which is testing a model by which private buyers pay for the benefits generated by NFM, such as reduction in flooding severity. Improvements to water quality and biodiversity are additional expected impacts to occur due to the project.

Greening operations

By far the greatest support a funder can make toward addressing the climate, nature and pollution crises and their health implications are through investments and grants. However, you should also consider your own operations and how you collaborate with grantees.

You should consider the following areas within your trust or foundation:

- Energy consumption.
- Reducing, reusing, recycling and waste management.
- Cleaning products.
- Travel.
- Procurement.
- Training and awareness raising with staff / volunteers / trustees.

It's also important to consider the following areas with regards to how you collaborate with your grantees and partners:

- Whether existing grantees require further information and / or resources to be able to green their operations.
- Whether existing grantees require resources to create space to think about the environmental impact and improvement opportunities within their work.

Further information and practical resources can be found via: Fit for the Future, SME Climate Hub and Acting on the Climate Crisis – Why, How and the Role of Philanthropy: A resource pack for funders by the Environmental Funders Network and the Association of Charitable Foundations.

Case study: Savitri Trust

Supporting environmental health to support human health

At Savitri, we are driven by the belief that every person has a right to good health. For over twenty years our family trust has been funding programmes that improve the well-being of individuals and communities in India and the UK. In doing so, we've come to realise that the best thing we can do to support human health is to support environmental health.

In 2018 we had a revelation as a family that although the work we were doing to fund curable blindness and palliative care in rural India is of great value, the moment had come to put more of our resources and energy into protecting the health of our environment. And—more pivotal for us—that the 'environment' shouldn't be seen as a separate programme to community health. How can it be when the two are inextricably linked?

We see the connections with communities we work alongside in India: extreme droughts affecting farmers in Chhattisgarh, serious flooding restricting travel between eye camps in Bihar, toxic pollution and pesticides harming the health of whole communities. We see the poorest, most rural communities being impacted the most by the degradation of our planet. Anything harming the environment also harms us. Our bodies absorb our environment. And it's not just in India, we are increasingly seeing the same challenges here in the UK.

We have developed our funding strategy to partner with organisations to address the interconnected health and environmental issues we face today. Our grantees include Pesticide Action Network UK, ClientEarth, Farming the Future, Beaver Trust and the Amazon Alliance. This is an 'all hands on deck' moment for planetary health. We have precious little time left and a woefully underfunded sector. The moment to act is now.

Making a commitment

New funders are signing up to the UK's Funder Commitment on Climate Change all the time. They're doing so because they recognise that the growing climate emergency is a serious risk to the pursuit of all charitable aims, and that foundations with wide-ranging charitable missions and expertise can support efforts to adapt to climate change and tackle its causes.

The funder commitments are:

1. **Educate and learn**: We will make opportunities for our trustees, staff and stakeholders to learn more about the key causes and solutions of climate change.
2. **Commit resources**: We will commit resources to accelerate work that addresses the causes and impacts of climate change. (If our governing document or other factors make it difficult to directly fund such work, we will find other ways to contribute, or consider how such barriers might be overcome).
3. **Integrate**: Within all our existing programmes, priorities and processes, we will seek opportunities to contribute to a fair and lasting transition to a post-carbon society, and to support adaptation to climate change impacts.
4. **Steward our investments for a post-carbon future**: We will recognise climate change as a high-level risk to our investments, and therefore to our mission. We will proactively address the risks and opportunities of a transition to a post-carbon economy in our investment strategy and its implementation, recognising that our decisions can contribute to this transition being achieved.
5. **Decarbonise our operations**: We will take ambitious action to minimise the carbon footprint of our own operations.
6. **Report on progress**: We will report annually on our progress against the five goals listed above. We will continue to develop our practice, to learn from others, and to share our learning.

The Funder Commitment can be signed online or by contacting the Association of Charitable Foundations. There are also a growing number of similar commitments in other countries, as well as an International Funder Commitment on Climate Change. An Individual Philanthropist's Commitment on Climate Change has also recently been launched, for those who give directly to charities, those who give via a community foundation or donor advised fund, and those who have a small, unstaffed charitable trust or foundation from which they manage their private giving.

Appendix 1: Recommended resources

Acting on the Climate Crisis – Why, How and the Role of Philanthropy: A resource pack for funders (Environmental Funders Network and the Association of Charitable Foundations, 2021)	A regularly updated resource pack providing information on climate change as well as linked social and environmental issues.
Healthy Planet, Healthy People series (Environmental Funders Network, 2021)	A webinar series and accompanying resources (of which this briefing paper is one) coordinated by the Environmental Funders Network.
Lancet Countdown 2020 Report (Lancet Countdown, 2021)	Annual report tracking the relationship between health and climate change from the Lancet Countdown, a collaboration of over 120 international experts.
COP26 Special Report on Climate Change and Health: The Health Argument for Climate Action (World Health Organisation, 2021)	Recommendations to address the health impacts of climate change, developed in consultation with over 150 organisations and 400 experts and health professionals, intended to inform governments and other stakeholders ahead of COP26.
The connections between climate and our health (Wellcome, 2021)	Four briefings looking at the evidence on how current food, energy, transport and health systems are contributing to the climate crisis and impacting people's health, and how they can also be part of the solution.
Healthy environment, healthy lives: how the environment influences health and well-being in Europe (European Environment Agency, 2020)	Report on the impacts of the quality of the environment on human health and well-being in Europe.

The invisible threat: how we can protect people from air pollution and create a fairer, healthier society (Asthma UK and the British Lung Foundation, 2021)	Report on the health impacts of particulate matter pollution in the UK.
Philanthropy Briefings on COVID-19 and Conservation, a Green Recovery and Human Health and the Environment (Liz Gadd on behalf of EFN, 2020)	Briefings for funders on the intersection of environmental issues with the Covid-19 pandemic and human health more broadly.
Funding the Future: How the climate crisis intersects with your giving (Active Philanthropy, 2020)	Guide for funders on how climate change intersects with giving to other issue areas.
Climate Change and Social Change – how funders can act on both (Ten Years' Time, 2019)	Guide for funders on how climate change intersects with social issue areas.
Healthy Environments, Healthy People briefing (Health and Environment Funders Network, USA, ~2015)	Briefing for USA funders on the intersection of the environment and human health.
Case study of a health crisis: How human health is under threat from over-use of antibiotics in intensive livestock farming (Alliance to Save Our Antibiotics, 2011)	Report on how human health is under threat from over-use of antibiotics in intensive livestock farming.
Feeling the heat (British Red Cross, 2021)	Report on the health impacts of heatwaves in the UK.
Thriving with Nature (WWF and the Mental Health Foundation, 2021)	Report on the benefits of time in nature for mental health and well-being.

All Consuming: Building a Healthier Food System for People and Planet (UK Health Alliance on Climate Change, 2020)	Report providing recommendations for building a healthier food system supportive of the environment and human health.
Planetary Health: Safeguarding Human Health and the Environment in the Anthropocene (Andy Haines and Howard Frumkin, 2021)	Book by leading planetary health experts on the environmental changes that threaten to undermine progress in human health.
Tackling a Double-Threat Children at the Front and Centre of Urban Fragility and Climate Change (Plan International, World Vision, UNICEF, 2021)	Briefing to ensure that child rights are firmly embedded in the urban agenda that recognises climate change is a threat multiplier, disproportionately affecting the most vulnerable girls and boys; and that girls and women are also acutely vulnerable because of pre-existing gender inequalities and social norms.

Appendix 2: Example charities

There are many impactful organisations operating in the UK and globally. This list provides examples of organisations known to be actively working at the intersection of human health and environmental issues in the UK, and is certainly not exhaustive. Many more environmental charities work on the environmental determinates of health; for further assistance please contact EFN or NPC.

N.B. Please note that no due diligence has been conducted on the organisations listed.

Organisation	Focus
350.org	An international movement working to end the age of fossil fuels and build a world of community-led renewable energy for all.
African Mountain Research Foundation	UK charity using data and field research to transform understanding of southern Africa's vital mountain systems, improve policy and scale landscape restoration programmes that build long-term water security.
Alliance to Save Our Antibiotics	UK-based alliance of health, medical, civil society and animal welfare groups campaigning to stop the overuse of antibiotics in animal farming.
Asthma-UK and the British Lung Foundation	Partnership of the two leading charities working to combat asthma and improve lung health in the UK.
British Red Cross	The UK's leading humanitarian emergency response organisation, working to support people in crisis, including during heatwaves, floods and other impacts of the climate and nature crises.
Campaign to Protect Rural England	England-focused charity working toward a countryside that's rich in nature, accessible to everyone and plays a crucial role in responding to the climate emergency.

CHEM Trust	UK registered charity working to prevent endocrine disrupting chemicals (EDCs) causing long-term damage to the health of humans and wildlife.
Clean Air Fund	A philanthropic organisation working globally to empower funders, researchers, policymakers and campaigners to deliver clean air for all.
ClientEarth	International not-for-profit that uses the power of the law to protect life on Earth and coordinates the Healthy Air Campaign coalition.
Compassion in World Farming	Animal welfare organisation campaigning against all systems of factory farming that contribute towards an increase in greenhouse emissions, a loss in biodiversity and threaten human health.
Conservation International	USA-based non-profit organisation empowering people to protect the nature that we rely on for food, fresh water and livelihoods.
Dandelion Time	UK charity operating in Kent, offering help to children with very challenging emotional issues, often resulting from trauma, violence or serious health difficulties in the family. Nature-based and therapist-led activities help children and families to strengthen relationships.
Doctors Against Diesel (coordinated by Medact)	A campaign for effective, coordinated policies that will lead to a step-change reduction in the biggest sources of air pollution, supported by leading UK experts on the health impacts of air pollution.
Earth Trust	An environmental learning charity operating on 500 hectares of farmland, woodland and wetland on the bank of the River Thames and seeking innovative ways to stimulate conversations about the health and well-being benefits of nature; food production and farming; ecosystem restoration; and natural resource management by engaging people in green spaces.
England's Community Forests	Twelve England-based Community Forests transforming the landscapes and communities in and around our largest towns and cities, including social prescribing projects.

Environmental Investigation Agency	An international non-governmental organisation exposing environmental crimes and campaigning for the protection of the environment through better enforcement of environmental law and progressive policymaking.
Fauna and Flora International	UK-based charity operating internationally which aims to conserve threatened species and ecosystems worldwide.
Friends of the Earth	A grassroots environmental campaigning organisation working to ensure environmental and social justice, human dignity, and respect for human rights and people's rights in order to secure sustainable societies.
Froglife	A UK charity working to improve amphibian and reptile habitats and inform global research, whilst engaging diverse communities to learn about wildlife conservation.
Gaia Foundation	UK-based charity working with partners, communities and movements in Africa, South America, Asia and Europe to revive bio-cultural diversity, regenerate healthy ecosystems and strengthen community self-governance for climate change resilience.
Global Greengrants Fund	A charitable foundation making small grants to grassroots environmental causes worldwide, supporting community-based groups advocating for issues of environmental justice, sustainability and conservation.
Green Alliance	An independent UK think tank and charity focused on ambitious leadership for the environment.
Green New Deal UK	A UK non-profit movement calling for 'green new deal' solutions that match the scale of the challenge.
Greenpeace	An independent organisation using peaceful campaigning methods to expose global environmental problems and promote solutions for a green future.

Heal Rewilding	UK-based wildlife charity committed to rewilding land across England in response to the climate and biodiversity emergency.
Healthy Food, Healthy Planet Initiative	A collaborative initiative of civil society organisations and funders aiming to align food systems with the climate targets of the Paris Agreement and United Nations Sustainable Development Goals by transforming animal-source foods.
International Union for the Conservation of Nature	A membership union comprising both government and civil society organisations working to conserve nature and accelerate the transition to sustainable development.
LSHTM Centre for Climate Change and Planetary Health	Research institution generating evidence-based solutions for planetary health to ensure a resilient and sustainable planet that fosters good health for all.
Mums for Lungs	Grassroots organisation working to raise awareness of the dangers of air pollution to human health and urging people to take action through various initiatives.
Nature Friendly Farming Network	A UK wide and farmer-led organisation promoting a sustainable form of farming, with a focus on improving biodiversity and public health.
New Economics Foundation	A UK think tank promoting social, economic and environmental justice.
Pesticide Collaboration (Coordinated by Pesticide Action Network UK and the RSPB)	Brings together health and environmental organisations, academics, trade unions, farming networks and consumer groups under a shared vision to urgently reduce pesticide-related harms in the UK for a healthy future.
Possible	UK climate charity supporting individuals and groups to take practical action on climate change.
Practical Action	International development organisation putting ingenious ideas to work so people in poverty can change their world.

Rewilding Britain	Charity that champions rewilding in Britain—acting as a catalyst for debate and action, and demonstrating the power of working with nature to tackle the climate emergency and the extinction crisis.
Rivers Trust	UK charity and the umbrella organisation for river improvement groups and projects in England, Wales, Northern Ireland and the Republic of Ireland.
Sustain	UK charity representing around 100 national public interest organisations working at international, national, regional and local levels to advocate for food and agriculture policies and practices that enhance the health and welfare of people and animals, improve the working and living environment, promote equity, and enrich society and culture.
Sustainable Food Trust	UK charity working to accelerate the transition to a more sustainable food and farming system.
Sustainable Soils Alliance	Charity campaigning to restore Britain's declining soil health, with a view to mitigate the effects of climate change and promote national food security.
The Climate Coalition	The UK's largest group of people dedicated to action against climate change with 140 member organisations—including the National Trust, Women's Institute, Oxfam and RSPB.
The Nature Conservancy	A non-profit environmental organisation working to create a world where people and nature can thrive, founded in the US and now operating in 79 countries and territories.
The Wildlife Trusts	Independent charities active in all four nations of the UK working to save wildlife and wild places, increase people's awareness and understanding of the natural world, and deepen people's relationship with it, including through social prescribing activities.
TRAFFIC	Non-governmental organisation working globally to ensure trade in wild animals and plants is not a threat to the conservation of nature.

Trees for Life	Scottish charity dedicated to rewilding the Scottish Highlands.
Wildlife Justice Commission	An independent non-profit organisation operating globally to disrupt and help dismantle organised transnational criminal networks trading in wildlife, timber and fish.
Woodland Trust	UK charity concerned with the creation, protection and restoration of native woodland heritage.
World Wildlife Fund (WWF)	A leading international organisation for wildlife conservation and endangered species.

Appendix 3: About the authors

About the Environmental Funders Network

The Environmental Funders Network (EFN) is a UK-based network of foundations, family offices and individual donors supporting environmental causes. Its aim is to increase the amount of financial support for environmental causes and to improve its overall effectiveness. Funders interested in joining EFN or finding out more about the network are very welcome to get in touch using the contact form at www.greenfunders.org/funders.

About New Philanthropy Capital

New Philanthropy Capital (NPC) is the think tank and consultancy for the charity sector. Its mission is to help charities, foundations, philanthropists, impact investors, social enterprises, corporates, and the public sector to maximise social impact in the lives of the people they serve. Through publications, events, policy work and consulting, NPC supports individuals and organisations, challenges and inspires the sector, and helps to create the conditions for impact.

- Liz Gadd**, New Philanthropy Capital**

  Liz has over 20 years' experience supporting charities and funders to improve their effectiveness. She has a special interest in bridging the divide between social and environmental charities and supporting social issue focussed charities and funders in the transition to a post-carbon economy. She is a Trustee of the Environmental Funders Network and Pesticide Action Network UK.

- Leah Davis**, New Philanthropy Capital**

  Leah has a fifteen-year career in policy and strategy development, having worked as Strategy Director and Acting Executive Director at the UK's leading environmental think tank, Green Alliance, and as a Senior Adviser in the Mayor of London's office. Leah's work has included establishing Greener UK and writing London's first climate change mitigation and energy strategy.

Appendix 4: Research methods

This briefing was developed through desk-based research and semi-structured interviews with a selection of stakeholders. The upmost care has been given to ensuring only reputable sources are quoted, however, the project's scope was insufficient for the authors to check that all research referenced had been peer reviewed. It is also important to remember that this is an emerging area of understanding with research and analysis ongoing across the public, private, charitable, and academic sectors.

To minimise the burden on contributing partners, the case studies were developed as far as possible from existing published and recorded material before agreement by the organisation referenced.

The research was supported by a survey of health funders, conducted July-August 2021, on their attitude toward and experience of funding environmental projects to support health outcomes.

Appendix 5: References

[1] https://www.who.int/publications/i/item/cop26-special-report

[2] https://reliefweb.int/report/world/report-impact-climate-change-migration-october-2021

[3] https://geographical.co.uk/people/the-refugee-crisis/item/3930-are-predictions-of-mass-climate-migrations-really-accurate

[4] https://www.un.org/press/en/2021/sc14445.doc.htm

[5] https://www.bmj.com/company/newsroom/over-200-health-journals-call-on-world-leaders-to-address-catastrophic-harm-to-health-from-climate-change/

[6] https://www.lshtm.ac.uk/research/centres/centre-climate-change-and-planetary-health

[7] https://www.unicef.org.uk/press-releases/onebillion-children-at-extremely-high-risk-of-the-impacts-of-the-climate-crisis-unicef/

[8] https://www.bmj.com/company/newsroom/over-200-health-journals-call-on-world-leaders-to-address-catastrophic-harm-to-health-from-climate-change/

[9] https://healthyclimateletter.net/

[10] https://www.who.int/news/item/11-10-2021-who-s-10-calls-for-climate-action-to-assure-sustained-recovery-from-covid-19

[11] https://www.stockholmresilience.org/research/research-news/2015-01-15-planetary-boundaries---an-update.html

[12] https://www.bloomberg.com/news/features/2021-10-07/how-climate-scientists-do-extreme-weather-attribution

[13] https://www.who.int/publications/i/item/cop26-special-report

[14] https://germanwatch.org/en/19777

[15] https://climateanalytics.org/blog/2020/climate-change-and-small-islands-more-scientific-evidence-of-high-risks/

[16] https://www.parliament.uk/globalassets/documents/post/postpn276.pdf

[17] https://www.gov.uk/government/publications/state-of-the-environment/state-of-the-environment-health-people-and-the-environment

[18] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[19] https://www.tuc.org.uk/research-analysis/reports/just-transition-greener-fairer-economy

[20] https://www.bbc.com/future/article/20191010-how-to-beat-anxiety-about-climate-change-and-eco-awareness

[21] https://www.theguardian.com/environment/2021/apr/20/climate-emergency-anxiety-threapists

[22] https://www.theguardian.com/society/2020/nov/20/half-of-child-psychiatrists-surveyed-say-patients-have-environment-anxiety

[23] https://www.theguardian.com/environment/2020/feb/10/overwhelming-and-terrifying-impact-of-climate-crisis-on-mental-health

[24] https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3918955

[25] https://www.theguardian.com/environment/2020/feb/10/overwhelming-and-terrifying-impact-of-climate-crisis-on-mental-health

[26] https://public.wmo.int/en/media/press-release/2020-was-one-of-three-warmest-years-record

[27] https://climate.nasa.gov/news/2865/a-degree-of-concern-why-global-temperatures-matter/

[28] http://www.bristol.ac.uk/news/2021/january/summer-heatwaves-uk.html

[29] https://www.metoffice.gov.uk/weather/climate-change/effects-of-climate-change

[30] https://www.ted.com/talks/balsher_singh_sidhu_are_we_running_out_of_clean_water

[31] https://www.theguardian.com/environment/2019/mar/18/england-to-run-short-of-water-within-25-years-environment-agency

[32] https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(21)00081-4/fulltext

[33] https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

[34] Arbuthnott, K. G. & Hajat, S. (2017). The health effects of hotter summers and heat waves in the population of the United Kingdom: a review of the evidence. Environ Health 16, 119.cited in

https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/feeling-the-heat-a-british-red-cross-briefing-on-heatwaves-in-the-uk

[35] https://www.theccc.org.uk/publication/independent-assessment-of-uk-climate-risk/

[36] https://www.gov.uk/government/publications/phe-heatwave-mortality-monitoring/heatwave-mortality-monitoring-report-2020

[37] Survey conducted for the British Red Cross of 2000 people in the UK 2021, cites in Feeling the heat: a British Red Cross briefing on heatwaves in the UK | British Red Cross

[38] https://www.nhs.uk/live-well/healthy-body/heatwave-how-to-cope-in-hot-weather/

[39] https://www.nationalgeographic.com/science/article/climate-change-increases-risk-fires-western-us

[40] https://scied.ucar.edu/learning-zone/air-quality/air-quality-and-climate-change

[41] https://www.fao.org/land-water/water/drought/en/

[42] https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

[43] https://www.who.int/news-room/fact-sheets/detail/climate-change-and-health

[44] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[45] https://phys.org/news/2020-11-global-species-planet-infectious-diseases.html

[46] https://germanwatch.org/sites/germanwatch.org/files/20-2-01e%20Global%20Climate%20Risk%20Index%202020_10.pdf

[47] https://www.aljazeera.com/news/2021/8/19/mapping-wildfires-around-the-world-interactive

[48] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6098859/

[49] https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086

[50] https://www.rcn.org.uk/clinical-topics/nutrition-and-hydration/cpd/key-challenges

[51] https://www.england.nhs.uk/ourwork/clinical-policy/older-people/improving-care-for-older-people/

[52] https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/feeling-the-heat-a-british-red-cross-briefing-on-heatwaves-in-the-uk

[53] https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/feeling-the-heat-a-british-red-cross-briefing-on-heatwaves-in-the-uk

[54] https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/feeling-the-heat-a-british-red-cross-briefing-on-heatwaves-in-the-uk

[55] https://www.gov.uk/government/publications/heatwave-plan-for-england/heat-health-risks-and-covid-19-actions-to-prevent-harm

[56] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/888668/Heatwave_plan_for_England_2020.pdf

[57] https://www.mayoclinic.org/diseases-conditions/dehydration/symptoms-causes/syc-20354086

[58] Auger, N., Naimi, A.I., Smargiassi, A., Lo, E., & Kosatsky, T. (2014). Extreme heat and risk of early delivery among preterm and term pregnancies, Epidemiology, doi: 10.1097/ EDE.0000000000000074 cited in https://www.climatecentre.org/downloads/files/IFRCGeneva/RCCC%20Heatwave%20Guide%202019%20A4%20RR%20ONLINE%20copy.pdf

[59] https://www.bmj.com/content/371/bmj.m3811

[60] https://www.bmj.com/content/371/bmj.m3811

[61] https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/feeling-the-heat-a-british-red-cross-briefing-on-heatwaves-in-the-uk

[62] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[63] https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/feeling-the-heat-a-british-red-cross-briefing-on-heatwaves-in-the-uk

[64] https://www.redcross.org.uk/about-us/what-we-do/we-speak-up-for-change/feeling-the-heat-a-british-red-cross-briefing-on-heatwaves-in-the-uk

[65] https://www.gov.uk/government/news/adapt-or-die-says-environment-agency

[66] https://blackagendareport.com/transcript-will-they-mourn-us-front-line-mia-mottley-pm-barbados-speech-opening-world-leaders

[67] http://journals.ametsoc.org/doi/abs/10.1175/JCLI-D-15-0369.1

[68] https://www.carbonbrief.org/explainer-what-climate-models-tell-us-about-future-rainfall

[69] https://www.carbonbrief.org/explainer-what-climate-models-tell-us-about-future-rainfall

[70] https://www.metoffice.gov.uk/research/climate/understanding-climate/uk-extreme-events-_heavy-rainfall-and-floods

[71] https://royalsociety.org/news/2020/04/Soil-structure-benefits/

[72] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/292928/geho0609bqds-e-e.pdf

[73] https://www.metoffice.gov.uk/research/climate/understanding-climate/uk-extreme-events-_heavy-rainfall-and-floods

[74] https://www.carbonbrief.org/how-much-flooding-is-in-the-uks-future-a-look-at-the-ipcc-report

[75] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[76] https://pubmed.ncbi.nlm.nih.gov/27088272/

[77] https://www.thelancet.com/pb/assets/raw/Lancet/pdfs/S1473309915700915.pdf

[78] https://www.theaa.com/driving-advice/seasonal/driving-through-flood-water

[79] https://www.theaa.com/driving-advice/seasonal/driving-through-flood-water

[80] https://www.reuters.com/article/us-indonesia-floods/indonesia-warns-of-risk-of-landslides-floods-from-new-cyclone-idUSKBN2BW0NN

[81] https://www.theguardian.com/australia-news/2021/mar/22/nsw-flooding-rain-forces-evacuation-of-18000-people-on-mid-north-coast-and-sydneys-west

[82] https://www.nytimes.com/2021/02/15/us/storm-power-outage.html

[83] https://www.fao.org/3/cb3673en/cb3673en.pdf

[84] https://pubmed.ncbi.nlm.nih.gov/21685525/

[85] https://ukphr.org/health-impacts-on-flooding/

[86] https://www.independent.co.uk/climate-change/news/new-york-ida-flooding-basement-apartments-b1913470.html

[87] https://www.cleanairfund.org/publication/global-funding-2021/

[88] https://www.epa.gov/ghgemissions/overview-greenhouse-gases

[89] https://www.cleanairfund.org/publication/global-funding-2021/

[90] https://www.gov.uk/government/publications/air-quality-explaining-air-pollution/air-quality-explaining-air-pollution-at-a-glance

[91] https://www.clientearth.org/latest/latest-updates/news/uk-air-pollution-how-clean-is-the-air-you-breathe/

[92] https://www.clientearth.org/latest/latest-updates/news/uk-air-pollution-how-clean-is-the-air-you-breathe/

[93] https://www.theguardian.com/environment/2021/feb/16/home-wood-burning-biggest-cause-particle-pollution-fires

[94] https://www.who.int/news/item/02-05-2018-9-out-of-10-people-worldwide-breathe-polluted-air-but-more-countries-are-taking-action

[95] https://www.unep.org/explore-topics/air/about-air

[96] https://www.worldometers.info/coronavirus/coronavirus-death-toll/

[97] https://www.who.int/airpollution/ambient/healthimpacts/en/

[98] https://ehp.niehs.nih.gov/doi/full/10.1289/EHP5975

[99] https://theprint.in/health/asthma-obesity-more-likely-in-delhi-kids-than-in-mysuru-kottayam-says-study-blames-pollution/726247/

[100] https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30063-2/fulltext

[101] https://www.brake.org.uk/get-involved/take-action/mybrake/knowledge-centre/uk-road-safety

[102] https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution

[103] https://www.unep.org/explore-topics/air/about-air

[104] https://www.gov.uk/government/news/public-health-england-publishes-air-pollution-evidence-review

[105] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/770715/clean-air-strategy-2019.pdf

[106] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[107] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/938623/Review_of_interventions_to_improve_air_quality_March-2019-2018572.pdf

[108] https://www.bloomberg.com/news/articles/2021-09-01/measuring-the-human-cost-of-global-air-pollution

[109] https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(18)30357-7/fulltext

[110] https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(09)61714-1/fulltext

[111] https://www.sciencedirect.com/science/article/abs/pii/S0920996416304467

[112] https://www.theguardian.com/environment/2020/oct/24/small-increases-in-air-pollution-linked-to-rise-in-depression-finds-study

[113] https://www.kcl.ac.uk/news/exposure-to-air-pollution-linked-with-increased-mental-health-service-use-new-study-finds

[114] https://www.kcl.ac.uk/news/childhood-air-pollution-exposure-linked-to-poor-mental-health-at-age-18

[115] https://www.who.int/teams/environment-climate-change-and-health/air-quality-and-health/ambient-air-pollution

[116] https://ourworldindata.org/air-pollution#who-is-most-affected-by-air-pollution

[117] https://ourworldindata.org/air-pollution#who-is-most-affected-by-air-pollution

[118] https://www.who.int/news/item/22-09-2021-new-who-global-air-quality-guidelines-aim-to-save-millions-of-lives-from-air-pollution

[119] https://vimeo.com/showcase/8637031/video/647440729

[120] https://www.stateofglobalair.org/

[121] https://www.cleanairfund.org/wp-content/uploads/2021/09/The-State-of-Global-Air-Quality-Funding-2021-report-compressed-2.pdf

[122] https://vimeo.com/showcase/8637031/video/647440729

[123] https://www.health.org.uk/publications/reports/the-marmot-review-10-years-on

[124] https://www.forbes.com/sites/danieladelorenzo/2021/11/02/air-pollution-caused-by-global-food-production-is-killing-more-than-890000-people-a-year-study-finds/?sh=503bf774e1bf

[125] https://www.sciencedirect.com/science/article/pii/S1361920919300392

[126] Brunt, H., et al., 2017, 'Air pollution, deprivation and health: understanding relationships to add value to local air quality management policy and practice in Wales, UK', Journal of Public Health 39(3), pp. 485-497. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[127] https://socialmetricscommission.org.uk/wp-content/uploads/2020/06/Measuring-Poverty-2020-Web.pdf

[128] Cournane, S., et al., 2017b, 'High risk subgroups sensitive to air pollution levels following an emergency medical admission', Toxics 5(4), 27. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[129] https://www.imperial.ac.uk/school-public-health/environmental-research-group/research/air-pollution-epidemiology/air-pollution-and-covid-19/

[130] https://www.asthma.org.uk/8c878464/globalassets/campaigns/publications/invisible-threat-final.pdf

[131] Halonen, J. I., et al., 2016, 'Long-term exposure to traffic pollution and hospital admissions in London', Environmental Pollution 208, pp. 48-57. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[132] Cournane, S., et al., 2017b, 'High risk subgroups sensitive to air pollution levels following an emergency medical admission', Toxics 5(4), 27. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[133] https://theconversation.com/air-pollution-may-contribute-to-alzheimers-and-dementia-risk-heres-what-were-learning-from-brain-scans-148776

[134] https://www.ecowatch.com/air-pollution-childrens-health-parkinsons-alzheimers-2648212948.html

[135] https://www.asthma.org.uk/8c878464/globalassets/campaigns/publications/invisible-threat-final.pdf

[136] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4311079/

[137] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4311079/

[138] https://www.sciencedirect.com/science/article/pii/S0197018620300991#

[139] Bové, H., et al., 2019. 'Ambient black carbon particles reach the fetal side of human placenta', Nature Communications 10(1), pp. 1- Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[140] https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution

[141] https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30063-2/fulltext

[142] https://www.asthma.org.uk/about/media/news/one-baby-born-breathing-toxic-air-every-two-minutes/

[143] Schultz, E. S., et al., 2016, 'Early-life exposure to trafficrelated air pollution and lung function in adolescence', American Journal of Respiratory and Critical Care Medicine 193(2), pp. 171-177. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[144] https://www.london.gov.uk/press-releases/mayoral/31m-kids-going-to-schools-in-areas-with-toxic-air

[145] https://www.nature.com/articles/d41586-019-01448-4

[146] https://www.britannica.com/topic/Postcards-from-the-6th-Mass-Extinction-2153898#ref1274124

[147] https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

[148] https://nbn.org.uk/stateofnature2019/

[149] https://www.un.org/sustainabledevelopment/blog/2019/05/nature-decline-unprecedented-report/

[150] https://ec.europa.eu/environment/nature/climatechange/index_en.htm

[151] https://www.unep-wcmc.org/news/exploring-links-between-biodiversity--carbon-storage-and-other-ecosystem-services

[152] https://ec.europa.eu/environment/nature/climatechange/index_en.htm

[153] https://www.cbd.int/health/infectiousdiseases

[154] https://news.un.org/en/story/2020/09/1072292

[155] https://www.unep.org/resources/emerging-zoonotic-diseases-and-links-ecosystem-health-unep-frontiers-2016-chapter

[156] https://pubmed.ncbi.nlm.nih.gov/11516376/

[157] https://www.nature.com/articles/d41586-020-02341-1

[158] https://www.mentalhealth.org.uk/our-work/research/coronavirus-mental-health-pandemic

[159] Ward Thompson, C., et al., 2016, 'Mitigating stress and supporting health in deprived urban communities: the importance of green space and the social environment, International Journal of Environmental Research and Public Health 13(4), p. 440 (DOI: https://doi.org/10.3390/ ijerph13040440). Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[160] Pope, D., et al., 2018, 'Quality of and access to green space in relation to psychological distress: results from a population-based cross-sectional study as part of the EURO-URHIS 2 project', European Journal of Public Health 28(1), p. 39. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[161] https://www.frontiersin.org/articles/10.3389/fpsyg.2018.02320/full

[162] Roe, J., et al., 2013, 'Green space and stress: evidence from cortisol measures in deprived urban communities', International Journal of Environmental Health Research 10, pp. 4086-4103. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[163] https://www.itv.com/news/granada/2021-07-30/ecotherapy-nature-on-prescription

[164] https://www.wildlifetrusts.org/sites/default/files/2019-09/SROI%20Summary%20Document%20-%20DIGITAL_0.pdf

[165] https://livingplanet.panda.org/en-gb/

[166] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[167] https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf

[168] https://www.nhm.ac.uk/discover/news/2016/july/biodiversity-breaching-safe-limits-worldwide.html#

[169] https://livingplanet.panda.org/en-gb/

[170] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[171] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[172] Mitchell, R. J., et al., 2015, 'Neighborhood environments and socioeconomic inequalities in mental well-being', American Journal of Preventive Medicine 49(1), pp. 80-84 (DOI: https://doi.org/10.1016/j.amepre.2015.01.017) Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[173] Lachowycz, K. and Jones, A. P., 2014, 'Does walking explain associations between access to greenspace and lower mortality?', Social Science & Medicine 107, pp. 9-17. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[174] Flouri, E., et al., 2019, 'The role of neighbourhood greenspace in children's spatial working memory', British Journal of Educational Psychology 89(2), pp. 359-373. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[175] Reuben, A., et al., 2019, 'Residential neighbourhood greenery and children's cognitive development', Social Science & Medicine 230, pp. 271-279. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[176] Kelz, C., 2013, 'The restorative effects of redesigning the schoolyard: a multi-methodological quasi-experimental study in rural Austrian middle schools', Environment and Behaviour 12(1), pp. 1-21. Cited in https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[177] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[178] https://www.sciencedirect.com/science/article/pii/S0160412018316544

[179] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[180] https://www.eea.europa.eu/publications/healthy-environment-healthy-lives

[181] http://www.ukhealthalliance.org/all-consuming/

[182] https://www.ipcc.ch/site/assets/uploads/sites/4/2020/02/SPM_Updated-Jan20.pdf

[183] https://www.carbonbrief.org/experts-how-do-diets-need-to-change-to-meet-climate-targets

[184] https://www.edf.org/climate/methane-crucial-opportunity-climate-fight

[185] https://livingplanet.panda.org/en-gb/

[186] https://www.the-scientist.com/news-opinion/widespread-declines-in-uks-pollinators--study-65666#

[187] https://www.theguardian.com/environment/2021/jul/25/the-insect-apocalypse-our-world-will-grind-to-a-halt-without-them

[188] https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf

[189] https://www.pan-uk.org/new-report-reversing-the-decline-of-insects/

[190] https://www.hsph.harvard.edu/c-change/subtopics/climate-change-nutrition/

[191] https://www.ciwf.org.uk/factory-farming/environmental-damage/

[192] https://www.ciwf.org.uk/factory-farming/your-health/#your-health-sources

[193] https://www.whyweeattoomuch.co.uk/whats-in-the-book.html

[194] http://www.ciwf.org.uk/media/5234769/Nutritional-benefits-of-higher-welfare-animal-products-June-2012.pdf

[195] https://www.ciwf.org.uk/factory-farming/your-health/

[196] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7649274/

[197] https://www.sciencedirect.com/science/article/pii/S221451411500121X

[198] https://www.healthline.com/nutrition/magnesium-deficiency-symptoms#TOC_TITLE_HDR_3

[199] https://www.fao.org/soils-2015/news/news-detail/en/c/277682/

[200] https://www.ciwf.org.uk/factory-farming/your-health/

[201] https://www.farmersweekly.co.za/farm-basics/how-to-livestock/stress-affects-livestock-health/

[202] https://www.antibioticresearch.org.uk/about-antibiotic-resistance/antibiotic-resistance-farming/

[203] https://www.longdom.org/open-access/Olaya-bovine-leukemia-zoonosis-associated-with-breast-cancer-in-humans-jmsp-1000110.pdf

[204] https://pubmed.ncbi.nlm.nih.gov/26332838/

[205] https://wedocs.unep.org/bitstream/handle/20.500.11822/32060/zoonoses.pdf?sequence=1&isAllowed=y

[206] https://www.researchgate.net/publication/333707242_Emerging_human_infectious_diseases_and_the_links_to_global_food_production

[207] https://www.who.int/news-room/fact-sheets/detail/antibiotic-resistance

[208] https://www.gov.uk/government/publications/health-matters-antimicrobial-resistance/health-matters-antimicrobial-resistance

[209] https://www.antibioticresearch.org.uk/about-antibiotic-resistance/antibiotic-resistance-farming/

[210] https://www.ciwf.org.uk/media/3758863/Antibiotics-in-Animal-Farming-Public-Health-and-Animal-Welfare.pdf

[211] https://www.wfp.org/news/unprecedented-hunger-follow-wake-climate-crisis-wfp-calls-urgent-action-world-food-day

[212] https://plantbasednews.org/culture/ethics/vegans-in-britain-skyrocketed/

[213] https://unfccc.int/blog/we-need-to-talk-about-meat

[214] https://www.nhs.uk/live-well/eat-well/red-meat-and-the-risk-of-bowel-cancer/

[215] https://www.hsph.harvard.edu/nutritionsource/2015/11/03/report-says-eating-processed-meat-is-carcinogenic-understanding-the-findings/

[216] https://www.ahajournals.org/doi/10.1161/JAHA.119.012865

[217] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3942738/

[218] https://www.sciencedaily.com/releases/2017/04/170419091654.htm

[219] https://www.bbc.co.uk/food/articles/plant_immunity

[220] https://www.hsph.harvard.edu/news/hsph-in-the-news/red-meat-linked-to-higher-stroke-risk/

[221] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6478664/

[222] https://www.actionagainsthunger.org.uk/why-hunger/climate-crisis

[223] https://foodfoundation.org.uk/wp-content/uploads/2020/09/FF-Broken-Plate-2020-DIGITAL-FULL.pdf

[224] https://academic.oup.com/ajcn/article/113/1/7/6000654

[225] https://www.food.gov.uk/sites/default/files/media/document/575-1-1008_X02001__Climate_Change_and_Food_Report__28_Sept_2010.pdf

[226] https://www.unep.org/news-and-stories/story/soil-pollution-risk-our-health-and-food-security

[227] https://ec.europa.eu/environment/integration/research/newsalert/pdf/IR5_en.pdf

[228] https://www.bbc.co.uk/news/science-environment-54195182

[229] https://oceanservice.noaa.gov/facts/pollution.html

[230] https://www.theriverstrust.org/key-issues/sewage-in-rivers

[231] https://www.unwater.org/water-facts/quality-and-wastewater/

[232] https://ec.europa.eu/environment/integration/research/newsalert/pdf/IR5_en.pdf

[233] https://www.who.int/news-room/photo-story/photo-story-detail/10-chemicals-of-public-health-concern

[234] https://ec.europa.eu/environment/integration/research/newsalert/pdf/IR5_en.pdf

[235] https://www.pan-uk.org/the-cocktail-effect/

[236] https://www.open.edu/openlearn/science-maths-technology/across-the-sciences/investigating-links-between-pesticides-and-mental-health

[237] https://www.unep.org/news-and-stories/press-release/un-report-urgent-action-needed-tackle-chemical-pollution-global

[238] https://chemtrust.org/edcs-list/

[239] https://pubmed.ncbi.nlm.nih.gov/24553011/

[240] https://chemtrust.org/edcs-health/

[241] https://issuu.com/pan-uk/docs/pesticide_news_127_-_november_2021?fr=sYTY2YzExOTMxNQ

[242] https://www.sciencemag.org/news/2020/05/meet-psychobiome-gut-bacteria-may-alter-how-you-think-feel-and-act

[243] https://www.studyfinds.org/gut-health-linked-to-air-quality/

[244] https://www.pan-uk.org/working-to-reduce-global-suicide-by-pesticide-ingestion/

[245] https://www.independent.co.uk/climate-change/news/environment-fish-changing-sex-gender-chemicals-pollution-rivers-water-charles-tyler-fisheries-society-symposium-a7821086.html

[246] https://www.medicalnewstoday.com/articles/water-pollution-and-human-health#water-pollution-and-human-health

[247] https://inews-co-uk.cdn.ampproject.org/c/s/inews.co.uk/news/science/plastic-air-pollution-allergies-copd-diabetes-1269042/amp

[248] https://chemtrust.org/

[249] https://www.pan-uk.org/the-cocktail-effect/

[250] https://www.pan-uk.org/dirty-dozen/

[251] https://www.greenfunders.org/where-the-green-grants-went-8/

[252] https://www.greenfunders.org/where-the-green-grants-went-8/

[253] https://www.bdbpitmans.com/blogs/charity-law/35-responsible-investment-update-charity-commission-summary-of-consultation-responses/