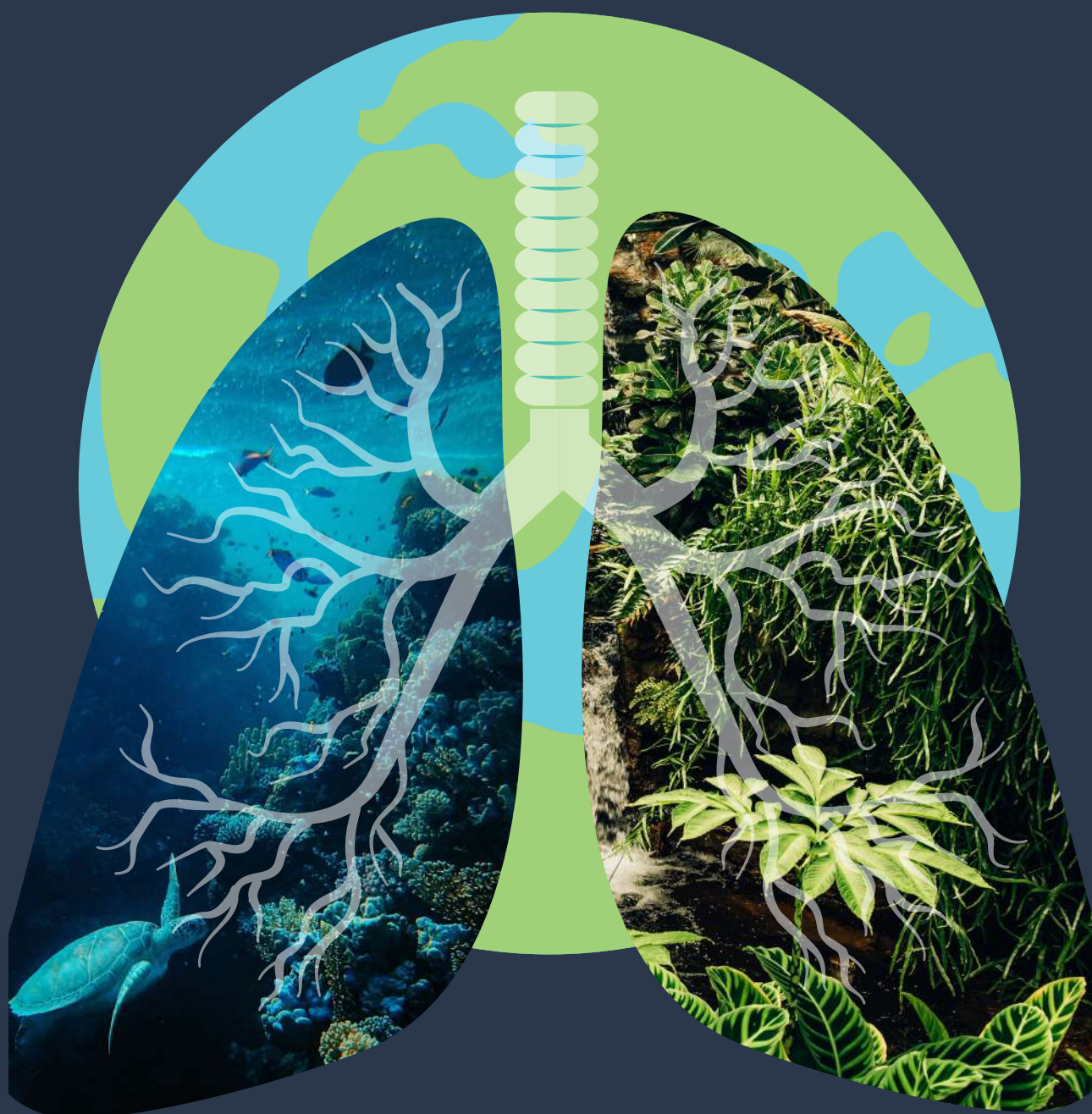


Biodiversity, climate change and health

A policy report from the UK Health Alliance on Climate Change



UK Health Alliance
on Climate Change

September 2023

Contents

1. Acknowledgements
2. Foreward Summary
3. Summary of Recommendations
4. Introduction
5. Part I: Terrestrial Ecosystems
6. Part II: Marine Ecosystems
7. References
8. Endorsements



The UK Health Alliance on Climate Change brings together health professionals to advocate for just responses to the climate and ecological crisis, promote the health benefits that flow from those responses, and empower members and health professionals to make changes in their professional and personal lives to respond to the crisis.

We are an alliance of more than 40 UK-based health organisations, collectively representing more than one million health professionals. Our members include medical, surgical and nursing royal colleges, faculties and societies, British Medical and Dental Associations, the BMJ and The Lancet.

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Find out more:

For any questions or queries about this policy report, or to discuss it further, please get in touch: info@ukhealthalliance.org

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Foreword

By Dr Richard Smith, Chair of the UK Health Alliance on Climate Change

As our name implies, the **UK Health Alliance on Climate Change** has concentrated on the health aspects of climate change, but we have now recognised that the destruction of nature and biodiversity is an equally serious threat to health. Indeed, were the Intergovernmental Panel on Climate Change to announce tomorrow that it has made a mistake and global temperatures are not rising, we would still be facing a major threat to health because of the loss of nature. The problems of climate change and the destruction of nature are intertwined and must be tackled together to avoid actions that improve one and worsen the other.

Biodiversity is a word that is only now penetrating everyday language, but the United Nations, which has held 15 global conferences on biodiversity, defines biodiversity as the diverse form of living beings on Earth and the natural patterns it forms. Humans, which are part of and not masters of nature, depend on biodiversity for food, water, timber, clean air, temperature control, and medicines as well as for well-being, inspiration, and meaning.

If we destroy biodiversity, we destroy ourselves, and yet we are living through what has been termed the sixth major extinction. The World Wildlife Fund estimates that the current species extinction rate is between 1000 and 10000 times higher than natural extinction rates.

The harms to health from the destruction of nature are similar to those caused by climate change: water and food insecurity, loss of lives and livelihoods, the spread of infectious diseases, increases in non-communicable diseases and mental health problems, and reduced capacity to develop new medicines derived from nature. As with climate change, the harm falls disproportionately on the poor and those in low-and-middle-income countries. One cause for celebration is the remarkable capacity of nature to regenerate. For instance, land destroyed by human activities can turn into forests rich with wildlife within a few decades when left undisturbed.

As with climate change, fossil fuels and the food system are the main causes of declining biodiversity. Tackling these would improve human and environmental health. This report covers both land and sea and shows how dependent we are on marine and terrestrial ecosystems which absorb more than half of carbon dioxide from the atmosphere. Yet we are acidifying the oceans and filling them with plastic, sewage, pharmaceuticals, and other waste products, killing marine life and threatening the existence of half a billion people, again mostly poor, who feed themselves through fisheries.

The world has recognised the implications of biodiversity loss and through the United Nations countries have agreed to conserve, manage, and restore 30% of the land, inland water, and oceans by 2030. Success, as with climate action, will depend on rich countries, who have agreed to mobilise \$30 billion for poorer countries. Overall countries have committed at least \$200 billion from private-public sources by 2030 to support biodiversity.

However, we have become used to governments not meeting their promises, and health professionals need to join others in proactively ensuring that these commitments are met. At the same time, we need to work to counter the harm caused to biodiversity by health systems, our own organisations, and our own professional and personal lives. We need as well to emphasise how biodiversity is essential for health and how restoring nature will benefit physical, mental, and spiritual health.

Summary of recommendations

For better terrestrial and marine ecosystems:



Protect, restore and regenerate nature and biodiversity in urban landscapes.



Prioritise and promote plant-based and sustainably sourced food, limit waste and build resilience against food insecurity.



Ensure delivery of the International Financial Commitments to support nature and biodiversity with regular monitoring and evaluation to demonstrate effectiveness.



End all subsidies, investments and new exploration for fossil fuels, while ensuring a just transition to renewable energy.



Reduce plastic waste by banning the production and sale of unnecessary plastic items with simultaneous efforts to incentivise reusing, recycling, and the production and utilisation of alternate compostable materials.



Increase knowledge and understanding of human and ecological risks caused by the presence of pharmaceutical products in water bodies.



Strengthen international financial flows and capacity-building with inclusive decision-making to support and implement innovative multidisciplinary solutions to save marine ecosystems.

Introduction

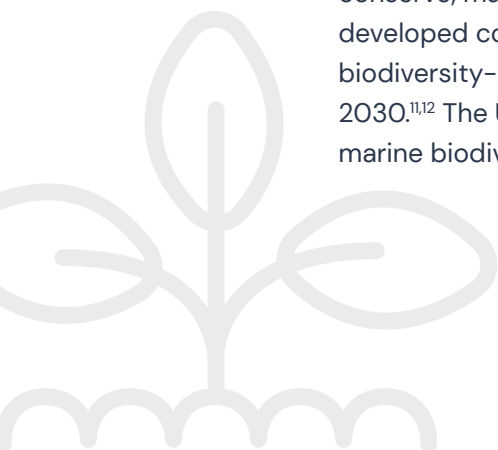
The climate and ecological crises are both driven by human activities. They each have catastrophic implications for human health and their strong interconnection creates a vicious circle where each is reinforced by the other.¹ A stable natural environment is critical for limiting global warming and achieving the UN's Sustainable Development Goals (SDGs).² Conversely, the loss of biodiversity is a major threat to human, animal, and environmental health. In order to mitigate harm and maximise the co-benefits of action, it is important that policies tackle both climate change and biodiversity loss together.¹ In this two-part policy report, we describe the impacts of biodiversity loss on land and oceans for human health and put forward recommendations to reduce biodiversity loss, restore nature, and achieve climate goals for the benefit of health.

The UN describes biodiversity as the diverse form of living beings on Earth and the natural patterns it forms.² Biodiversity is essential for human health as it makes ecosystems that humans depend on more resilient and productive.³ Biodiverse ecosystems are fundamental to the existence of our current civilisation and the world's economies and livelihoods. They provide us with food, timber, medicines, air and water as well as recreation and cultural inspiration. Biodiversity helps regulate the climate which is critical to sustain all life on the Earth.⁴

Today, biodiversity is declining at its fastest rate in human history. This loss is a direct consequence of human domination of natural resources. For example by reshaping natural habitats to create farmlands and for the extraction and usage of natural resources. In the last 50 years, there has been a 240–250% increase in meat production ($\approx$ 350 million tonnes) and mineral extraction ($\approx$ 92 billion tonnes), which have contributed to a 69% decline in monitored wildlife populations globally.^{5–7} About one million animal and plant species are under threat of extinction.⁶ The World Wide Fund for Nature states the UK to be one of the most nature-depleted countries in the world with over 14% of native species facing extinction and over 40% in decline.⁸ But at the same time, it is vital to note that nature has a remarkable ability to regenerate and restore itself when left alone.⁹

Our relationship with nature which depends on extraction, logging and burning of natural resources to meet demand is unsustainable.⁶ The negative impacts on human health include loss of lives and livelihoods, access to water and food insecurity, the spread of infectious diseases, increases in non-communicable diseases, and reduced capacity to develop new medicines derived from nature.^{2,10} These impacts are disproportionately borne by socio-economically and geographically disadvantaged groups.¹

In December 2022, the Convention on Biodiversity Conference (COP15) agreed to conserve, manage, and restore 30% of the land, inland water and oceans by 2030, with developed countries agreeing to mobilise \$30 billion for developing countries and overall biodiversity-related global funding of at least \$200 billion from private-public sources by 2030.^{11,12} The UN member states subsequently reached a historic agreement to protect marine biodiversity in international waters.¹³



Part I: Terrestrial Ecosystems

Green and blue spaces in urban environments

Rapid and large-scale urbanisation has had a direct consequence on wildlife in terms of land use and land cover changes.¹⁴ It has also fragmented landscapes, creating barriers between habitats. While many urban environments incorporate parks and green spaces, their biodiversity varies with the degree of fragmentation, management, herbicide use, local population density, and surrounding land use. Air, light and noise pollution also impact biodiversity in urbanised areas. Currently, 84% of the UK population lives in towns and cities.¹⁵ This is projected to increase further over the next few years.

The built environment affects both physical and mental health. Air pollution, heat, and lack of infrastructure that supports physical activity and connection with nature have both direct and indirect consequences for health. In the UK, inequalities in access to green space for exercise and recreation, combined with higher levels of air pollution in the most socioeconomically deprived areas, threaten the physical and mental health of millions of adults and children.¹⁶ The impacts of the lack of access to high-quality green space were particularly evident during lockdowns put in place during the COVID-19 pandemic: people living in flats, without access to gardens or green space were more acutely affected.¹⁷

Well-managed, high-quality green and blue spaces in urban environments can both enhance biodiversity and restore nature bringing multiple health benefits. They provide shading and reduce areas of raised temperatures experienced in cities and urban spaces (urban heat islands), positively affect physical and mental health and wellbeing, and provide adaptation to extreme heat.^{10,18} The presence of such biodiverse natural spaces (for example with a diverse group of flowering plants and trees) within urban infrastructure provides habitat for the declining species of pollinators.¹⁹

In 2020, the total value of ecosystem services in England was estimated to be £35.7 billion.²⁰ More than half of it was derived from cultural services, mainly recreation and tourism and the health benefits associated with it. The health benefits through the removal of air pollution by vegetation were estimated to be £2.17 billion, out of which £1.86 billion was due to PM2.5 removal. Further, by enabling people to spend sufficient time in nature each week (minimum of 2 hours) health benefits based on quality-adjusted life years was £5.7 billion between 2018 to 2020.²⁰ A review of green spaces by Public Health England concluded that £2.1 billion per year could be saved in health costs if everyone in England had good access to green space.²¹ Fields in Trust estimates that reduced GP visits as a result of access to parks and green spaces would save the NHS around £111 million per year.²² The health service is responding through initiatives such as NHS Forest, which is aimed at transforming health sites into healthy, biodiverse green spaces and includes over 300 UK

healthcare sites.²³

The UK Government Environmental Improvement Plan includes a commitment that every person should have access to green space or water, such as wetlands, woodlands, parks and rivers within a 15-minute walk from their home. With 80% of people living in towns and cities, one-third of the population currently does not have access to green or blue space within 15 minutes of their homes.²⁴ Natural England's Green Infrastructure Framework provides a system for analysing where green infrastructure in urban environments is needed most to support equitable access to green spaces across the country.²⁴ A greenspace interactive map and open space audit and strategy for planning authorities in Scotland have been produced by NatureScot to help deliver the Scottish Planning Policy.²⁵ The Wales Green Infrastructure Forum is focused on promoting green infrastructure in towns and cities in Wales.²⁶



Recommendation 1

Protect, restore and regenerate nature and biodiversity in urban landscapes. The aim is to reach the ratified 30% biodiversity target by 2030. This can be achieved through multi-level, cross-sectoral partnerships and collaboration to collectively design and deliver high-quality green and blue spaces in urban areas and NHS sites such that it enables physical and mental health and well-being and green social prescribing.^{23,24} These spaces should be designated as key health infrastructure that would improve population health.



Food system and land use

Globally, the food system is the primary driver of terrestrial biodiversity loss, principally caused by the conversion of natural ecosystems for crop production or pasture resulting in the loss of habitats.³ High dependence on the use of fertiliser, pesticides, energy, land and water, and on unsustainable practices, such as removing hedgerows, has reduced the variety of landscapes and habitats and threatens existing ecosystems. Animal farming for meat and dairy production uses more land and water than growing fruits and vegetables.^{3,27,28} Animal-sourced diets have a 14 times higher environmental impact than plant-sourced diets.²⁷ Diets rich in red meat and processed food are associated with increased risk of diabetes, cardiovascular diseases and cancer.^{28,29}

Food production patterns are responsible for one-third of greenhouse gas emissions globally and animal-based food accounts for more than 50% of these.²⁷ Climate change is threatening food security through rising temperatures, water scarcity and extreme weather events. The UK relies heavily on importing fresh fruits and vegetables; around one-third of these come from climate-vulnerable countries with long supply chains.³⁰ The fragility of these chains became starkly apparent at the beginning of the Covid pandemic.

A significant proportion ($\approx 40\%$) of the food produced for human consumption is wasted globally.³¹ In the UK, 9.5 million tonnes of food are thrown away every year; households are responsible for 70% of the UK's food waste.³² Food waste is associated with more than 25 million tonnes of greenhouse gas emissions and an economic cost of over £19 billion per annum.³² As the global population is rapidly expanding, the demand for easy access to affordable, calorie-rich and resource-intensive foods is growing.¹⁰ This further aggravates environmental degradation and has poor health impacts manifesting as obesity and related diseases.²⁹

Human beings need to consume a diet with diverse nutrients to meet the requirements of the body. Diversity in the variety of foods consumed underpins dietary health and good nutrition², yet about 40% of crops consumed by humans come from just three crops (rice, wheat and maize) and 95% of the total food from livestock is from only five species (out of about 40 species that contribute to food production).^{2,33} The loss of genetic diversity in the food system increases vulnerability to crop disease outbreaks, reduces dietary and nutritional value, and limits the diversity of pollinators and key ecosystem support such as pest and disease control.¹⁰ Global declines in pollinator species diversity and in the number of pollinators also negatively impact the quantity, nutritional content, and quality of food, further threatening food security, agricultural productivity, and human nutrition.² Biodiversity helps increase agricultural resistance while monocultures are more prone to pests and diseases.

Changing the way we produce and consume food is critical to protecting biodiversity, reducing greenhouse gas emissions, adapting to climate impacts, and improving health while reducing pandemic risks and the rising burden of antimicrobial resistance. Due to the disproportionate impact of animal farming on biodiversity, land use and the environment, we need to shift to diets based more on plants while reducing the consumption of animal-based diets (by over 50%).^{3,29} Currently, more than 80% of farmland in the UK is dedicated

to raising animals as food.²⁸ Globally, it is estimated that a transition away from animal agriculture towards a plant-based food system would allow the release of more than three-quarters of farmland back to nature, whilst providing the opportunity to repurpose land to sequester carbon.³⁴ This should happen in parallel with the implementation of nature-friendly, farming methods that protect animal welfare and significantly reduce food wastage. Such a shift will positively impact human health.^{3,29}



Recommendation 2

Prioritise and promote plant-based and sustainably sourced food, limit waste and build resilience against food insecurity. This can be achieved through a transition to sustainable diets by committing to prioritising plant-based and sustainable food while reducing meat and dairy consumption and food wastage. A parallel shift to refocus subsidies on sustainable agricultural production is needed.¹²



Global responsibility

The UK's footprint on our global environment has risen in line with the increasing demand for agricultural and forestry products. Between 2016 and 2018, an area equivalent to 88% of the total UK land area was required to supply the UK's demands for just seven agricultural and forest commodities (beef and leather, cocoa, palm oil, pulp and paper, soy and timber).³⁵ Research by the World Wide Fund for Nature (WWF) and Royal Society for the Protection of Birds (RSPB) has found that the UK's demand for commodities is affecting more than 2,800 species already threatened by extinction and that 28% of the nation's total land footprint overseas is located in countries at high or very high risk of deforestation, conversion of natural ecosystems and/or human rights abuses.³⁵

A quarter of the global land area is traditionally owned, managed, used, or occupied by indigenous people and local communities who depend on nature for subsistence, livelihoods and health.³⁶ Globally, about a fifth of people rely on wild species for food and their livelihoods.³⁷ Declines in terrestrial, marine and freshwater wildlife are a major challenge for these resource-dependent populations, particularly in low- and middle-income countries. Inclusive wealth is a measure of a country's natural, human and manufactured resources, and is a better indicator of human well-being than GDP.^{4,38} The United Nations Environment Programme (UNEP) Inclusive Wealth Report 2018 found that 44 out of 140 countries have had a decline in inclusive wealth, even though the GDP per capita has grown in most of these.³⁸ This implies a further widening of wealth (and thereby health) inequalities.

At COP15 in December 2022, countries agreed to mobilise \$30 billion for developing countries to protect biodiversity and restore nature.¹¹ The UK has committed to deliver £3 billion of its total £11.6 billion international climate finance commitment to 2025 on supporting nature and biodiversity.¹¹ The UK Government's International Climate Finance strategy has ambitious plans for protecting and enhancing global natural assets. However, the UNEP states that to meet climate change, biodiversity and land degradation targets by 2050 there is a massive financial gap of around \$4.1 trillion (£3.29 trillion).³⁹ The role of the public sector in creating opportunities and demand for investments in nature and biodiversity is crucial to increase private sector investment to meet these targets.³⁹



Recommendation 3

Ensure delivery of the International Financial Commitments to support nature and biodiversity with regular monitoring and evaluation to demonstrate effectiveness. The UK government must deliver on the promises made internationally to protect and restore nature. There should be a simultaneous development of innovative ways to increase financial investments to support climate and ecological action, particularly through the private sector.³⁹

Part II: Marine Ecosystems

Oceans and the life in them are crucial to human health and well-being as well as the existence of human civilisation. To achieve the UN's Sustainable Development Goal 14 (Conserve and sustainably use the oceans, seas and marine resources) efforts to conserve and regenerate the oceans must be made urgently.⁴⁰

Oil fields and marine life

Fossil fuel mining and burning are the biggest drivers of global heating. Oceans are responsible for absorbing around one-third of the total carbon dioxide (CO₂) and more than 90% of the excess heat released into the atmosphere.⁴¹ Higher levels of atmospheric greenhouse gas and heat are leading to acidification and warming of the oceans respectively, which in turn is harming marine life. Coral reefs constitute less than 1% of the ocean beds but provide shelter and breeding grounds to more than a quarter of marine life. Globally 14% of coral reefs were lost between 2009 and 2018 due to global warming and a further half will endure unsuitable conditions for survival by 2035.⁴²

There are over 12,000 offshore oil rigs worldwide and 184 of them operate in the North Sea.⁴³ During the lifetime of these oil and gas platforms, they cause massive damage to deep water organisms. Evidence suggests that defunct platforms could support the reflorescence of marine organisms, such that marine life could be restored and regenerated with time, once oil rigs are abandoned.^{44,45}

Ocean acidification and coral reef loss can lead to harmful algal blooms which can adversely affect human health through the release of aerosolized toxins.⁴⁶

The rich biodiversity of the oceans offers substantial opportunities for discoveries and innovations in medical research. For example, coral reefs are a key source of marine products and could lead to the development of novel pharmaceuticals. Damage to this vast reservoir of potentially useful resources can be disadvantageous to health.⁴⁶

Climate change is melting glaciers and ice caps resulting in sea level rise, coastal erosion and flooding. This not only risks health and well-being through physical injuries, drowning, increased incidences of food and water-borne infections and poor mental health outcomes but also risks the loss of livelihoods, infrastructure, and food and water security.⁴⁷ Marine and terrestrial animals and plants may also be damaged or destroyed during extreme weather events.

Although the effects of ocean acidification and heating are global, they are inequitable. The vulnerable communities and regions in the global south disproportionately bear the brunt of the adverse impacts.



Recommendation 4

End all subsidies, investments and new exploration for fossil fuels, while ensuring a just transition to renewable energy.⁴⁸ There must be no new offshore drilling for oil along with urgent phasing out of offshore oil rigs. There needs to be a simultaneous effort to switch to cleaner fuels. This could be achieved through a combination of wind, solar, hydroelectric and other renewable sources of energy.

Pollution caused by human activities

Marine pollution is primarily due to land-based activities. The exponentially increasing plastic, sewage and other forms of waste that run off into the oceans are harmful to marine life. More than 10 million metric tons of plastic, around 85% of marine litter, ends up in oceans around the world every year.⁴⁹ This number is expected to almost triple by 2040. The fishing industry itself contributes to around a third of this plastic waste. Nutrient pollution is causing eutrophication (blooming of harmful algae) in coastal areas and increasing the number of dead zones – regions under water with extremely low oxygen levels where life cannot survive – globally (approximately 700 in 2019, the total size is estimated to be larger than the UK).⁴⁹ Nitrogen and phosphorus waste from fertilisers and manure generated from farming are significant contributors to eutrophication.

Contamination of rivers and oceans with persistent chemicals and heavy metals leads to poisoning and bioaccumulation in some species (e.g. higher concentrations in those at the top of the food chain such as fish eaten by humans). Substances dumped into water include heavy metals (mercury, arsenic, copper, iron and lead), pharmaceutical drugs and active ingredients in daily-use products (household and personal care). For example, the combustion of coal can lead to mercury pollution in water. The concentration of this neurotoxin, methylmercury, in tissues intensifies as it moves up the food chain. Fishes such as tuna and striped bass have been found with tissues with over 10 million times greater concentrations of methylmercury than the surrounding water.⁴¹ High levels of dietary exposure to fish contaminated with methylmercury increases the risk of fetal anomalies, cardiovascular diseases, and dementia in adults.⁴¹ Many countries around the world have issued advisories to restrict fish consumption to limit mercury toxicity. For example in the UK, it is advised to eat no more than two portions (~280g) of small fish a week, and preferably avoid predatory fishes.⁵⁰

In the UK, coastal litter mainly consists of fishing and sewage-related debris (20%), cigarette butts (18%) and other plastic waste including cups, bottles, cotton buds, crisp packets and shopping bags (12%).⁵¹ Microplastics in waterways, produced from primary or secondary sources or due to fragmentation of microplastics, have become a serious

environmental and health hazard.⁵¹ Pharmaceutical products including antibiotics have been found in high concentrations in effluents of 13% of sewage treatment plants and waterways in the UK.⁵² Little is known about the environmental risk of the majority of medications currently in use. There is evidence of toxicological effects in animals due to the biologically active components dumped into water bodies; for example, oral contraceptives have led to the feminisation of male fishes and there is evidence of antimicrobial resistance linked to the discharge of antibiotics.^{52,53} The most effective strategy to prevent the disposal of pharmaceuticals in waterways is through cross-sectoral, multi-agency systems approaches, such as Scotland's One Health Breakthrough partnership.⁵⁴



Recommendation 5

Reduce plastic waste by banning the production and sale of unnecessary plastic items with simultaneous efforts to incentivise reusing, recycling, and the production and utilisation of alternate compostable materials. This can be achieved through a market transformation towards a circular economy and adoption of necessary policy and regulatory frameworks.⁵⁵



Recommendation 6

Increase knowledge and understanding of human and ecological risks caused by the presence of pharmaceutical products in water bodies. This requires a whole systems approach with investment in research to measure the ecological footprint of medicines that enables prescribers and patients to make environmentally informed choices. This generated data will help reduce harmful impacts by preventing the release of pharmaceuticals in water bodies through proper regulation and governance.^{52,54}



Global responsibility

Globally, around half a billion people earn their living through fisheries, mostly small-scale.⁴⁰ Coral reefs protect and nurture commercially important fishes while regulating both the quality and quantity of the seafood. In many African, South Asian and small island countries, more than half of the protein in the diet is from fish. The warming and acidification of oceans have led to an overall reduction in fish catch and have also adversely affected fisheries and shellfish aquacultures.⁴⁷ This decrease in catch amounts can increase the price of seafood, forcing people to resort to affordable and unhealthy options, which can manifest as obesity.⁴⁶ In others, who do not have access to alternative options, this reduced availability of seafood might further aggravate undernutrition.

Tourism is strategically important in coastal areas, though the economic benefits are not shared equitably.⁴⁶ Poorly maintained and polluted coastal regions can lead to distorted perceptions of blue spaces and a sense of disconnection from nature. This can negatively impact the limited time children and adults spend outdoors and further deteriorate their physical and mental health.⁴⁶ Extreme weather events such as coastal floods due to rising sea levels lead to significant damage to infrastructure and livelihoods and poor physical and mental health outcomes.

The UK has a global responsibility in developing and supporting sustainable blue economies in vulnerable countries through financial investments and the provision of resources as necessary. The UK has invested £500 million in the Blue Planet fund to deliver better outcomes for climate change and biodiversity, reduce marine pollution and ensure sustainable seafood practices in developing nations.¹¹ Interventions targeted at protecting and restoring marine ecosystems also help mitigate the climate crisis and reduce health inequalities. Inclusive decision-making, such as consulting local and Indigenous people in decision-making with regard to the oceans and coastal ecosystems, has better, just and sustainable outcomes.⁴⁷



Recommendation 7

Strengthen international financial flows and capacity-building with inclusive decision-making to support and implement innovative multidisciplinary solutions to save marine ecosystems. This can be done through targeted reduction of different kinds of pollution, overconsumption and waste, and by providing positive incentives to local communities to protect, conserve and restore marine ecosystems. Identification and scaling up of successful local innovations should be done wherever appropriate.^{12,40,47}



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Endorsements

Endorsements for this policy report from our members and partners

