

Institute for Public Policy Research



WE ARE NOT READY

**POLICYMAKING
IN THE AGE OF
ENVIRONMENTAL
BREAKDOWN**

FINAL REPORT

**Laurie Laybourn-Langton,
Joshua Emden and Tom Hill**

June 2020

CONTENTS

Summary	3
1. Introduction	7
2. Sustainability	10
Environmental breakdown is the defining challenge of our time	10
Policymakers need to wake up to environmental breakdown	14
Thriving within environmental limits: conditions for policymaking.....	14
UK performance.....	16
A thriving UK within environmental limits	19
3. Justice	21
Environmental breakdown is unjust	21
A just transition for all: conditions for policymaking	24
UK performance.....	26
Responsibility and justice in the age of environmental breakdown	28
4. Preparedness	31
Societies are not adequately prepared for environmental breakdown ...	31
Being prepared: conditions for policymaking	35
UK performance.....	35
A better prepared UK	38
5. Conclusion	40
Summary of policies.....	41
References	42

ABOUT THIS PAPER

This is the final report of a major IPPR research programme – *Responding to Environmental Breakdown* – that has investigated how to realise a more sustainable, just and prepared society in response to environmental breakdown. The programme and this paper seek to inform debate over the relationship between policy and politics and environmental breakdown, supporting education in economic, social and political sciences. In doing so, they seek to help advance environmental improvement, sustainable development, and to relieve poverty and disadvantage. The scope of this programme and its output is global but uses the UK as a case study to explore the major issues and policy responses.

Responding to Environmental Breakdown is part of IPPR’s wider work on environmental issues, which includes the landmark Environmental Justice Commission, which will help develop the ideas and policies to bring about a rapid green transition that is fair and just.

To learn more, and to read the other reports from *Responding to Environmental Breakdown*, visit: <https://www.ippr.org/research/topics/environment>

ABOUT THE AUTHORS

Laurie Laybourn-Langton is an associate fellow at IPPR.

Joshua Emden is a research fellow at IPPR.

Tom Hill was a senior research fellow at IPPR at the time of writing this report.

ACKNOWLEDGEMENTS

The authors would like to thank Darren Baxter-Clow, Leslie Harroun, Robin Harvey, Abi Hynes, Lara Iannelli, Michael Jacobs, Astrid Kann-Rasmussen, Irene Krarup, Peter Lipman, Richard Maclean, Asher Miller, Luke Murphy, Lesley Rankin, Carys Roberts, Olivia Vaughan and David Wastell, as well as all those who attended the research roundtables for this programme. In particular, we would like to thank Partners for a New Economy without whose support this programme would not have been possible.



Download

This document is available to download as a free PDF and in other formats at:
<http://www.ippr.org/research/publications/we-are-not-ready>

Citation

If you are using this document in your own writing, our preferred citation is:
Laybourn-Langton L, Emden J and Hill T (2020) *We are not ready: Policymaking in the age of environmental breakdown, final report*, IPPR. <http://www.ippr.org/research/publications/we-are-not-ready>

Permission to share

This document is published under a creative commons licence:
Attribution-NonCommercial-NoDerivs 2.0 UK
<http://creativecommons.org/licenses/by-nc-nd/2.0/uk/>
For commercial use, please contact info@ippr.org



SUMMARY

ENVIRONMENTAL BREAKDOWN IS THE DEFINING CHALLENGE OF OUR TIME

This is the final report of a major research programme investigating the implications of the global environmental crisis for politics and policymaking. Overall, this programme has found that human impacts on the environment have reached a critical stage and are eroding the conditions upon which enduring socioeconomic stability is possible.

- **The environmental crisis encompasses more than just climate breakdown.** Destructive impacts on the environment encompass many areas of nature and natural systems – including soil, biodiversity and the oceans – driving a complex, dynamic process of overall environmental breakdown of unprecedented scale and pace that is reaching critically dangerous levels. In many ways, environmental breakdown cannot be solved but can be better managed.
- **Environmental breakdown is creating a new, highly destabilised domain of risk.** The consequences include financial instability, ill health and conflict. In all, environmental breakdown is creating a new, extreme normal of persistent, compounding and constantly evolving destabilisation across most areas of society, economies, politics and the environment. This has implications for all areas of policy and politics, and increases the chance of the collapse of social and economic systems at local, national and even global levels. The global, system-wide shock of the coronavirus pandemic – and the lack of preparedness on the part of many governments – foreshadows the destabilisation to come.
- **Environmental breakdown is a problem of socioeconomic systems.** It is driven by the structures and dynamics of these systems, with political-economic models across the world achieving social progress at the expense of the environment. Many socioeconomic systems have developed under conditions of remarkable stability, often prioritising efficiency over resilience, and are therefore acutely vulnerable to the domain of risk imposed by environmental breakdown. The coronavirus pandemic has exposed many of these vulnerabilities.
- **Environmental breakdown is unfair.** Those who contributed least to the cumulative stock of environmental degradation disproportionately suffer its consequences and are more vulnerable, often experiencing pre-existing problems or lacking the resources to protect their wellbeing. The multiplier effect of environmental breakdown on existing inequity will be extreme, not just shrinking the ability or will to deal with these problems but growing them exponentially. Perceptions of fairness will weigh heavily on the ability of countries and communities to maintain cooperation under conditions of compounding environmental breakdown.

THE UK IS NOT READY FOR THE DEMANDS OF THE AGE OF ENVIRONMENTAL BREAKDOWN

Policymakers need to wake up to the implications of environmental breakdown. The response needed from governments is far more systemic than recent periods of unprecedented action, such as in response to the 2007/08 financial crisis or the coronavirus pandemic in 2020. Responding to environmental breakdown means undertaking a directed transformation of socioeconomic systems to realise

societies that are: more sustainable and just, bringing human activity to within environmentally sustainable limits while tackling inequalities and improving quality of life; and better prepared, increasing levels of resilience to the impacts of accelerating environmental breakdown and other interrelated crises.

Such a transformation necessitates a shift in the current political-economic paradigm: the system of thought and practice that drives the behaviours of decision-makers and institutions, helping determine the structures and dynamics of overall socioeconomic systems. The current paradigm acts as a barrier to rapid, structural and equitable socioeconomic change. A new approach to policymaking is needed. In response, this paper defines overall conditions for policymaking to drive each element of the transformation, providing a guide for policymakers present and future. It then uses the UK as a case study of one nation within an international context to assess progress towards meeting these conditions. Overall, it finds that the UK is not ready for the demands imposed by environmental breakdown, a failure which has large negative implications for current and future generations. The historical disregard of environmental considerations in most areas of policy has been a catastrophic mistake.

1. SUSTAINABLE: THRIVING WITHIN ENVIRONMENTAL LIMITS

Policy should set a range of binding environmental limits on economies, effectively placing a full sustainability constraint within which activity can occur. This should drive a new, sustainable conception of abundance that establishes a positive correlation between human progress and environmental sustainability, realising the co-benefits of cleaner, more efficient economies, instead of simply greening the current model.

The UK is acting too slowly on environmental sustainability. One of the foremost tasks of policy under conditions of environmental breakdown is to bring the entire UK economy and its wider environmental footprint to within sustainable limits. This requires a system-wide reorientation of socioeconomic activity unprecedented in peacetime, if ever. While the UK has often been a leader in understanding and acting on issues of environmental concern, it is failing to adequately recognise the extent to which it is contributing to overall environmental breakdown and to set a full suite of legally binding and enforced goals that seek to bring all negative impacts on the environment to within safe limits. The UK's environmental impact far exceeds these limits. This failure is a function of a prevailing political-economic paradigm founded on narrow conceptions of progress, a limited role for state action, and an emphasis on individual responsibility and responses rather than collective and systemic change. In response, a comprehensive overall framework for sustainability and the resultant policymaking is needed, and should include:

- A Sustainable Economy Act mandating legally binding goals or targets for the rapid reduction of a full range of environmental impacts, and undertaking directed action to realise the co-benefits of a fairer and more sustainable model of abundance for society.
- Changes to the decision-making structures of government, including establishing a Minister for the Sustainable Development Goals, making decisions to achieve societal goals in line with a suite of indicators of wellbeing, and establishing a Council for the Response to Environmental Breakdown at the heart of government to provide transparency over the complex and pressing decisions that need to be made to respond to environmental breakdown.
- A Green Industrial Strategy driving huge, state-led investment and regulation to expedite economic development towards meeting environmental goals and wellbeing objectives.

2. JUST: A JUST TRANSITION FOR ALL

Policy should seek to realise a just transition for everyone, ameliorating the inequities inherent in the socioeconomic drivers of environmental breakdown, more fairly distributing its costs within and between societies, maximising transitional benefits for marginalised communities, observing historical and international responsibilities, and acting to relieve the unique burden placed on future generations.

The UK is failing to adequately recognise the extent and severity of injustice and unfairness relating to environmental breakdown. Notable efforts – such as the Scottish Just Transition Commission and the Welsh Well-being of Future Generations Act – do not extend across the UK or throughout government decision-making at all levels. Commitments to reduce environmental impact do not adequately consider cumulative contribution and policies are actively driving environmental destruction abroad. The full rights of future generations are not formally recognised, younger generations have little direct agency over decision-making, and the general failure to act on environmental breakdown and prepare for its impacts imperils the future. Inadequate attention or support is being given to those communities who will disproportionately experience negative impacts or who are particularly vulnerable. An explicit just transition approach and capabilities should exist across government, including through:

- A Net Zero and Just Transition Delivery Body, as argued for by IPPR's Environmental Justice Commission, to be responsible for developing and delivering a national Net Zero Delivery Plan which must be centred around a just transition. The core focus of this body and supporting Just Transition Fund must be to bring together the nation to plan and implement strategies for undoing structural inequity and distributing the impacts of acting on environmental breakdown, to be supported by similar bodies within the devolved nations (including Scotland's existing Just Transition Commission) and at the regional level.
- A nationwide Future Generations Act that formally recognises protections for the interests of future generations and their right to a stable environment, ensuring those yet to be born are stakeholders in policy and have legal standing should the government fail to meet its environmental responsibilities.
- A fair and responsible foreign policy based on an understanding of the UK's historical role in driving environmental breakdown and its cumulative contribution to environmental damage. In turn, the UK should take the approach of a 'supporting partner' in providing resources to those most in need and to drive reform of global structures and institutions that entrench environmental damage and socioeconomic iniquity.

3. PREPARED: REALISING THE BENEFITS OF MORE RESILIENT SYSTEMS

Policy should go beyond the current focus on adaptation of physical infrastructure to climate shocks, expanding efforts to prepare for the systemic consequences of environmental breakdown on all socioeconomic and natural systems, and realising the inherent benefits of more resilient societies.

The UK is not prepared for the increasingly severe impacts of environmental breakdown. Its analysis of the risks and threats is underdeveloped, largely limited to climate breakdown, and the lack of integration between risk assessment processes may preclude a sophisticated analysis of the overall domain of risk emerging as a result of environmental breakdown. The government is failing even to adequately implement adaptation measures under its own analysis, which primarily focus on infrastructure and other 'hard' systems and have scant consideration of health, social and political cohesion and other 'soft' systems. The coronavirus pandemic has provided a practical example of the failings of risk management and planning

and the inadequacies of public engagement on issues of risk. The domain of risk resulting from environmental breakdown is highly complex and poorly understood across government and the wider public, and has implications for all people and areas of policy. Therefore, as a matter of priority, the government needs to develop a more sophisticated analysis of the risks and engage the population in a transparent process of education and engagement. Mechanisms to achieve this include:

- A Royal Commission on Preparations for Environmental Breakdown that rapidly develops a more sophisticated analysis of the domain of risk resulting from environmental breakdown and assesses the UK's preparedness, both to inform policy and to openly engage the public in considering and acting on risks that will impact all citizens.
- A national education programme on environmental breakdown, to rapidly develop a shared understanding across the population of the reality and risks of environment breakdown, and a Future Leaders Fund, to help outstanding young leaders develop the experience and competencies needed to lead in a future of unprecedented destabilisation.
- Integrated risk assessment and planning driving coordination across government on responding to the complexities of the domain of risk associated with environmental breakdown.

IN RESPONDING TO ENVIRONMENTAL BREAKDOWN, A BETTER WORLD IS POSSIBLE

Implementation of these policies should be considered in the context of the response to the coronavirus pandemic and measures taken to recover from the social and economic damage. Action to ameliorate the systemic shock of the pandemic and alleviate the risk of future outbreaks is insufficient without addressing environmental breakdown. Moreover, the unprecedented emergency measures taken by governments to combat the pandemic are a reminder of the extraordinary resources and capabilities that can be mobilised across societies in the face of major threats.

In many respects, environmental breakdown will get worse. Progress is too slow; we are far behind. But all is not lost. A new approach is needed and, crucially, in responding to environmental breakdown, a better world is possible; one in which cleaner, more efficient, fair and better prepared societies can flourish under a new conception of abundance. The actions needed to mitigate environmental breakdown are those that societies and economies should have undertaken anyway to realise happier, healthier lives. Overall, this report is intended to provide a guide for politicians and other policymakers to help this world come to pass, particularly members of younger generations, who must rise to the challenge, emerging as leaders of a new type.

1. INTRODUCTION

“ People are dying. Entire ecosystems are collapsing. We are in the beginning of a mass extinction. And all you can talk about is money and fairytales of eternal economic growth. How dare you!

Greta Thunberg, 2019¹

“ Just as a piece of elastic can lose its capacity to snap back to its original shape, repeated stress can lead systems – organizations, economies, societies, the environment – to lose their capacity to rebound. If we exhaust our capacities to absorb disruption and allow our systems to become brittle enough to break, it is difficult to overstate the damage that might result.

Global Risks Report, World Economic Forum, 2018²

The environmental crisis is going to get worse. Critical destruction has already occurred and so much has been lost. Great tracts of land are degraded, species are extinct and global animal populations have collapsed (Laybourn-Langton et al 2019a). A million species are threatened with extinction, many within decades, and recent years have seen record volumes of greenhouse gases pour into the atmosphere (IPBES 2019; WMO 2018). As a result, the window of opportunity to avoid increasingly unmanageable destabilisation is closing as natural systems threaten to pass points of no return. Even if far more action were taken, natural inertias create a dangerous ‘stopping distance’ between human action and environmental reaction. For example, even if global greenhouse gas emissions were eliminated by the mid-part of this century, temperatures could still continue to rise (IPCC 2019). Crucially, a similar problem exists within human systems, constraining the response. All economies are, by their very construction, currently dependent on the continuation of environmental destruction. Thus, there also exists a stopping distance between decisions to end environmental degradation and the eventual achievement of sufficient levels of sustainability. It would be both impossible and catastrophic to stop, overnight, the damaging activities upon which our societies depend, switching off the fossil fuel power plants and stopping the dirty vehicles. Yet the opposite is happening; more coal power plants are planned and petrol and diesel cars continue to roll off production lines, speeding up the destruction and lengthening societies’ stopping distance.

To varying degrees, mainstream politics is failing to engage the public in the full implications of environmental breakdown. Action on this crisis is sometimes couched in terms of a binary outcome: either these efforts will succeed, and

1 Thunberg 2019

2 WEF 2018

breakdown will stop, or they will fail, to be followed by some great, unnamed catastrophe. Breaking from this false dichotomy first requires policymakers to understand that the environmental crisis has already reached critical levels and that it will get worse, further driving a complex, dynamic process of overall environmental breakdown. The consequences for societies are systemic – leaving no area of politics and policymaking untouched – and dire. They include growing and persistent financial instability, ill health and conflict, as environmental stressors interact with and exacerbate existing social and economic trends (Laybourn-Langton et al 2019a). In the extreme, this saturating destabilisation increases the chance of the collapse of social and economic systems at local, national and even global levels. Environmental breakdown thus presents decision-makers with a new domain of risk of unprecedented complexity and severity.

This reality has two critical implications for how policymakers respond to environmental breakdown. Firstly, the response must be far quicker and at a far greater scale than hitherto achieved or recognised, driving nothing less than a transformational change of social and economic systems. As the United Nations (UN)'s Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) concluded in 2019, responding to environmental breakdown requires all societies and economies to undertake a 'fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values' (IPBES 2019). These changes are likely to be without precedent, at least since the dawn of the industrial age, and must occur across societies already experiencing upheaval. Secondly, this must be achieved over a period in which the destabilising consequences of environmental breakdown are set to multiply. Among other things, this destabilisation could act to erode cooperation and embolden regressive political actors, crowding out efforts to realise transformative change to socioeconomic systems, driving a vicious circle. It is therefore imperative that efforts to realise this transformation are mindful of and robust to an emergent truth: things are going to get worse.

Over 2019, these efforts blossomed. Activist groups, including Extinction Rebellion and Fridays For The Future, brought the crisis to a mass audience. Campaigners for a Green New Deal offered an alternative vision of the future in which more sustainable societies can also be fairer and more prosperous. National institutions, from the UK Parliament to the Tate, declared climate and ecological emergencies. The UK government committed in law to a net-zero decarbonisation target. Investors such as BlackRock upped their rhetoric on using their market power to drive sustainability. Environmental concern grew across the world. Yet these efforts are still to achieve a sufficient pace and reach of change; rhetoric remains far ahead of reality.

This report is the final output of a project begun before this new wave of action. The project has sought to understand the extent to which mainstream policy debates do not sufficiently appreciate the scale and pace of environmental breakdown, its destabilising implications, and the extent of the necessary response. While some progress has been made over the period of this project, these conclusions, unfortunately, stand. After an initial report setting out the problem, four briefing papers explored the consequences of environmental breakdown for political economy, inter-generational issues, international cooperation and politics.³ Throughout, this project has argued that an adequate response to environmental breakdown requires the realisation of an overall socioeconomic transformation, to make societies more sustainable and just – fairly bringing human activity to within environmentally sustainable limits – and prepared for the increasingly severe impacts of accelerating environmental breakdown.

3 These briefing papers can be accessed on the IPPR website: <https://www.ippr.org/environmentalbreakdown>

Fundamentally, seeking such a transformation can enable current and future generations to hope for a better world in the face of the threat posed by environmental breakdown. While this threat will grow, the actions needed to mitigate it are those that societies and economies should have been undertaking anyway to realise happier, healthier lives. The global coronavirus pandemic, which erupted in the final months of this project, serves to remind policymakers of the fragility of human systems to pervasive, exponential threats – and of the exponential response that can be mobilised across societies.

This report summarises the arguments for why a transformational response should be taken and presents an overall framework for understanding what constitutes good policymaking and governance under conditions of and in response to environmental breakdown. To do so, the following three chapters inspect each element of the overall transformation – sustainability, justice, preparation – and follow the same schema in relation to each element; exploring the consequences of environmental breakdown, defining principles for policymaking, assessing the performance of the UK government, and discussing the policies needed to achieve a minimal viable response to environmental breakdown. As with the other outputs of this project, the report uses the UK as a case study within an international context and its analysis and recommendations should be relevant to readers in countries across the world. Overall, this report is intended to provide a guide for politicians and other policymakers to help them navigate the unprecedented challenge presented by environmental breakdown – particularly members of younger generations, who must rise to the challenge, emerging as leaders of a new type.

2. SUSTAINABILITY

Human impacts on the environment have reached a critical stage, eroding the conditions upon which socioeconomic stability is possible (Laybourn-Langton et al 2019a). These impacts are not isolated to climate breakdown and encompass most other natural systems – including soil, biodiversity and the oceans – driving a complex, dynamic process of overall environmental breakdown that has reached dangerous levels. The consequences include growing economic instability, socioeconomic volatility and conflict, increasing the chance of the collapse of human systems at local, national and potentially even global levels. The historical disregard of environmental considerations in most areas of policy has been a catastrophic mistake. This chapter explores the leading causes and consequences of environmental breakdown and the responses that should be taken by policymakers to slow its acceleration.

ENVIRONMENTAL BREAKDOWN IS THE DEFINING CHALLENGE OF OUR TIME

Mainstream political and policy debates have failed to adequately recognise the challenge posed by environmental breakdown. Overcoming this failure will require policymakers to undertake three major transformations in their understanding of the environmental crisis:

1. Environmental destabilisation is unprecedented in its scale and pace

Aggregate human impacts on the environment range from local to global scales and are overwhelmingly negative, altering and destabilising the environmental preconditions upon which societies depend (ibid). Critically, human activity has altered the functioning of global natural systems that are essential to the regulation of stable living conditions on Earth, such as the climate cycle. These changes are occurring at speeds unprecedented in human history or, in some cases, millions or billions of years. Notable markers of environmental breakdown include:

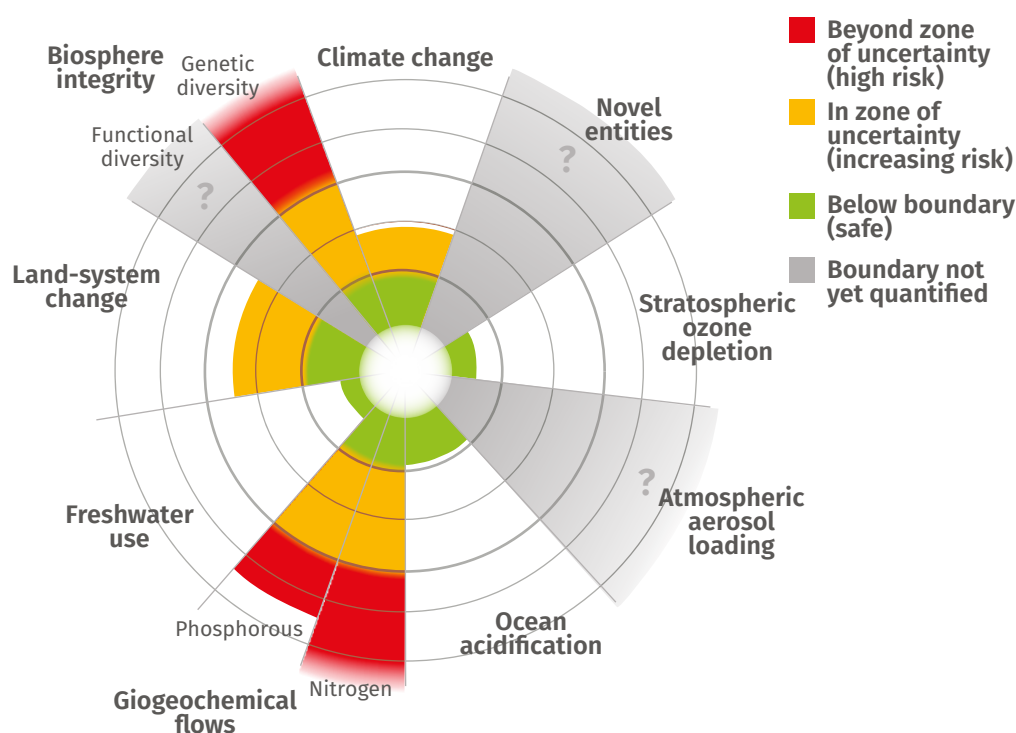
- **Climate:** Atmospheric CO₂ concentrations are the highest level since the Pliocene era three to five million years ago, when the temperature was 2–3°C warmer and sea level was 10–20 metres higher (WMO 2018).
- **Biodiversity:** It is estimated that populations of vertebrate animals have dropped by nearly three-fifths since 1970 (WWF 2018). Species extinction rates are at orders of magnitude higher than the natural rate and are accelerating, and it is estimated that around one million species are threatened with extinction in the coming decades, an eighth of the total species on Earth (IPBES 2019).
- **Land use:** More than 70 per cent of ice-free land is directly impacted by human activity (IPCC 2019). Much of this influence is dangerously destructive. Around a quarter of ice-free land is being degraded by human activity (ibid). Soil erosion from agricultural fields is estimated to be more than 100 times higher than it can be naturally replenished in areas that are conventionally tilled and 10 to 20 times higher in areas with no tillage (ibid).

Overall, it is estimated that many natural systems have been pushed into ‘unsafe operating spaces’, as figure 2.1 shows. As a result, tipping points – at which natural systems are pushed beyond the threshold of their stable state, causing an abrupt and possibly irreversible change in the functioning of these systems

– are at risk of being triggered (something which may have already occurred), threatening cascading, unmanageable environmental breakdown (Lenton et al 2019). Furthermore, the high interdependence of natural systems means that rapid changes in one system can disrupt others, potentially triggering large-scale environmental change at a regional or global level, such as higher temperatures and the other consequences of climate breakdown, triggering a collapse in biodiversity. These inter-system cascades could be compounding, unpredictable, abrupt and catastrophic to human civilisation.

FIGURE 2.1: THE CURRENT STATUS OF THE NINE PLANETARY BOUNDARIES

Three natural systems sit within a safe operating space while five systems have been dangerously disrupted



Source: Steffen et al (2015), modified from Rockström et al (2009)

2. Environmental breakdown is creating a new, highly destabilised domain of risk

The consequences of environmental breakdown – from extreme weather events to the depletion of arable land – will impact social and economic systems from a local to a global level: a process that is already underway (Laybourn-Langton et al 2019a). Environmental breakdown is creating an unprecedented state of perpetual and growing system-wide destabilisation. Environmental shocks stress social and economic systems and aggravate existing problems, driving a compounding, runaway process of destabilisation that percolates through interconnected human systems. In order to better understand this complex process, we separate the key consequences of environmental breakdown for human systems into three areas:

- **Localised impacts:** The direct and indirect impacts of environmental shocks on societies and economies incur significant and enduring costs. For example, the immediate destruction of extreme weather events can lead to ongoing disruption to infrastructure, ill health and political destabilisation.

- **Systemic consequences:** The consequences of breakdown are systemic and uncontained by the boundaries of the nation state. Globalised economic systems transmit the impacts of local events across national borders. Food shocks, for example, do not just affect those countries in which the agricultural system is impacted, but are experienced across supply chains through shortages and increased prices.
- **Interaction with socioeconomic context:** The consequences of environmental breakdown will interact with existing socioeconomic and political problems, such as inequality, state fragility and geopolitical tension, compounding and exacerbating them.

The consequences of environmental breakdown for societies and economies are unprecedented in their scale, speed, severity and complexity. Many socioeconomic systems are vulnerable to systemic shocks, with considerations of efficiency often being prioritised over resilience (Linkov et al 2019). In the extreme, environmental breakdown could trigger catastrophic breakdown of human systems, driving a rapid process of runaway collapse in which economic, social and political shocks cascade through the globally linked systems. Persistent, compounding stress could erode the capacity of human systems to respond to and recover from instability, leading to permanent failure or a new, sub-optimal level of functioning (WEF 2018). Concurrently, societies and economies will have to undergo rapid and unprecedented structural changes in order to slow environmental breakdown, many of which could be highly divisive and disruptive. In all, these factors create a state or 'domain of risk' of complex, enduring and potentially overwhelming destabilisation of human systems.

3. Environmental breakdown is a problem of economic systems

Environmental breakdown is driven by the structures and dynamics of socioeconomic systems (Laybourn-Langton and Hill 2019). Prevailing models of economic development around the world are founded on unsustainable resource use, such as the combustion of fossil fuels and overexploitation of soils. These dynamics are partly driven by investment processes that exclude environmental considerations (including internalisation of the costs of destruction and its destabilising consequences), and business strategies and government policy approaches that promote the acquisition and consumption of goods and services in ever greater quantities. As a result, environmental breakdown has exposed a number of major, interrelated challenges to prevailing economic models, including:

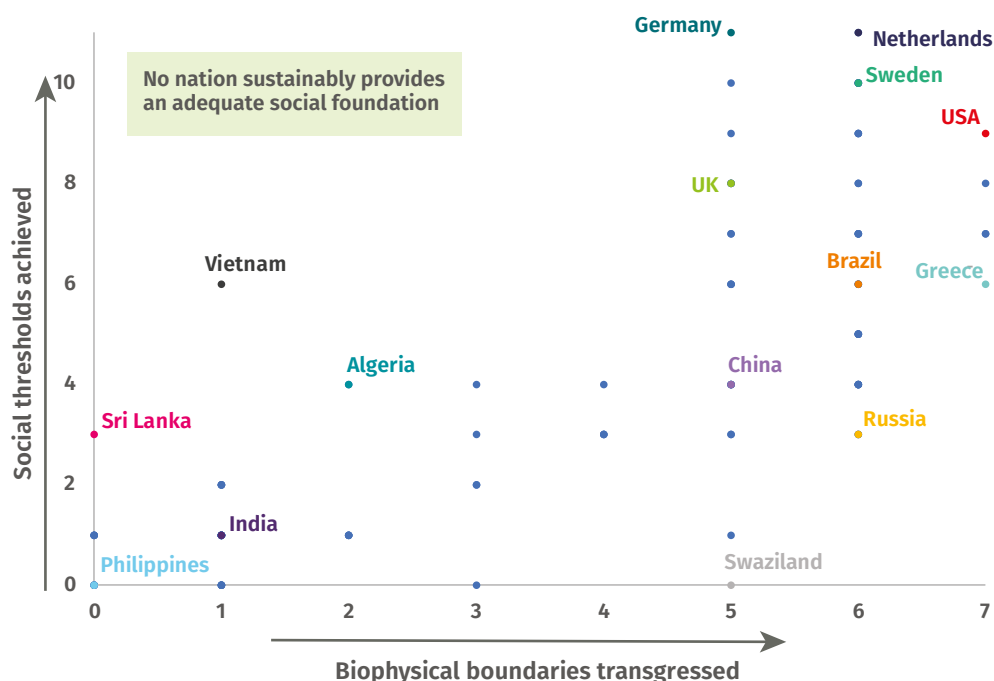
- **Social progress has been achieved at the expense of the environment.** In the UK and in countries around the world, there is a positive correlation between progress towards social goals and environmental breakdown, as shown in figure 2.2 (O'Neill et al 2018). Some evidence suggests that it may not be possible to decouple economic growth, as currently measured, from environmental degradation in the time remaining or even at all (Hickel and Kallis 2019).
- **Headline measures of economic progress exclude environmental degradation.** Despite its use as a headline metric of economic progress around the world, there is widespread appreciation that GDP is an inadequate measure for considering socioeconomic progress and its interrelation with nature (Colebrook 2018). Its continued use as the primary single measure of economic success perpetuates the myth that compounding economic growth necessarily improves societal welfare.
- **Economies are vulnerable to environmental shocks.** Many critical socioeconomic systems are dangerously unprepared for the impacts of environmental breakdown. For example, many central banks have warned of the potential for financial crises resulting from both the risks to investors of continued exposure to the falling value of carbon assets (which must occur if

carbon budgets are to be met) and macroeconomic destabilisation associated with infrastructure damage, agricultural losses and commodity price spikes resulting from environmental shocks (NEF 2017; Rudebusch 2019). The coronavirus pandemic has exposed how socioeconomic systems have often developed to prioritise efficiency over resilience.

- **Economic systems are unsuited to rapid change.** The construction of economies means that inertias inherent in systems with high environmental impact limit the capacity to make these systems sustainable. For example, it is estimated that the complete electrification of vehicles in the UK alone would require most of the current global production of precious metals, would rely on large increases in energy use, and would lead to negative consequences for other natural systems and societies in the Global South (Herrington et al 2019; Dominish et al 2019). Similarly, unsustainable infrastructure, such as fossil fuel plants with decades-long lifespans, ‘lock in’ the use of carbon, thereby inhibiting future decarbonisation (Erickson et al 2015).
- **Structural inequality will be exacerbated by environmental breakdown.** Global economic structures still fail to provide adequate social and economic opportunities to all or even meet basic needs. The unequally distributed impacts of environmental breakdown interact with the structural drivers of inequality to degrade development outcomes, with the UN concluding that the current trajectory of climate breakdown alone is expected to push tens of millions of people into poverty and ‘threatens to undo the last 50 years of progress in development, global health, and poverty reduction’ (HRC 2019).

FIGURE 2.2: NO NATION IS SUSTAINABLY PROVIDING AN ADEQUATE SOCIAL AND ECONOMIC FOUNDATION

Social thresholds achieved versus biophysical boundaries transgressed



Source: A Good Life for All Within Planetary Boundaries (2019)⁴

4 For data, see: <https://goodlife.leeds.ac.uk/countries/>

Overall, prevailing socioeconomic systems are divisive and degenerative (Raworth 2017). They continue to drive critical levels of environmental breakdown without meeting human needs, have little recourse to the resultant injustices and are failing to adequately prepare for a destabilised future.

POLICYMAKERS NEED TO WAKE UP TO ENVIRONMENTAL BREAKDOWN

Environmental breakdown is the defining challenge of our time and for those to come. The cumulative environmental destruction brought by socioeconomic systems has critically destabilised natural systems. As a result, the increasing frequency and severity of environmental shocks will be transmitted across socioeconomic systems, which are already experiencing acute stress, destabilising them over a period in which they must undergo rapid structural change. Such a state of affairs may present a challenge without precedent in human history. Therefore, in response, an overall socioeconomic transformation is needed, to make societies more:

- **sustainable and just**, rapidly bringing the impacts of human activity to within environmentally sustainable limits while tackling inequalities and improving quality of life, and
- **prepared**, increasing levels of resilience to the impacts of accelerating environmental breakdown.

These transformations – to prevent and mitigate environmental breakdown while increasingly preparing for its impacts – are interrelated processes. For example, in the case of climate breakdown, increased use of renewable energy can lower greenhouse gas emissions while improving energy system resilience by reducing reliance on energy imports and exposure to fluctuations in fossil fuel markets (World Bank 2018). In turn, reducing investments in fossil fuel companies can both increase resilience to economic shocks resulting from devaluation in these companies, and also discourage a business model that necessitates unsustainable emission of greenhouse gases (Carney 2015). For the remainder of this chapter, we will explore those measures needed to drive sustainability and rapidly bring the impacts of human activity to within safe limits. Subsequent chapters will turn to issues of justice and preparedness.

THRIVING WITHIN ENVIRONMENTAL LIMITS: CONDITIONS FOR POLICYMAKING

Realising more sustainable, just and prepared societies requires governments and policymakers to undertake action of an unprecedented speed and scale. The nature of the challenge posed by environmental breakdown means this action is of an order of magnitude greater than recent periods of unprecedented action on the part of governments, such as in response to the 2007/08 financial crisis and its after-effects or the ongoing coronavirus pandemic. Environmental breakdown has already reached critical levels and is difficult or impossible to undo, and the resultant destabilisation is growing, is systemic and impacts from local to global levels.

As such, the action required to adequately respond to environmental breakdown necessitates a shift in the political-economic paradigm: the system of thought and practice that drives the behaviours of decision-makers and institutions, helping determine the structures and dynamics of the overall socioeconomic system (Laybourn-Langton and Hill 2019). In contrast to the prevailing political-economic paradigm, a new paradigm will need a better understanding of the historical antecedents of the crisis, a recognition of and action to shift structures and imbalances of power, and an analytical framework capable of understanding the dynamic complexity of human and natural systems. It will also need a policy programme underpinned by a new set of objectives and conditions by which to measure success. In this chapter we set out these conditions for policymaking with regards to sustainability. The primary objective of policymaking should be

to rapidly bring human impacts on the environment to within sustainable limits through realising structural changes to socioeconomic systems that also maximise positive socioeconomic outcomes. We set out parallel conditions for considerations of justice and fairness and of preparedness in the following chapters. In the case of sustainability, we group the conditions into two areas – those relating directly to the environment and those relating to socioeconomic transformation:

1. Slowing environmental breakdown

Destructive human impacts on the environment must be brought within sustainable limits as quickly as possible. In many cases, the opposite is happening; overall, aggregate global human activity is consuming resources at a rate far in excess of nature's ability to regenerate, and at a rate that is increasing. It is therefore imperative that governments better understand their countries' contribution to environmental destruction and act to rapidly bring it within sustainable limits, doing so by adhering to four conditions, asking:

- **Are there legally binding goals for all areas of environmental concern?** Many governments now recognise the threats of climate breakdown and have introduced targets to reduce greenhouse gas emissions. Measurement of and action to reduce environmental degradation in other areas, such as chemical pollution and loss of certain animal populations, is widespread. Explicit, legally binding goals should exist to reduce other critical environmental degradation, such as large-scale species extinction and destabilisation of biogeochemical cycles, and a sufficient enforcement regime should exist to ensure goals are met.
- **Are these goals compatible with environmental stability?** Goals should be founded on a shared understanding of what constitutes a 'safe operating space' for natural systems, thus setting limits on environmental degradation compatible with stable functioning of these systems, such as those employed by the planetary boundaries framework (Rockström et al 2009; Steffen et al 2015; O'Neill et al 2018).
- **Do these goals consider the domestic contribution of environmental impacts abroad?** The total environmental destruction attributed to a given country is a function not just of activity occurring within its own borders but also degradation resulting from factors abroad, such as the production and distribution of goods and services to meet domestic consumption demands. Goals to reduce the environmental impact of a country should encompass the full scope of that impact.
- **Where goals have been set, are they on track to being met?** Many of the goals for slowing environmental breakdown will have to be long term, which can reduce the incentive for policymakers to act, and many are not on track to being delivered. Goals or targets do not meet themselves; they are easy to set and difficult to deliver.

2. Towards a new abundance

The current model for furthering social outcomes around the world is unsustainable and, irrespective of environmental breakdown, is failing to provide widely shared prosperity. The measures needed to combat environmental breakdown can be those that improve social and economic outcomes (Karlsson et al 2020). For example, reductions in the production and consumption of red meat can improve environmental outcomes, including lowering greenhouse gas emissions, deforestation rates and soil degradation, while improving health through a more varied and nutritious diet (EAT-Lancet 2019). Policy should seek to enable a new sustainable conception of abundance throughout society and economy that realises a positive correlation between human progress and environmental sustainability, such as that set out in the UN's sustainable development

goals (SDGs), instead of simply greening the current model. Conditions for doing so include asking:

- **Are a broad range of indicators used to define socioeconomic progress?** Moving beyond the failings of GDP and other headline economic indicators, governments should measure progress through a broader range of indicators including wellbeing and sustainability, such as Scotland's National Performance Framework (Scottish Government 2019), with budgetary decision-making determined in reference to improvements in these areas, as is increasingly the case in some countries, such as New Zealand (APPGWE 2019; New Zealand Treasury 2019).
- **Is the government delivering an industrial strategy for rapid environmental sustainability?** Rapid and unprecedented changes to the composition and purpose of economic activity is required to bring human impacts to within environmentally stable limits and maximise the socioeconomic benefits of doing so. Market dynamics alone cannot realise such a profound transformation and so governments need to actively promote structural change in the economy through coordinated industrial strategy (Jacobs et al 2017; Green Alliance 2017).
- **Are the rules governing economic activity becoming compatible with environmental sustainability?** Institutional arrangements and rules underpinning market dynamics and government policies are some of the most powerful forces driving environmental breakdown and negative socioeconomic outcomes. For example, over US\$700 billion was invested in fossil fuels across the world in 2017 and, in the same year, UK local government pension funds held over £16 billion of investments in fossil fuels (IEA 2018; Lander 2017). This partly resulted from short-termist decision-making encouraged by laws and valuation methods that neglect the environmental impact of investments. These rules need to change in order for the efforts of governments, companies and other actors to have a systemic difference.

UK PERFORMANCE

Having defined the conditions upon which policymaking should seek to rapidly reduce environmental impacts and maximise socioeconomic benefits, we assess the performance of the UK government in meeting these conditions.⁵

5 This is a subjective qualitative assessment to determine the UK's current performance against a set of systemic criteria on its progress in addressing the issue of sustainability in relation to environmental breakdown. Qualitative assessments are undertaken with regards to justice and then preparedness in the later chapters. Each assessment is based on a subjective measure of whether the conditions defined in each chapter are being met through government policy, either wholly, partially or not at all. Where possible, assessment is made with respect to the UK as a whole. Instances where policy is a matter for devolved administrations and differs significantly across the UK is either noted or the assessment is made in reference to policy concerning England. We recognise that in some areas the UK is recognised as 'a world leader' while in others it is falling short of other countries. However, the purpose of these assessments is not to compare the UK's performance relative to other countries but instead in relation to the degree of action required to effectively address the causes and effects of environmental breakdown.

TABLE 2.1: ASSESSMENT OF UK GOVERNMENT PERFORMANCE AGAINST IPPR CRITERIA FOR IMPROVING SUSTAINABILITY IN RESPONSE TO ENVIRONMENTAL BREAKDOWN

Assessment using subjective qualitative criteria detailed in previous section

	Condition	Rating	Notes
Slowing environmental breakdown	Legally binding goals are in place for all areas of environmental concern		The government has targets or goals for a range of areas of environmental concern, including greenhouse gas emissions, biodiversity and many pollutants, many of which are legally binding. More targets are proposed in the government’s Environment Bill. However, goals are not set for other areas of environmental concern, such as a target for the UK’s global environmental footprint, which is absent from the current version of the Bill.
	Goals are compatible with environmental stability		A number of the government’s environmental goals are compatible with stability. For example, its greenhouse gas emissions target meets the global requirement to reach net-zero in the coming decades, and the UK has met its requirements under the Montreal Protocol to halt ozone depletion. However, other goals have been criticised for being inadequate. For instance, the government’s Environment Bill does not include legally binding actions or binding interim targets to deliver the recovery of nature.
	Goals encompass the full, global scope of the UK’s environmental impact		As a party to a range of international agreements, certain environmental standards have been applied to foreign economic activity related to UK consumption, to some extent. However, little to no direct attention is paid to these impacts; for example, the UK’s climate targets do not consider emissions resulting from non-domestic production (though this is in line with international standards).
	Existing goals are on track to being met		The UK has made progress in meeting environmental goals, such as reducing greenhouse gas emissions and reintroducing some endangered wildlife. However, critical goals are not being met. For example, the government is set to miss 14 of the 19 Aichi Biodiversity Targets (JNCC 2019), the Committee on Climate Change has warned that the UK is not on track to meet its carbon budgets (CCC 2019a), and over 80 per cent of reporting zones in the UK have air pollution levels that breach legal limits (ClientEarth 2020).

Towards a new abundance	A broad range of indicators define socioeconomic progress		Government decision-making is determined by a range of factors, including meeting environmental and social objectives. Action is being taken to measure progress against a diversity of indicators, such as the Measures of National Well-being Dashboard developed by the Office for National Statistics and, in Scotland, the National Performance Framework. ⁶ However, government decisions are largely directed by quantitative cost-benefit analyses that favour maximisation of a narrow range of predominantly financial indicators, and the government has not yet adopted budgetary decision-making determined in reference to wellbeing and sustainability (APPGWE 2019). GDP and other narrow economic measures still dominate the political, business and cultural imaginary (Coyle 2015).
	An industrial strategy for rapid environmental sustainability		Nationally, the government has a range of policies and proposals for investing in clean technologies and environmentally sustainable economic development, most notably its Clean Growth Strategy and overall Industrial Strategy. However, doubts have been raised about the ability of these strategies to drive changes in the economy that produce greenhouse gas emissions pursuant with carbon budget targets (Murphy 2019), and it is unclear how these strategies seek to drive similar changes to bring the impacts of economic activity to within safe limits across all areas of environmental concern.
	Changes to socioeconomic rules support rapid environmental sustainability and maximisation of socioeconomic benefits		The government’s Green Finance Strategy provides a framework for financial reform in relation to climate breakdown and, relatedly, the Bank of England is taking measures on the disclosure of financial risks. Yet UK companies and banks still invest billions in the unsustainable use of fossil fuels, the UK government makes direct investments in environmentally damaging activity, and the Bank of England indirectly promotes such activities through its quantitative easing programme (Laybourn-Langton and Hill 2019; Van Lerven 2018). Beyond climate breakdown, it is unclear how the government seeks to change rules and regulations to reduce investments across all areas of environmental concern, and to maximise socioeconomic benefits in the process, with inadequate progress being made towards meeting the SDGs (EAC 2019b; Jennings et al 2019; UKSSD 2018).

KEY: Condition is being met Condition is being partly met Condition is not being met

Source: Authors' analysis

6 See: <https://www.ons.gov.uk/peoplepopulationandcommunity/wellbeing>

Overall, while the UK has been a leader in understanding and acting on issues of environmental concern, it is failing to adequately recognise the extent to which it is contributing to overall environmental breakdown and to set goals that bring all negative impacts on the environment to within safe limits. Accordingly, estimates, such as those in table 2.2, put the UK's environmental impact as far exceeding safe limits. This failure is a function of a prevailing political-economic paradigm founded on narrow conceptions of progress, a limited role for state action, and an emphasis on individual responsibility and responses rather than collective and systemic change (Laybourn-Langton and Hill 2019). It is unclear how the considerable socioeconomic co-benefits of a more sustainable society can be realised under such a paradigm.

TABLE 2.2: THE UK'S ENVIRONMENTAL SUSTAINABILITY PERFORMANCE RELATIVE TO THE 'SAFE AND JUST SPACE' FRAMEWORK

Per capita consumption for the UK and per capita boundaries for a sustainable planet with 7 billion people⁷

Biophysical indicator	Unit	UK per capita impact	Per capita boundary	% use of allocation
CO2 emissions	tonnes CO2 per year	12.1	1.6	756%
Phosphorus	kilograms P per year mined and applied to erodible (agricultural) soils	5.2	0.9	578%
Nitrogen	kilograms N per year from industrial and intentional biological fixation	72.9	8.9	819%
Freshwater use	cubic metres H2O per year	240	574	42%
Embodied human appropriation of net primary production (eHANPP) ⁸	tonnes of carbon per year	2.4	2.6	92%
Ecological footprint ⁹	global hectares (gha) per year	4.2	1.7	247%
Material footprint ¹⁰	Tonnes per year	24.3	7.2	338%

Source: O'Neill et al (2018)

7 The per capita boundaries assume a global population of seven billion people and all seven indicators account for international trade. Straightforward per capita allocations omit considerations of justice. Other methods include differentiated environmental allocations, taking into account nations' differing historical responsibility (contribution to the problem) and capacity (ability to pay) (Baer 2012), or allocations that promote active repairing of environmental damage (Raworth 2017).

8 The land use intensity anywhere on Earth resulting from a nation's domestic biomass consumption.

9 How much biologically productive land and sea area a population requires to produce the biotic resources it consumes and absorb the CO2 emissions it generates.

10 Raw material consumption, regardless of where the material is extracted.

A THRIVING UK WITHIN ENVIRONMENTAL LIMITS

One of the foremost tasks of policy under conditions of environmental breakdown is to bring the entire UK economy and its wider environmental footprint to within sustainable limits. This requires a system-wide reorientation of socioeconomic activity unprecedented in peacetime, if ever. Responsibility for doing so cuts across all policy areas and levels of government and will require significant increases in the capability and capacity of government action. Policies that could drive this action include:

A Sustainable Economy Act

The government should adopt a Sustainable Economy Act that mandates statutory goals or targets for the rapid reduction of a full range of environmental impacts, including across biodiversity, soil fertility and air quality, effectively placing a full sustainability constraint on all UK economic activity (Laybourn-Langton and Hill 2019). In this way, the Sustainable Economy Act (SEA) should be modelled on the Climate Change Act (CCA) and the UK target of net-zero decarbonisation by 2050, which effectively places a greenhouse gas constraint on the economy; it is vital that this constraint is extended to cover all elements of environmental breakdown. The government could use the Environment Bill, which is currently the vehicle for its wider environmental ambitions, to implement the proposals outlined here. Supporting elements should include:

- **Interim targets.** The CCA requires governments to reduce emissions in line with five-year ‘carbon budgets’ and the SEA should adopt the same approach, mandating governments to reduce environmental impacts in line with legally binding targets or other means of measuring the health of natural systems.
- **Impacts abroad.** Crucially, these targets should encompass the environmental impact of goods and services imported to the UK and resultant plans to reach these targets should seek to restore as well as conserve natural systems.¹¹
- **Advisory body.** The SEA should be overseen by two independent bodies: one to advise and another to enforce (see below). The advisory body – provisionally called the Committee on Environmental Sustainability – should be an independent, expert public body, modelled on (and potentially subsuming) the Committee on Climate Change. It should: advise the government on environmental breakdown, its causes and extent, long-term goals and targets; give policy advice on how to achieve these objectives, and assess potential and planned policies, including the impact of domestic sustainability action around the world.
- **Enforcement body.** The SEA’s enforcement body should be independent from the Committee on Environmental Sustainability and have powers to hold the whole of government to account on meeting the legally binding targets of the SEA, taking action to enforce any breaches. A suitably modified version of the Office of Environmental Protection, proposed by the government as part of the Environment Bill, could play this role.

Overall, the SEA would protect and enhance environmental protection post-Brexit and go beyond the limited measures offered by the Environment Bill, providing a model for countries around the world, in the same way as the Climate Change Act in 2008. The Environment Bill could be the vehicle for introducing the content proposed in the SEA. However, as many environmental organisations have pointed out (EAC 2019c), the Bill as currently drafted fails to introduce the framework, legally binding targets and interim milestones necessary ‘to drive real-world environmental improvements’ (National Trust 2019).

11 While developing greenhouse gas emission ‘budgets’ is relatively easy, quantifying those for other natural systems is highly challenging. Furthermore, methods of doing so, including pricing a range of ‘natural services’, may be unsuitable as, in some instances, they inappropriately attempt to place a monetary value on non-market concepts, such as the aesthetic value of landscapes.

Towards a new abundance

By requiring the UK economy to operate within environmental limits, the SEA would necessitate a new model of improving social and economic outcomes while reducing environmental impacts. Such an approach would mark a decisive break from the current political-economic paradigm. It would also require cross-departmental coordination and policy coherence across all parts of government. Policies to achieve this include:

- **A Minister for the Sustainable Development Goals.** The UN's sustainable development goals (SDGs) provide a framework for understanding the policy priorities in bringing human activity to within safe limits while improving socioeconomic outcomes. Responsibility for achieving these goals should sit at the very top of government (UKSSD 2018). To do this, the brief of a Secretary of State (the Secretary of State for Business, Energy and Industrial Strategy or the Minister for the Cabinet Office) should be extended to include the position of Minister for the Sustainable Development Goals, giving that minister overall responsibility for coordinating efforts to bring environmental impacts to within sustainable limits while maximising socioeconomic benefits.
- **Wellbeing as the objective.** The government should adopt a suite of wellbeing indicators, including those relating to the SDGs, and measure ongoing developments on these indicators, if this is not already done (APPGWE 2019). These indicators should be used in policy impact assessments and other means of determining policy formulation and delivery, including changing the Green Book – the Treasury's guide to spending decisions, used across Whitehall – to ensure that all guidance fully reflects the government's environmental targets, under the SEA, and its wellbeing objectives. In turn, the government's Budget and other financial planning should determine funding allocations in order to maximise progress towards these objectives.
- **Council for the Response to Environmental Breakdown.** The government should establish a Cabinet committee to coordinate the response to environmental breakdown. The Council should be chaired by the Prime Minister and attended by the Chancellor of the Exchequer, other senior ministers and relevant senior officials (in a similar way to the National Security Council), including those from the advisory and enforcement bodies under the Sustainable Economy Act. The Council should consider all matters relating to the response to environmental breakdown, including the progress towards environmental sustainability, maximisation of socioeconomic co-benefits, fairness and distributional concerns, and ongoing efforts to prepare for growing destabilisation. The Council should be transparent and accountable and act as a hub for increasing transparency and accountability over the complex and pressing decisions that will have to be made in response to environmental breakdown. The Council should work closely with and include representation from the Net Zero and Just Transition Delivery Body described in the next chapter.
- **A Green Industrial Strategy.** The government should develop and implement an active, mission-oriented strategy of state-led investment and regulation that seeks to expedite economic development towards meeting the environmental goals of the SEA and the societal goals of the government's wellbeing objectives (Mazzucato and Dibb 2019). Such a plan should be developed in consultation with and seek to leverage the capabilities of a range of stakeholders, including businesses, trades unions and civil society throughout the UK, and in conjunction with the Net Zero and Just Transition Delivery Body described in the next chapter. Such a mobilisation would require a considerable expansion of state resources and capability (Jacobs et al 2017).

3.

JUSTICE

Environmental breakdown has profound implications for how people and organisations relate to each other across society. For example, the livelihood of a farmer has always been inextricably linked to the movements of global food markets, the behaviour of firms and governments who preside over these markets, and the demands of consumers who buy from them. Over the coming decades, these groups will all have to play their part in rapidly reducing the environmental impacts of the global food system, with all the disruption and difficulty that comes with such change. This will require high levels of cooperation. Yet this cooperation will have to be developed and sustained over a period in which the consequences of environmental breakdown will increase as a result of falling crop yields, more extreme weather and the general disruption brought by a more destabilised world. Cooperation will be severely tested by this destabilisation.

A key factor determining how cooperation will respond to this test is perceptions of fairness and justice. Those with the greatest means contribute more to environmental degradation relative to those with less. Rapid changes to socioeconomic systems incur costs as well as benefits, which fall unequally. Those who contributed little to cumulative environmental breakdown disproportionately suffer its consequences. As destabilisation grows, our ability to adequately respond to environmental breakdown will hinge on how policymakers respond to questions of justice and fairness, including how some have contributed so much more to the problem, why others feel its harshest consequences, and what role we should all play. This chapter tackles these questions.

ENVIRONMENTAL BREAKDOWN IS UNJUST

The age of environmental breakdown is one in which the increasing frequency and severity of environmental shocks is and will increasingly be transmitted across socioeconomic systems, which are already experiencing acute stress, destabilising them over a period in which they must undergo rapid structural change. Such a state of affairs may present a challenge without precedent in human history. There are three major considerations for issues of justice and fairness.

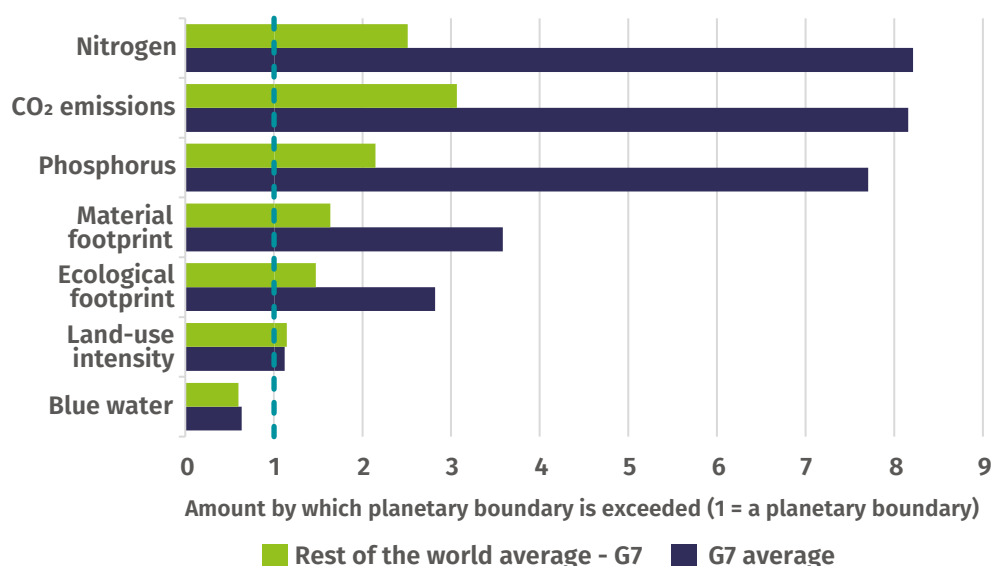
1. Contribution to environmental breakdown is unevenly distributed

Environmental breakdown is a cumulative problem. It is the stock of environmental destruction that is pushing natural systems beyond safe limits. For example, climate breakdown is being driven by the rapid increase in cumulative net greenhouse gases in the atmosphere over the last few centuries (IPCC 2018). Some countries and communities have contributed far more to this stock than others. Though the UK currently accounts for around 1 per cent of global greenhouse gas emissions released each year, it has made the fifth largest contribution to cumulative emissions (WRI 2019; Laybourn-Langton and Rankin 2019). The US has maintained its lead as the highest yearly emitter for over a century and a half, and so sits far out in front as the country contributing the most to cumulative emissions. In contrast, Ghana dropped from the 103rd biggest yearly emitter in 1850 to 111th in 2014, while Haiti climbed from 147th to 142nd over the same period (Lebling et al 2018); accordingly, they both sit towards the bottom of the list of cumulative emitters. Similar disparities can be found across other planetary boundaries.

This is both an inter- and an intra-generational problem. It was current and previous generations of people in the UK who built up its cumulative contribution to environmental breakdown, and who benefitted from the economic gains of doing so. Yet future generations and those just born will experience the acute consequences of environmental breakdown even if they contribute little or nothing to the stock of destruction. Among current generations, those who live in countries that have benefitted from past environmental exploitation still often make the largest contribution to the ongoing destruction. As figure 3.1 shows, the G7 – the world’s wealthiest countries – have by far the biggest impact on resource consumption. Expressed as a per capita average, the G7 consumes almost four times as much phosphorus and nitrogen, nearly three times as much carbon dioxide (CO₂), and has almost double the material footprint as the rest of the world.

FIGURE 3.1: SOME NATIONS HAVE CONTRIBUTED FAR MORE TO ENVIRONMENTAL BREAKDOWN THAN OTHERS

Per capita consumption of each planetary boundary comparing G7 to the rest of the world, where a value greater than 1 means the boundary is exceeded

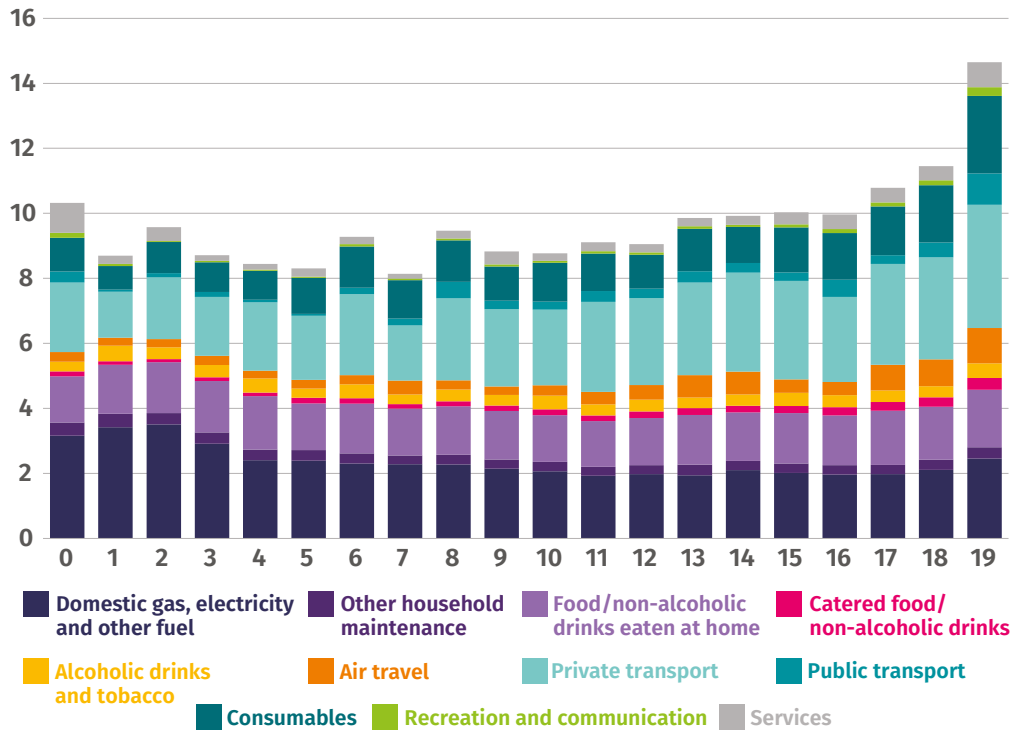


Source: IMF (2019); O’Neill et al (2018) [adapted by IPPR]

This unequal contribution is also observed within countries. For example, in the UK, the poorest communities contribute the least to greenhouse gas emissions, with highest income earners contributing over 40 per cent more emissions than the lowest earners, as figure 3.2 shows. This partly results from the consumption behaviour of wealthier segments of the population, who generate more emissions from private transport, air travel and consumables. The gap would likely be larger were it not for lower income earners disproportionately living in energy-inefficient homes (Barrett et al 2018; Emden et al 2018). Furthermore, environmental impact extends beyond the UK’s shores. Imported products to richer countries and regions like the US and Europe have embedded negative environmental impacts such as air pollution or degradation of land that are not included in environmental targets in the countries demanding these products (Kenner 2015).

FIGURE 3.2: POORER PEOPLE HAVE A LOWER CARBON FOOTPRINT THAN THE RICHEST

Consumption emissions (CO2eq) per capita split by income across 20 quantiles and by activity



Source: University of Leeds Sustainability Research Institute (2019)¹²

2. The impacts of environmental breakdown are unevenly distributed

Those who have contributed least to environmental breakdown are often those who are most impacted by its disruptive and destructive consequences. For example, in England, there are many spatial overlaps between the local areas of those experiencing greatest hardship and the neighbourhoods in which flooding is most likely (England and Knox 2015). This is at least in part because flooding makes houses more difficult to sell, causing house prices to drop (Policy Expert 2020; Brignall and Jones 2016). Across the world, poorer nations, which have contributed relatively little to environmental breakdown, are often located in regions experiencing higher levels of environmental stress and can have a greater reliance on sectors more at risk of disruption, such as small-scale farming (IMF 2017).

3. The consequences of environmental breakdown exacerbate existing injustice

Those who contribute least to environmental breakdown are not just disproportionately exposed to its impacts. They are also disproportionately vulnerable to these consequences, as they are often experiencing pre-existing problems and have fewer resources with which to respond. Acutely exposed nations often suffer from an underdevelopment of public goods that can impair effective responses to shocks, such as resilient infrastructure and democratic institutions, and many are burdened with the damaging economic, social and environmental legacy of colonialism (Weiss et al 2018). In turn, high-income nations are better able to prepare for the impacts of environmental breakdown,

¹² Data table for graph available on request – underlying data from licensed UK Data Archive.

with, for example, per capita spending on health adaptation measures vastly higher in wealthier nations (Watts et al 2018). In contrast, around 99 per cent of economic losses in low-income nations due to climate-related extreme weather events remain uninsured. These inequalities are getting worse as environmental breakdown accelerates.

Across the world, the impacts of environmental breakdown are particularly severe for those communities already suffering injustice resulting from socioeconomic structures of inequality, both past and present, including ethnic minorities, indigenous peoples and women (UNFCCC 2019a). Younger generations disproportionately reside in low and lower middle-income countries and therefore a growing proportion of the global population will experience the worst impacts of accelerating environmental breakdown, further widening already large intra-generational inequalities (Laybourn-Langton et al 2019b).

Injustice could erode cooperation under conditions of environmental breakdown

These dimensions of injustice are all related (GNDE 2019). Fundamentally, the current distribution of rewards and costs in and across societies is determined by the historical development of economic and political structures. The UK has the fifth largest economy partly because of the socioeconomic development resulting from its contribution as the fifth largest cumulative greenhouse gas emitter. Former colonies in the Global South have made a negligible contribution to cumulative global emissions yet are disproportionately exposed to extreme weather resulting from the carbon largesse of their former rulers. In all countries, those on low incomes, younger generations, women and ethnic minorities have legitimate cause to point out that the impacts of environmental breakdown exacerbate the structural inequity they already suffer, and to ask more from those with the power to undo this state of affairs.

The multiplier effect of environmental breakdown on these existing injustices could be extreme, both worsening inequality and other problems and shrinking the political will and resources to deal with them. For example, the UN has concluded that the current trajectory of climate breakdown alone is expected to push tens of millions of people into poverty and ‘threatens to undo the last 50 years of progress in development, global health, and poverty reduction’ (HRC 2019). Fracturing cooperation – within and between countries – could worsen this situation by diminishing efforts to slow environmental degradation and provide assistance to those experiencing its accelerating impacts, creating a world – in the words of the UN Special Rapporteur on extreme poverty and human rights – of ‘climate apartheid’ in which the ‘wealthy pay to escape overheating, hunger, and conflict while the rest of the world is left to suffer’ (ibid). The resulting destabilisation, including political extremism and social fragmentation, could further erode cooperation. Maintaining trust and cohesion is imperative to collective action. In the extreme, such dynamics could threaten a collapse in international cooperation as countries turn inwards to the perceived security of the nation state in order to protect their populations and interests, or lash outwards in an effort to maintain geopolitical power and access to resources. Under conditions of accelerating environmental breakdown, a fracturing in cooperation could prove to be a catastrophic outcome (Laybourn-Langton and Rankin 2019). It is imperative that policymakers ensure efforts to tackle issues of justice and fairness cut across all elements of the response to environmental breakdown. It is both a moral and a practical imperative.

A JUST TRANSITION FOR ALL: CONDITIONS FOR POLICYMAKING

The concept of a ‘just transition’ sits at the heart of debates over the role of justice and fairness within environmental policymaking. First coined by trades unions and labour movements, a just transition has been defined as the need to

provide and guarantee ‘better and decent jobs, social protection, more training opportunities and greater job security for all workers affected by global warming and climate change policies’ (ITUC 2018). Such an approach should remain at the heart of responses to the full picture of environmental breakdown. However, the other dimensions of injustice discussed in the previous section demand that this definition be expanded to incorporate the full scope of what constitutes a just transition, including the fair distribution of costs within and between societies, maximising transitional benefits for marginalised communities, historical and international responsibilities, and the unique burden placed on future generations. Accordingly, we propose a set of approaches for realising a truly just transition (GNDE 2019):

1. International

Wealthy nations and communities not only contribute most to the stock of environmental breakdown, they preside over and benefit from an economic development model founded on unsustainable environmental impacts and global power imbalance (Laybourn-Langton and Rankin 2019). Therefore, under conditions of environmental breakdown, international cooperation should be founded on explicit recognition of cumulative responsibility for the problem and the current capability to act. This approach should be typified by three conditions, asking:

- **Has a ‘fair share’ approach to reducing environmental degradation been taken?** Commitment to international efforts to bring human activity to within sustainable environmental limits should be a function of a country’s cumulative contribution to breakdown and their current capability to act. Sufficient enforcement mechanisms should exist to ensure commitments are met.
- **Does foreign policy seek to modify global economic and political structures driving environmental breakdown?** International influence should shape the decisions of multilateral institutions and support the reform or creation of international institutions and structures that realise a more sustainable, just and prepared world.
- **Does trade and wider economic policy make efforts to reduce environmental impact and maximise positive social impact abroad?** Domestic consumption and economic development should minimise damaging environmental impacts elsewhere.

2. Inter-generational

Younger and future generations will disproportionately bear the burden of having to rapidly transform economic systems in order to decelerate environmental breakdown while withstanding its increasingly destabilising consequences; an unprecedented challenge. Immediate efforts are needed to support these generations, beyond those to slow environmental breakdown, including meeting the following conditions:

- **Are there legal protections for future generations?** Governments of all levels should be bound by formal protections for the interests of future generations and their right to a stable environment, ensuring these protections influence all policymaking decisions.
- **Does the government incorporate long-term planning into its policymaking?** Government decision-making at all levels should more appropriately weight socioeconomic and environmental factors in the medium and long term, beyond a focus on narrow, short-term measures.
- **Is action being taken to empower younger generations and prepare them for a more destabilised future?** Explicit support is needed to prepare for a more destabilised future and to further empower the growing voice and leadership of younger people.

3. Intra-generational

The impacts of environmental breakdown and the costs and benefits of realising a more sustainable society will fall unevenly across domestic communities. In turn, the ability for these communities to support and absorb these impacts is a function of existing capabilities and inequalities. Policy should be proactive in recognising and acting on these factors, covering the following conditions:

- **Is there an explicit just transition element to industrial policy?** Government policy should actively seek to minimise negative outcomes on communities and workers when managing industrial change, including introducing programmes for re-skilling and re-training workers, wage support, and health and wellbeing services.
- **Are there clear policies to protect vulnerable communities and fairly distribute the costs of transition across all communities?** Government should understand and act to minimise the disproportionate burden of environmental degradation on poor, marginalised and/or minority communities and support these groups through the transition to a sustainable economy.
- **Do policies explicitly consult and engage with all communities?** Policy should be designed and implemented to include extensive and early-stage engagement with and involvement of those communities it seeks to support, and an understanding of the existing political, social and economic context facing these groups.

UK PERFORMANCE

We now assess the UK's performance in meeting these conditions for good governance relating to justice under conditions of environmental breakdown.

TABLE 3.1: ASSESSMENT OF UK GOVERNMENT PERFORMANCE AGAINST IPPR CRITERIA FOR CONSIDERATIONS OF A JUST RESPONSE TO THE ENVIRONMENTAL BREAKDOWN

Assessment using subjective qualitative criteria detailed in previous section

	Condition	Rating	Notes
International	Fair share environmental targets based on contribution and capability	Yellow	The UK is party to international environmental agreements that recognise differentiated responsibility. But its net-zero decarbonisation target does not consider cumulative contribution (Laybourn-Langton and Rankin 2019; War on Want 2020). Other international targets, such as those for biodiversity, are being missed (JNCC 2019) and the UK is vastly exceeding its per capita share of global resources (Laybourn-Langton and Rankin 2019). Contributions to some international environmental funds has increased (GCF 2019).
	Foreign policy to reform international institutions and structures	Yellow	The government has expressed willingness for changes to institutions, including linking its continued investment in World Bank funds to institutional reforms that prioritise action on climate breakdown (Elliott 2019). However, the UK continues to support damaging global structures and institutions, such as the unequal energy treaties and financial architectures that promote environmentally destructive investments (Laybourn-Langton and Rankin 2019).
	Trade and economic policy minimise negative impacts abroad	Red	The government is also undertaking significant investments in unsustainable activity abroad, including fossil fuel infrastructure in low- to middle-income countries (EAC 2019a). Domestic contribution to action on climate breakdown is less impressive when considering ‘consumption-based’ emissions – those resulting from the production of goods and services imported from abroad (Defra 2019) – while little regard is given to other environmental limits.
Inter-generational	Legal protections for future generations	Yellow	While there are many laws protecting children’s rights across the UK, there are no formal mechanisms to ensure that current policymakers must consider the likely future impacts of policies on generations yet to be born, and sustainable development has not been embedded legally or institutionally across government (Roderick 2010). While the proposed Environment Bill mentions restoring the environment for future generations, young and future generations have no formal acknowledgement as stakeholders within the Bill save for its general inclusion in the principle of sustainable development (Smith and Priestley 2020). A rare exception is the path-breaking Well-being of Future Generations (Wales) Act 2015.
	Longer-term planning incorporated into decision-making	Yellow	While the proposed Environment Bill is a welcome development in terms of longer-term government planning, there are concerns that the action proposed by the Bill is inadequate, including in the setting and execution of targets, the risks of the regression of environmental law, and a lack of coordination across the nations of the UK (Greener UK 2020). Beyond the Environment Bill, decision-making methods, including discount rates, favour the short term and can disfavour action to improve sustainability (Laybourn-Langton et al 2019b). Longer-term environmental targets have been set, but the general failure to take adequate action on and prepare for environmental breakdown threatens the future of societies.
	Preparing and empowering younger generations	Red	Young people are leading the discussion on the threats of environmental breakdown and the need for action. Yet many are excluded from decision-making processes by not having the right to vote until they reach the age of 18 and existing efforts to increase youth participation in government are insufficiently resourced (ibid). Some teachers and students say that education on environmental breakdown is limited (Scott 2020). The government is failing to meet requirements on adaptation to climate breakdown (CCC 2019b), and it is unclear if any efforts are being taken to prepare society for the multiplicity of risks resulting from environmental breakdown.
Intra-generational	Just transition elements to industrial policy	Yellow	While there are some examples of businesses considering just transition policies for workers within their companies (Emden and Murphy 2018), there is no national support for transition, with the exception of Scotland’s Just Transition Commission. At present, just transition policy is not recognised as a national priority and the National Retraining Scheme, which holds the potential to support workers transitioning between jobs, has been consistently delayed.
	Protecting vulnerable communities and fairly distributing costs	Red	Little consideration has been given to how unequal contribution to environmental breakdown can inform responsibility for acting (Preston et al 2014). Some sustainability policies are regressive, such as revenue-raising through energy bills (Barrett et al 2018). It is unclear if there is an explicit strategy for recognising and acting to ameliorate the impacts of and action to reduce environmental breakdown on vulnerable and marginalised communities.
	Consulting and engaging with all communities	Yellow	The creation of the National Climate Assembly – a citizens’ assembly comprised of members of the public established by six parliamentary select committees ¹³ – is a positive development that will help to engage with communities and makes efforts to engage with a representative sample of the country’s demographics. However, while the Assembly consults a representative sample of the population, it does not consult a representative sample of those people and areas which may be worst affected. Furthermore, while the engagement is useful to inform policy, it does not necessarily help to inform other members of the public. For example, a government survey recently found that 48% of the public had ‘never heard’ of renewable heating systems, with just 6% claiming to ‘know a lot’ (BEIS 2019).

KEY: Condition is being met Condition is being partly met Condition is not being met

Source: Authors' analysis

13 More information can be found on the Assembly website: <https://www.climateassembly.uk/about/>

Overall, the UK is failing to adequately recognise the extent and severity of injustice and unfairness relating to environmental breakdown. Notable efforts, such as the Scottish Just Transition Commission and the Welsh Well-being of Future Generations Act, do not extend across the UK or throughout government decision-making. Commitments to reduce environmental impact do not adequately consider cumulative contribution and the historical role of the UK in environmental breakdown, and contemporary policies are actively driving environmental destruction abroad. The rights of future generations are not formally recognised, younger generations have little direct agency on decision-making, and the general failure to act on environmental breakdown and prepare for its impacts imperils the future. Inadequate attention or support is being given to those communities who will disproportionately experience negative impacts or are particularly vulnerable.

RESPONSIBILITY AND JUSTICE IN THE AGE OF ENVIRONMENTAL BREAKDOWN

Policymaking that responds to environmental breakdown must fairly share the costs of doing so. It must also be seen to tackle the issue of unfairness head on. The recent social unrest in France in reaction to the implementation of fuel efficiency measures at the same time as tax cuts for the wealthiest stands as a warning. Policies that could achieve the opposite include:

A just transition for all

The UK must not repeat the mistakes of the past when whole communities were left behind following the closure of the coalmines and wider deindustrialisation. Nor should it continue to accept the unequal burden of environmental breakdown across its regions and communities. A transition that is fair and just must be put at the heart of government policy not just to mitigate risks, but to make the most of the substantial opportunities the transformation brings to address underlying economic and social inequalities. Policies to achieve this include:

- **A Net Zero and Just Transition Delivery Body.** As argued for by IPPR's Environmental Justice Commission, the government should establish a UK-wide Net Zero and Just Transition Delivery Body, to be supported by similar bodies within the devolved nations (including Scotland's existing Just Transition Commission) and at the regional level. The body will be responsible for developing and delivering a national Net Zero Delivery Plan which must be centred around a just transition.

This body should bring people together in a partnership model to plan and implement equitable responses to climate change environmental breakdown, ensuring everyone's voice can be heard. They should involve all relevant stakeholders, including metro mayors, local authorities, trades unions, LEP (local enterprise partnership) representatives, local community representatives, civil society, local businesses and businesses interested in investing in the region. This will require the establishment of new social partnerships at both firm and sector levels to manage the transition. Within the Delivery Body, committees should be formed that recognise acute loci of justice and fairness issues, such as a Younger and Future Generations Committee.
- **A national Just Transition Fund.** This should be established as part of regional economic development funding to help the drive towards an economy that operates within environmental limits and to ensure that those negatively disrupted are given the resources and support to succeed in the future. The Fund should be established with an initial capitalisation of £5 billion. The Fund should also contribute to the rebalancing the UK economy, promoting regeneration and diversification across regions, and be an active part of the government's Green Industrial Strategy. It should provide material support to those workers who are most impacted by the transition away from environmentally damaging economic activity, as well as re-training programmes and investment in social institutions and mental health and wellbeing services.

Fair and responsible foreign policy

The UK government should seek a new approach to foreign policy founded on a better recognition of its historical responsibilities. These include the cumulative contribution to the global climate and environmental crises and its past and present role in promoting an unsustainable economic model across the world, including through the British Empire and other imperial structures. Such a policy should embody active solidarity and a commitment to act as a ‘supporting partner’ in exercising power and disbursing assistance in ways compatible with justice more broadly, recognising that environmental justice intersects with all global justice issues. The resultant policies should include (Laybourn-Langton and Rankin 2019):

- **A fair share of global sustainability targets.** In recognition of its cumulative contribution, the UK should make a contribution to reducing the remaining global greenhouse gas emissions of 200 per cent of UK emissions below 1990 levels. This should be achieved by setting a more ambitious path to domestic net-zero emissions and supporting less industrialised nations to reduce emissions, both directly, through resource transfers and assistance, and indirectly, by using UK influence to undo damaging global economic dynamics, as the following recommendations explore. The government should rapidly seek to understand how the fair share approach can be extended to other relevant environmental impacts. All fair share targets should be enshrined in law through the Sustainable Economy Act, thus ensuring enforcement through the Act’s supporting institutions.
- **Increase financial support to meet the fair share.** Non-domestic material support for sustainability measures should be explicitly linked to realising a fair share of sustainability targets. In the case of greenhouse gas emission reductions, the government should commit £20 billion to the Green Climate Fund up to 2030 – or equivalent mechanism – as a means of both realising the non-domestic emissions reduction target and supporting less industrialised nations to adapt to the changing climate on their own terms (Laybourn-Langton and Rankin 2019). Similar funding should be linked to a fair share approach on other environmental impacts. This funding should be in addition to any overseas aid funding.
- **Reform multilateral institutions through membership conditionality.** The government should apply conditions to UK contributions to and involvement in the World Bank, IMF and other multilateral agencies and funds that require these institutions to rapidly increase support for the response to environmental breakdown and adopt policy approaches that promote human rights and local capabilities, such as by supporting a moratorium on public private partnerships (PPP) as the preferred mechanism for financing infrastructure projects.
- **Championing sustainable and just international agreements.** The government should actively support the adoption of international agreements, including: a binding global migration compact that provides legal protections to people displaced by the impact of environmental breakdown; a binding UN treaty on transnational corporations and human rights, and the addition of ‘ecocide’ (the serious loss, damage or destruction of ecosystems) to the list of international crimes at the International Criminal Court.
- **Ending the export of environmental damage.** The government should commit to including consumption-based targets under the Sustainable Economy Act and establish a mandatory due diligence mechanism to reduce the UK’s global environmental impacts. All environmentally damaging investment through UK Export Finance should cease and be wound down, with compensation provided to ameliorate the negative impacts of these investments. The government should also actively seek the reform of or leave trade agreements that limit the response of states to environmental breakdown, including by seeking a moratorium on investor-state dispute settlements for fossil fuel companies under any investment treaty anywhere in the world.

Empower and invest in younger and future generations

Many young people are already leading the discussion on the threats of environmental breakdown and the need for action. This leadership should be better recognised, including through formal representation of the interests of younger and future generations in decision-making systems. Investments and other types of support should be accelerated to help younger and future generations realise a more sustainable, just and prepared world. These should maximise the interrelated benefits of both slowing environmental breakdown and preparing for its impacts. Policies to achieve these outcomes should include (Laybourn-Langton et al 2019b):

- **A Future Generations Act.** The government should adopt a nationwide Future Generations Act in order to formally recognise protections for the interests of future generations and their right to a stable environment. Doing so would recognise those yet to be born as stakeholders in policy and would ensure they had legal standing should the government fail to meet its environmental responsibilities. The environmental targets under the Sustainable Economy Act would provide the basis upon which the Future Generations Act and its supporting institutions would ensure government provides rights to a healthy environment for future generations. The Act should embed the rights of future generations in legislation, in the same way that civil and political rights are embedded in the Human Rights Act, and require government decision-making methodologies adopt lower discount rates as a means to reduce the bias against longer-term decision-making.
- **The Office for Future Generations.** The government should create a dedicated Office for Future Generations, sitting within the Cabinet Office and reporting to the Council for the Response to Environmental Breakdown. The Office should receive input from a Future Generations Committee within the Net Zero and Just Transition Delivery Body. The Office would be responsible for conducting ‘future generations impact assessments’ as part of every policy cycle, ensuring ministers would have a statutory obligation to demonstrate how their decisions considered the rights of future generations.
- **Future Generations Select Committee.** A parliamentary select committee for future generations should be established to scrutinise government policy and its impacts on future generations, drawing on the expert input of the Younger and Future Generations Committee within the Net Zero and Just Transition Delivery Body.
- **Voting rights to 16- and 17-year-olds.** Suffrage should be extended to 16- and 17-year-olds, expanding the franchise to cover a greater proportion of those in younger generations who will disproportionately experience the unprecedented implications and challenges of environmental breakdown. To support this, government should provide greater educational materials to inform democratic decisions in general, and environmental breakdown in particular. These changes should be made as part of a wider programme of democratic reform across the UK.

4.

PREPAREDNESS

Acting to realise a more sustainable and just world is only part of the response to environmental breakdown. Its severe consequences are already here, and more are yet to come, 'locked in' by inertias in both natural and human systems. To varying degrees, this observation sits behind existing efforts to adapt to climate and other environmental shocks across the world. These efforts will have to go further. The threats resulting from environmental breakdown are far more severe and loom closer on the horizon than is appreciated by mainstream political discourse, at least in countries like the UK. As a result, the requirements of preparation are more extensive, covering all of society, and should therefore be far more visible in political debate. This chapter explores these requirements and the responses that policymakers should take to ensure we are better prepared for the accelerating consequences of environmental breakdown.

SOCIETIES ARE NOT ADEQUATELY PREPARED FOR ENVIRONMENTAL BREAKDOWN

As chapter 2 explained, environmental breakdown can be thought of as having inaugurated a new domain of risk facing policymakers. These risks are systemic, cumulative, non-linear, span local to global geographies, multiply many other risk factors, and encompass both sudden, high-impact events and gradual, 'slow burn' disruption (Laybourn-Langton et al 2019a; Pinner et al 2020). Environmental shocks – such as extreme weather events and ecosystem collapse triggered by species extinction – impact societies in a number of ways and on differing scales, such as causing localised damage and ill health or triggering shocks in globalised food and financial systems. Accordingly, the new domain of risk has considerable consequences for virtually all areas of policy and politics at all levels, from local communities to international institutions. It is different to previous risk domains – such as that experienced in the Cold War, with the risk of political standoff leading to a nuclear exchange, or the heightened risk of financial crisis in the post-Bretton Woods era – because it is largely driven by natural processes that are, increasingly, out of the control of human action and which are characterised by large levels of uncertainty. It will interact with existing risk, multiplying the chance and severity of crisis, potentially driving a 'perfect storm' of interrelated challenges. It is a new, extreme normal of persistent, compounding and constantly evolving destabilisation across most social, economic, political and environmental factors.

In many ways, the coronavirus pandemic has provided an insight into elements of this domain of risk (ibid). It has constituted a physical shock to economies and societies, both directly through morbidity and mortality and indirectly through the impacts of the resultant public health restrictions. These shocks have been transmitted and amplified through socioeconomic systems, with knock-on effects to supply chains and financial markets, and have multiplied existing problems, exacerbating vulnerabilities such as health inequalities and the regressive structural problems facing emerging economies. The problem grew exponentially, quickly overwhelming an inadequate capacity to respond on the part of many governments. The impacts will be highly damaging and enduring, and in turn, reducing pandemic risks requires major changes to socioeconomic systems, many of which are similar to those needed to combat environmental breakdown. However, the pandemic should be seen as one particular threat.

Unlike the risks associated with pandemic threats, the domain of risk brought about by environmental breakdown creates an enduring state of compounding stress across a multitude of systems, with certain threats and shocks seemingly unrelated, in the first instance, to environmental factors (ibid). Indeed, the likelihood of pandemics has arguably been increased by environmental degradation (Jordan 2019; Winston 2020).

Some sectors or communities have a sophisticated analysis of this domain of risk. Foremost among them are military and security communities, spurred on by the priorities of their operational duties (Klare 2019). As the US National Academies of Science, Engineering, and Medicine have concluded:

‘...it is prudent for security analysts to expect climate surprises in the coming decade, including unexpected and potentially disruptive single events as well as conjunctions of events occurring simultaneously or in sequence, and for them to become progressively more serious and more frequent thereafter, most likely at an accelerating rate. The climate surprises may affect particular regions or globally integrated systems, such as grain markets, that provide for human well-being.’
(NRC 2013)

Accordingly, domestic military doctrine and that for intergovernmental military alliances understand climate and other environmental crises as risk or threat multipliers. For example, the US government’s 2014 Quadrennial Defense Review concluded that:

‘The pressures caused by climate change will influence resource competition while placing additional burdens on economies, societies, and governance institutions around the world. These effects are threat multipliers that will aggravate stressors abroad such as poverty, environmental degradation, political instability, and social tensions – conditions that can enable terrorist activity and other forms of violence.’
(DoD 2014)

Alternative – though no less sophisticated – analyses exist in other communities, particularly those engaged with direct experiences of severe environmental shocks and the compounding destabilisation that can result, including the global permaculture movement and indigenous communities.¹⁴ However, there are little to no instances of these issues being discussed within mainstream political debates and certainly nothing commensurate with the scale of the potential implications of growing destabilisation for societies. This absence is unsustainable. Policymakers must be incentivised to develop and act on a deeper analysis of the full preparation requirements resulting from environmental breakdown. The costs and benefits of preparation measures will need to be discussed openly, ensuring populations have oversight of and are more likely to accept these policies. Such a debate should be founded on four major insights:

1. Environmental threats go beyond the localised impacts of climate breakdown

Inasmuch as adaptation issues are discussed in mainstream political debates, they often focus on the localised impacts of discrete shocks resulting from climate breakdown. In the UK, these routinely include a higher incidence and severity of extreme weather, such as storms or heatwaves, and the implications of rising sea levels, particularly coastal erosion and flooding. The negative impacts of these events are mainly identified in terms of damage to physical infrastructure, threats to health, and downside effects on economic activity. In response, policymakers are urged to improve emergency response capabilities and to invest in adaptation

¹⁴ See, for example, Henfrey 2018 and UNFCCC 2019b.

measures to reduce risk, as well as to accelerate efforts to slow climate breakdown. This is narrow characterisation of the risks resulting from environmental breakdown, which should be broadened through understanding that:

- **Discrete threats can come from a range of environmental shocks**, such as the impact of soil depletion on food production or the consequences for ecosystem stability of species loss. Crucially, these shocks are a function of the interrelation of destabilising natural systems; for example, more severe flooding can wash away precious topsoil and higher temperatures can encourage pests, both of which can negatively impact food production (HMG 2017).
- **Shocks are transmitted through interlinked systems**, compounding and amplifying threats across the world. For example, the geographical concentration of the global production of staple crops increases the risk that environmental shocks in these areas will have worldwide implications, with price rises and shortages transmitted through food systems. Environmental breakdown means that production shocks are becoming more likely. A UK-US food security taskforce has estimated that one-in-100-year production shocks are likely to become one-in-30-year events over the coming decades (GFS 2015); another estimate puts the chance of simultaneous failure of maize production in the US and China, which provide 60 per cent of the global maize supply, at one-in-20 (Kent et al 2017). The threats resulting from environmental breakdown can be both discrete and connected.
- **Shocks drive a range of destabilisation, spurring and amplifying political, economic and social problems far afield from the original shock**. For example, the economic effect of food shocks, including price increases, can spur wider effects that cascade across society, such as the health impacts of a lack of access to healthy food and political discontent, both of which may already be pressing issues for at-risk communities. This destabilisation can then be further transmitted through social, economic and political systems – a second order of consequences of environmental shocks – such as through increases in forced displacement or conflict having consequences for geopolitics and security issues.

2. Our systems are vulnerable to these threats, with efficiency having taken priority over resilience

Our social, economic and political systems, from healthcare to financial markets, have developed over a period of remarkable environmental stability. As a consequence, these systems may be particularly vulnerable to growing environmental instability and the increasingly severe threats that result. This could be as a result of a failure to adequately prepare for expected shocks, such as in the case of the major disruptions to water supplies during the winter storms of 2018, the negative consequences of which were partly down to inadequate planning and action on the part of water companies (Ofwat 2018). It could also result from vulnerabilities inherent in the very construction of systems upon which we rely, such as those exposed in north Lancashire in 2015, when Storm Desmond disrupted power supplies, triggering a cascading breakdown of socioeconomic functions that ultimately relied on a stable supply of electricity (RAE 2016). Indeed, a global trend towards the prioritisation of the efficiency of systems over their resilience – eliminating redundant processes or resources and maximising productivity in service of short-term gain above all considerations – could mean critical systems are acutely vulnerable at exactly the moment when environmental impacts are set to significantly increase (Linkov et al 2019). For example, food systems are reliant on a small number of homogenous crops – more than 75 per cent of global food supply currently comes from five animal and 12 plant species – and just-in-time supply processes, both of which heighten vulnerability (WEF 2018; Lang 2020). Vulnerabilities relating to efficiency over resilience were exposed by

the coronavirus pandemic, including a lack of intensive care capacity in healthcare systems and the fragility of just-in-time production processes. In the extreme, a confluence of stressors and vulnerabilities could lead to the collapse of critical systems, a catastrophic outcome (WEF 2018).

3. Preparation is needed across all areas of society

The extent and severity of the risks to societies resulting from environmental breakdown mean that efforts to be better prepared for environmental shocks should extend beyond a focus on adapting physical infrastructure to encapsulate a wider range of social, economic and political factors – ‘soft’ as well as ‘hard’ adaptation (Sovacool 2011). These range from the hyper-local, such as adequate emergency social provision for those isolated or displaced by extreme weather, to the global, including ensuring food systems have larger buffer stocks and employ other measures to increase resilience to concurrent and severe production losses. They also include elements often seen as unrelated to environmental crisis, such as the risk of rising political extremism resulting from perceptions of threats relating to refugees forcibly displaced by growing destabilisation (Laybourn-Langton and Murphy forthcoming). Some progress has been made in identifying the consequences of climate breakdown for socioeconomic systems, such as the risks to macroeconomic destabilisation associated with infrastructure damage, agricultural losses and commodity price spikes resulting from environmental shocks (Rudebusch 2019). While governmental organisations at all scale have plans and dedicated resources available for responding to shocks and crises, these measures must be able to handle the speed, severity, complexity and multiplicity of risks emerging as a result of environmental breakdown. Indeed, the coronavirus pandemic has exposed the potential inadequacies of assessment and planning mechanisms in the face of well-identified threats.

4. Adaptation is not enough; systems should be transformed to become more resilient

Ultimately, being prepared for a more destabilised world requires systems to be restructured to become more resilient, not just modified or better adapted. Being prepared means tackling both the systemic causes of environmental breakdown and the vulnerabilities of those systems, not just preparing them for increasingly severe symptoms. This should be done in concert with the strategies explored in the previous two chapters, to transform socioeconomic systems to make them more sustainable and just. While more resilient systems could plausibly be achieved in the short term without recourse to sustainability and issues of fairness and justice, such an approach is self-defeating in the medium to long run, as destabilisation and discontent grows. In undertaking these transformations, the vast co-benefits of more resilient societies can be realised – from healthier, less fragile food systems, to local, secure renewable energy generation – and efficiency and resilience should no longer be seen as mutually exclusive (IPCC 2014; Linkov et al 2019). These co-benefits include those resulting from greater preparation of natural systems. Natural or ‘green’ adaptation measures are generally cheaper than ‘grey’ infrastructure adaptation and can also respond to risks from a range of environmental degradation at the same time, whereas grey measures generally respond to problems on a case-by-case basis (Browder et al 2019; European Commission 2014). For example, flood defences are an important measure to address increased frequency of flooding. However, additional or, where appropriate, alternative strategies like tree-planting are particularly attractive because they can reduce the severity of flooding, are also a major part of climate mitigation strategies, and, if planted in ways that are sensitive to local ecosystems, can boost biodiversity.

BEING PREPARED: CONDITIONS FOR POLICYMAKING

Failing to understand and prepare for all the threats resulting from environmental breakdown ultimately risks efforts to realise a more sustainable and just world and increases the chance of countries and communities becoming overwhelmed. Worsening destabilisation could increase political discontent or force nations to adopt protectionist or openly hostile strategic positions, or to buckle under compounding crises (Klare 2019; Laybourn-Langton and Murphy forthcoming). In the extreme, such dynamics could threaten a collapse in cooperation between countries and communities across the world as they turn inwards to protect their interests, crowding out action on sustainability, or lash outwards, acting violently to maintain foreign interests and, as a result, directly drive further destabilisation. Avoiding such an escalation requires preparation measures that go beyond the adaptation of physical infrastructure to the impacts of climate breakdown. In considering all the dimensions of preparedness explored in the previous section, we propose a set of conditions to direct policymaking in order to realise higher levels of preparedness in response to the domain of risk brought about by environmental breakdown:

- 1. Do adaptation measures explicitly consider threats beyond those relating to climate breakdown?** Understanding of and planning in response to environmental shocks should include threats relating to all natural systems, such as soil depletion and species extinction, and the interrelation between these threats.
- 2. Are actions being taken to prepare for the systemic consequences of environmental breakdown?** The negative consequences of environmental breakdown extend beyond discrete threats to encompass shocks transmitted through interlinked human systems, and so preparation measures should consider threats beyond those resulting from the direct impacts of environmental shocks, such as domestic extreme weather events.
- 3. Are actions being taken to prepare all socioeconomic and natural systems, as well as physical infrastructure?** The destabilisation brought by environmental breakdown impacts most areas of society and interacts with existing socioeconomic instability, stressing vulnerabilities. It also damages natural systems, further driving environmental breakdown. Explicit action should be taken to understand and prepare for threats to a full range of social, economic, political and environmental factors, including markets, particularly vulnerable communities, political processes, equity, social cohesion and global cooperation.
- 4. Are actions being taken to maximise the co-benefits of more resilient systems?** Preparing for environmental breakdown should encapsulate transformations to socioeconomic systems that increase the structural resilience of these systems and maximise the co-benefits to societies of greater levels of resilience. This should also include the imperative to improve preparedness of natural systems to greater destabilisation – and the co-benefits to society of doing so.
- 5. Have preparation measures been taken after engagement with the wider population?** The measures needed to reach adequate levels of preparedness to environmental breakdown will impact everyone, likely entail significant trade-offs and the sharing of costs and benefits, may have implications for civil liberties, and should be implemented rapidly. Furthermore, it is unlikely that preparation can adequately mitigate all potential threats. Consequently, governments should engage with populations to enhance shared understanding of the threats relating to environmental breakdown, provide for debate and scrutiny over preparation measures, and increase cooperation between communities in readiness for the growing severity of impacts.

UK PERFORMANCE

We now assess the UK's performance in meeting these conditions for good governance relating to preparation for the consequences of environmental breakdown.

TABLE 4.1: ASSESSMENT OF UK GOVERNMENT PERFORMANCE AGAINST IPPR CRITERIA FOR CONSIDERATIONS OF PREPAREDNESS FOR THE CONSEQUENCES OF THE DOMAIN OF RISK BROUGHT ABOUT BY ENVIRONMENTAL BREAKDOWN

Assessment using subjective qualitative criteria detailed in previous section

Condition	Rating	Notes
Adaptation measures consider threats arising from all elements of environmental breakdown		<p>The main government processes that are particularly relevant to risk and threats resulting from environmental breakdown include the National Risk Assessment (NRA) and the UK Climate Change Risk Assessment (CCRA). The CCRA considers an expansive range of risks resulting from climate breakdown and the impacts on other natural systems, including ecosystems, soils and biodiversity, as well as socioeconomic drivers of environmental stress, such as water use resulting from economic growth (HMG 2017). However, these relate primarily to factors relating to climate breakdown. The public National Risk Register, published as part of the NRA process, only features direct risks associated with climate breakdown, such as storms and flooding, and poor air quality (Cabinet Office 2017).</p> <p>The Committee on Climate Change (CCC) has criticised the National Adaptation Programme, which focuses on adaptation to climate breakdown and uses the CCRA as an input into planning, for omitting consideration of risks on many areas of the environment resulting from climate breakdown (CCC 2019b). Moreover, the CCC has criticised the government for treating adaptation as a separate goal in its 25 Year Environment Plan, instead of a necessary prerequisite of meeting all goals, and has pointed out that the resilience monitoring to be adopted by the proposed Office for Environmental Protection as a means to track progress on the 25-year plan is 'missing most of the relevant resilience metrics...and some key risks are not covered' (ibid). Overall, it is unclear to what extent the government holds a centralised assessment of the threats from all environmental factors and their interrelation, with most assessments focusing on risks associated with climate breakdown.</p>
Actions are being taken to prepare for the systemic consequences of environmental breakdown		<p>The CCRA considers the slow-onset risks and changing extremes from climate breakdown and looks at direct, indirect and major discontinuities, such as tipping points, both within the UK and affecting the UK from abroad (HMG 2017). Primarily, this analysis focuses on factors relating to climate breakdown and notes that more research is needed to understand international issues such as conflict and risks to international governance. In addition, the CCC has noted that the National Adaptation Programme omits risks facing the UK from the implications of climate breakdown overseas and other systemic consequences (CCC 2019b).</p> <p>The National Risk Register does look at a range of risks that could be impacted by environmental breakdown, such as infectious diseases, but does not explicitly explore the wider domain of risk that could impact the likelihood and severity of these threats. This partly results from the methodology of the NRA, which considers discrete threats over a predefined short-term period and would present a significant challenge to government response (Stock and Wentworth 2019). Multiple or overlapping hazards are not fully integrated into the NRA and are often overlooked (ibid). Crucially, the CCRA and NRA are 'not currently aligned', with the former focusing on long-term adaptation planning and the latter on short-term emergency response, and the agencies responsible for each 'do not routinely meet to discuss the two documents' (ibid). This means there might be no centralised, integrated assessment of the various risks dealt with by both assessment processes. This could preclude understanding of and action on many of the characteristics of the domain of risk associated with environmental breakdown, such as compounding slow-onset destabilisation of systems. Furthermore, a lack of resources across government, particularly as a result of successive budget cuts, and to risk-planning may erode the capacity of the UK to prepare for already identified threats.</p>
Actions are being taken to prepare all socioeconomic and natural systems		<p>The National Adaptation Programme has made some progress on adaptation to risks associated with climate breakdown and measures are being taken by businesses and other actors; in particular, the CCC has highlighted pockets of excellence in adaptation-planning and action, such as in water management (CCC 2019b). There is some progress in socioeconomic systems often not associated with adaptation requirements, such as assessment and disclosure of risk in the finance sector.</p> <p>However, adaptation efforts are largely limited to risks arising from climate breakdown and adaptation of physical infrastructure and natural systems, with little explicit focus on the multiplicity of risks to wider socioeconomic systems arising from environmental breakdown. Moreover, these existing efforts have been deemed inadequate. A CCC assessment has concluded that many national plans and policies still lack a basic acknowledgement of climate breakdown, zero of 33 priority areas scored well in reducing exposure to risk, nearly a third of sectors have no plans for handling long-term climate breakdown, including aspects of business and healthcare, and the priority given to adaptation in England has been eroded over the past 10 years (CCC 2019b). The CCC has also concluded that the government's Industrial Strategy made no mention of risks from climate breakdown and that significant gaps remain in preparation for risks to trade, international finance and natural systems. Accordingly, the CCC states that 'England is not prepared for even a 2°C rise in global temperature, let alone more extreme levels of warming' (ibid). Meanwhile, the lack of integration between the CCRA and NRA could risk precluding system-wide action on the nature of risk and multiplicity of threats resulting from environmental breakdown, such as the impact on political cohesion from persistent disruptions to food prices or supply. Government analyses of risk have been known to exclude the impacts on a range of socioeconomic systems from threats, such as in the case of an Environment Agency assessment of Storm Desmond that did not consider health effects among other factors (Stock and Wentworth 2019). This is partly because the siloed nature of government stymies multi-dimensional risk analyses, leading the NRA process to struggle to identify risk owners when a risk's impacts cut across departmental briefs, and so risks could 'fall between the cracks', as was the case with the Icelandic volcanic eruption of 2011 (OECD 2018).</p>

<p>Actions are being taken to maximise the co-benefits of more resilient systems</p>		<p>The CCRA, the wider work of the CCC, and the National Adaptation Programme consider the potential benefits of greater adaptation and resilience to the implications of climate breakdown. However, the CCC has concluded that the Programme is failing to understand and act on the full range of opportunities; plans for realising opportunities to business are given the lowest quality rating (CCC 2019b). Furthermore, the CCC has pointed to the failure of the government's Industrial Strategy to mention opportunities for UK skills, services and technologies to support adaptation efforts (ibid). In turn, the CCC has a limited analysis of the potential co-benefits of adaptation (as well as mitigation) policies, though has started to consider health factors; this is largely down to the brief and role of the Committee in relation to government. In general, where individual government plans and policies seek to maximise socioeconomic outcomes there is little explicit link between these and threats from environmental breakdown, risk assessments, and adaptation and resilience-planning.</p>
<p>Preparation measures are being developed and undertaken with extensive engagement from populations</p>		<p>All the processes and bodies listed in previous sections engage with a broad range of stakeholders and publish documents for public consumption. However, it is unclear how much the public engages with these issues. Consideration and discussion of threats and resilience in response to climate breakdown is largely absent from mainstream political debate, let alone those relating to the overall domain of risk emerging as a result of environmental breakdown. While the National Climate Assembly is a positive step in citizen engagement, discussion of threats and resilience are limited, and the Assembly has no direct power over government decision-making.</p> <p>Overall, there is no systematic, nationwide effort to educate the general population on the threats from environmental breakdown and to engage them in dialogue on preparedness. Within government, the CCC has criticised the approach to delegate adaptation processes for climate breakdown, concluding that 'leaving adaptation responses to local communities and individual organisations without a strategic plan is not a strategy to manage the risks' from climate breakdown (CCC 2019b). Meanwhile, inadequate communication between government and expert communities, such as in academia, have been highlighted as a weakness in the NRA process, which, as a result, could mean it acts more reactively than proactively in identifying risks (Stock and Wentworth 2019). In addition, the controversy around the transparency of the membership and decision-making of the government's Scientific Advisory Group for Emergencies (Sage) during the coronavirus pandemic underlines the need for greater transparency and accountability in risk-planning and response across government.</p>

KEY: Condition is being met Condition is being partly met Condition is not being met

Source: Authors' analysis

The UK is not prepared for the increasingly severe impacts of environmental breakdown. Its analysis of the risks and threats is underdeveloped, largely limited to climate breakdown, and the lack of integration between risk assessment processes may preclude a sophisticated analysis of the overall domain of risk emerging as a result of environmental breakdown. While publicly available strategic analyses undertaken by the Ministry of Defence come closer (MOD 2018), these insights are limited to security considerations, and there is little evidence they have been internalised across government. In turn, the government is failing even to adequately implement adaptation measures under its own limited analysis. As the CCC has concluded:

'Climate [breakdown] is also not a discrete policy issue that falls neatly under a single department's remit. It will affect the Government's ability to meet a very wide range of goals and objectives...These factors mean that adaptation action will not be successful without a strong, integrated, strategic national plan...The Government's approach of mainstreaming adaptation has, so far, not succeeded in putting in place a coherent and coordinated plan, nor the resources to enable the required actions to be carried out.'

(CCC 2019b)

A BETTER PREPARED UK

Recent high-profile events have raised questions as to how prepared the UK is for a range of threats. The ongoing coronavirus pandemic – an example of a non-linear, system-wide shock – has severely tested the government’s risk assessment and management capabilities. Criticism of the government’s response to the severe flooding over the winter of 2019/20 linked a perceived lack of readiness to cuts in the budgets of the Environment Agency and a range of emergency services (BBC 2019). The chair of the Committee on Climate Change has described the government’s overall approach to climate breakdown as being run ‘...like a Dad’s Army’ and has concluded that ‘we can’t go on with this ramshackle system’ (Harrabin 2019). It is critical that the UK develops a better understanding of and becomes better prepared for the domain of risk emerging as a result of environmental breakdown. As in other areas relating to environmental breakdown, responsibility for doing so cuts across all policy areas and levels of government and will require significant increases in the capability and capacity of government action. Policies that could spur improved preparedness include:

- **A Royal Commission on Preparations for Environmental Breakdown**

The implications of the domain of risk relating to environmental breakdown are unprecedented in their complexity and potential severity and are poorly understood. Action to increase levels of preparedness are pressingly urgent and must start from a position of weakness, with existing plans being inadequate. These actions will have consequences for all UK citizens, and therefore should be open to extensive scrutiny. In response, an ongoing royal commission should be established that rapidly develops a more sophisticated analysis of the domain of risk relating from environmental breakdown and assesses the UK’s preparedness, to inform both policy and the public. The commission should consider all factors relating to preparedness, ranging from adequate resourcing for public bodies, through the management of risk in globalised supply chains, to the role of foreign and security policy in maintaining international cooperation under conditions of growing destabilisation. The commission should gather inputs from a range of stakeholders, including a process of consultation and engagement with citizens across the country, and ensure its conclusions and recommendations are widely disseminated. In doing so, the commission should work closely with – but be independent from – the Net Zero and Just Transition Delivery Body and the Council for the Response to Environmental Breakdown; ultimately, these bodies should act on the commission’s insights and recommendations.

- **A national education programme on environmental breakdown and a Future Leaders Fund**

There is little shared understanding across the UK population of the severity of environmental breakdown and the risks therein.¹⁵ A better understanding of the unprecedented threat posed by environmental breakdown is urgent and important, including in ensuring politicians face the correct political incentives to act on both preparation and undertaking the transformations needed to realise more sustainable and just societies. It is also important so that populations are better prepared, both physically and mentally, for the new domain of risk brought about by environmental breakdown. A nationwide education programme should be established to develop this shared understanding across the population, delivered through existing educational pathways and other educational routes across civil society, with elements including basic scientific understanding, the nature of risk, and avenues of support for the downside mental health consequences of understanding the reality of environmental breakdown. The programme should work closely

15 For a wider discussion of the educational requirements of environmental breakdown, see, for example, Teach the Future (2020): <https://www.teachthefuture.uk>

with the investigation undertaken by the royal commission described above, drawing on and disseminating its findings. In addition, the programme should administer a Future Leaders Fund that disburses grants to and provides training for outstanding young leaders across a range of sectors – such as healthcare, policymaking, business, and civil society – to help them develop the experience and competencies needed to lead in a future of unprecedented destabilisation.

- **Integrated risk assessment and planning**

Risk assessment and planning criteria across government should be updated to include considerations of the complexities of the domain of risk associated with environmental breakdown. Responsibility for driving preparedness should rest with and be coordinated by the Council for the Response to Environmental Breakdown. In doing so, the Council should ensure the National Risk Assessment and planning process is integrated with the analyses of the Committee on Environmental Sustainability. In turn, all government departments should include considerations of environmental breakdown on their risk registers and all of the associated political, economic and societal risks associated with that department's work, and maintain ongoing assessments of future risks. The process of doing so across government should be coordinated by the Council for the Response to Environmental Breakdown.

5. CONCLUSION

In many respects, environmental breakdown cannot be ‘solved’. No level of action will realise a world untouched by its consequences, at least not for many generations. Much environmental destruction has already occurred, and more is on the way. We live in a new age in which no political issue can escape from the reality of environmental breakdown. Many communities – particularly in the Global South – have been living in this reality for a long time, suffering under its iniquitous consequences. Environmental breakdown is neither new nor exogenous, an unexpected by-product of human activity. On the contrary, it is endogenous, the inevitable outcome of the systemic reliance of societies and economies on the unsustainable exploitation of nature, a reliance built over hundreds of years. It is from this foundational realisation that we can better conceive of the response to environmental breakdown. While it cannot be solved, it can be better managed. The question is how.

To date, progress has been too slow, and we are far behind. But all is not lost. A new approach is needed. This report – and those in the series preceding it – have argued that environmental breakdown can only be sufficiently managed if societies undertake an overall transformation across three areas. They must become more sustainable, decelerating the drivers of breakdown and bringing natural systems back into safe operating spaces. This must be done in a way that is just, ensuring that the benefits and costs of the transformation are fairly shared. And societies must be better prepared, freeing us from the fear and destruction brought by environmental breakdown.

Such a transformation necessitates a shift in the current political-economic paradigm: the system of thought and practice that drives the behaviours of decision-makers and institutions, helping determine the structures and dynamics of overall socioeconomic systems. The current paradigm acts as a barrier to rapid, structural and equitable socioeconomic change. A new approach to policymaking is needed.

In driving rapid sustainability, policy should set a range of binding environmental limits on economies, effectively placing a full sustainability constraint within which activity can occur. Crucially, in doing so, we can realise the enormous co-benefits of cleaner, more efficient, fair and prepared societies. This is a new conception of abundance, in which we graduate beyond an economic model that sought social progress at the expense of the natural preconditions upon which we all depend. The actions needed to mitigate environmental breakdown are those that societies and economies should have always taken to realise happier, healthier lives. They are also those that can realise a just transition for everyone, ameliorating the inequities inherent in the socioeconomic drivers of environmental breakdown, more fairly distributing its costs within and between societies, maximising transitional benefits for marginalised communities, observing historical and international responsibilities, and acting to relieve the unique burden placed on future generations. And policy should go beyond the current focus on adaptation of physical infrastructure to climate shocks, expanding efforts to prepare for the systemic consequences of environmental breakdown on all socioeconomic and natural systems, and realising the inherent benefits of more resilient societies.

This report is intended to provide a guide for politicians and other policymakers in conceiving of and implementing such an approach. It was written in the first few months of the coronavirus pandemic, which provides a useful analogue for a full spectrum mobilisation of the capacity and capabilities of societies in the face of a rapid, systemic shock. But the response to environmental breakdown will have to be greater. This report is therefore dedicated to younger generations, throughout the world, who will have to emerge as leaders of a new type, capable and equipped to bring hope in the face of a future of unprecedented risk – and of opportunity.

SUMMARY OF POLICIES

A thriving UK within environmental limits

- A Sustainable Economy Act mandating statutory goals or targets for the rapid reduction of a full range of environmental impacts.
- Changes to the decision-making structures of government, including establishing a Minister for the Sustainable Development Goals, making decisions in reference to a suite of indicators of societal wellbeing, and establishing a Council for the Response to Environmental Breakdown at the heart of government.
- A Green Industrial Strategy to reorient the direction of economic development towards rapid environmental sustainability and maximising societal wellbeing.

Responsibility and justice in the age of environmental breakdown

- A Net Zero and Just Transition Delivery Body and Just Transition Fund to bring together the nation to plan and implement strategies for undoing structural inequity and distributing the impacts of acting on environmental breakdown.
- A fair and responsible foreign policy based on a fair share of undoing the cumulative damage of driving environmental breakdown and acting as a supporting partner to provide resources to those most in need and to drive reform of global structures and institutions that entrench environmental damage and socioeconomic inequity.
- Empowering and investing in younger generations, enshrining the rights of future generations in law and extending voting rights to more young people.

A better prepared UK

- A Royal Commission on Preparations for Environmental Breakdown that rapidly develops a more sophisticated analysis of the domain of risk resulting from environmental breakdown and assesses the UK's preparedness, both to inform policy and to openly engage the public in considering and acting on the risks for all.
- A national education programme on environmental breakdown, to rapidly develop a shared understanding across the population of the reality and risks of environment breakdown, and a Future Leaders Fund, to help outstanding young leaders develop the experience and competencies needed to lead in a future of unprecedented destabilisation.
- Integrated risk assessments and planning that updates risk assessment and planning criteria in line with the nature of risk and threats under conditions of environmental breakdown and ensures clear lines of responsibility throughout government.

REFERENCES

- All Party Parliamentary Group on Wellbeing Economics [APPGWE] (2019) A Spending Review to Increase Wellbeing, The What Works Centre for Wellbeing. <https://wellbeingeconomics.co.uk/wp-content/uploads/2019/05/Spending-review-to-increase-wellbeing-APPG-2019.pdf>
- Baer P (2012) 'The Greenhouse Development Rights Framework for Global Burden Sharing: Reflection on principles and prospects', WIREs Climate Change. <https://doi.org/10.1002/wcc.201>
- Barrett J, Owen A and Taylor P (2018) Funding a Low Carbon Energy System: A fairer approach?, UK Energy Research Centre
- Brignall M and Jones R (2016) 'Homeowners Count the Cost as Floods Force Prices to Plummet', The Guardian, 2 January 2016. <https://www.theguardian.com/environment/2016/jan/02/floods-house-prices-plummet>
- British Broadcasting Corporation [BBC] (2019) 'General Election 2019: Have flood and fire services been cut by the Conservatives?', 12 November 2019. <https://www.bbc.co.uk/news/50395117>
- Browder G, Ozment S, Rehberger Bescos I, Gartner T and Lange G-M (2019) Integrating Green and Gray: Creating next generation infrastructure, World Bank and World Resources Institute. <https://openknowledge.worldbank.org/handle/10986/31430>
- Cabinet Office (2017) National Risk Register of Civil Emergencies, 2017 Edition, HM Government. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/644968/UK_National_Risk_Register_2017.pdf
- Carney M (2015) 'Breaking the Tragedy of the Horizon – Climate change and financial stability', speech by Mark Carney, 29 September 2015. <https://www.bankofengland.co.uk/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability>
- ClientEarth (2020) 'The Environment Bill: Another missed opportunity for clean air.' <https://www.clientearth.org/were-demanding-urgent-action-on-uk-air-pollution/>
- Colebrook C (2018) Measuring What Matters: Improving the indicators of economic performance, IPPR. <http://www.ippr.org/research/publications/measuring-what-matters>
- Committee on Climate Change [CCC] (2019a) Reducing UK Emissions – 2019 Progress Report to Parliament. <https://www.theccc.org.uk/publication/reducing-uk-emissions-2019-progress-report-to-parliament/>
- Committee on Climate Change [CCC] (2019b) Progress in Preparing for Climate Change – 2019 Progress Report to Parliament. <https://www.theccc.org.uk/publication/progress-in-preparing-for-climate-change-2019-progress-report-to-parliament/>
- Coyle D (2015) GDP: A Brief but Affectionate History – Revised and expanded Edition, Princeton University Press
- Department for Business, Energy & Industrial Strategy [BEIS] (2019) BEIS Public Attitudes Tracker: December 2018 Survey (Wave 28). https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/776657/BEIS_Public_Attitudes_Tracker_-_Wave_28_-_key_findings.pdf
- Department for Environment, Food & Rural Affairs [Defra] (2019) UK's Carbon Footprint 1997–2016. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/794557/Consumption_emissions_April19.pdf
- Department of Defense [DoD] (2014) Quadrennial Defense Review, US Government. https://archive.defense.gov/pubs/2014_Quadrennial_Defense_Review.pdf
- Dominish E, Florin N and Teske S (2019) Responsible Minerals Sourcing for Renewable Energy, University of Technology Sydney. <https://www.uts.edu.au/research-and-teaching/our-research/institute-sustainable-futures/our-research/resource-futures/responsible-minerals-for-renewable-energy>

- EAT-Lancet (2019) Food, Planet, Health: Healthy Diets From Sustainable Food Systems – Summary report of the EAT-Lancet Commission. https://eatforum.org/content/uploads/2019/01/EAT-Lancet_Commission_Summary_Report.pdf
- Elliott L (2019) 'UK Urges World Bank to Channel more Money into Tackling Climate Crisis', The Guardian, 20 October 2019. <https://www.theguardian.com/business/2019/oct/20/uk-urges-world-bank-to-channel-more-money-into-tackling-climate-crisis>
- Emden J and Murphy L (2018) Risk or Reward? Securing a just transition in the north of England – interim report, IPPR. <http://www.ippr.org/publications/research/risk-or-reward>
- Emden J, Murphy L and Lloyd H (2018) Beyond ECO: The future of fuel poverty support, IPPR. <https://www.ippr.org/research/publications/beyond-eco>
- England K and Knox K (2015) Targeting Flood Investment and Policy to Minimise Flood Disadvantage, Joseph Rowntree Foundation. <https://www.jrf.org.uk/report/targeting-flood-investment-and-policy-minimise-flood-disadvantage>
- Environmental Audit Committee [EAC] (2019a) UK Export Finance: Nineteenth report of session 2017–19, House of Commons. <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1804/1804.pdf>
- Environmental Audit Committee [EAC] (2019b) Our Planet, Our Health: Twenty-First Report of Session 2017–19, House of Commons. <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1803/1803.pdf>
- Environmental Audit Committee [EAC] (2019c) Scrutiny of the Draft Environment (Principles and Governance) Bill: Eighteenth report of session 2017–19, House of Commons. <https://publications.parliament.uk/pa/cm201719/cmselect/cmenvaud/1951/1951.pdf>
- Erickson P, Kartha S, Lazarus M and Tempest K (2015) 'Assessing Carbon Lock-in', Environmental Research Letters, 10(8). <https://iopscience.iop.org/article/10.1088/1748-9326/10/8/084023>
- European Commission (2014) Green Infrastructure and Climate Adaptation. https://ec.europa.eu/environment/nature/ecosystems/pdf/Green%20Infrastructure/GI_climate_adaptation.pdf
- Global Food Security [GFS] (2015) Extreme Weather and Resilience of the Global Food System, Final Project Report from the UK-US Taskforce on Extreme Weather and Global Food System Resilience
- Green Alliance (2017) Industrial Strategy fit for the Future – Perspectives on building a competitive UK economy. https://www.green-alliance.org.uk/resources/Industrial_strategy_fit_for_the_future_perspectives.pdf
- Green Climate Fund [GCF] (2019) 'United Kingdom Pledges to Double Contribution to Green Climate Fund'. <https://www.greenclimate.fund/news/united-kingdom-pledges-to-double-contribution-to-green-climate-fund>
- Green New Deal for Europe [GNDE] (2019) Blueprint for Europe's Just Transition, Edition II. <https://report.gndforeurope.com/cms/wp-content/uploads/2020/01/Blueprint-for-Europes-Just-Transition-2nd-Ed.pdf>
- Greener UK (2020) Briefing for Commons Second Reading of the Environment Bill. https://greeneruk.org/sites/default/files/download/2020-02/Greener_UK_and_Link_briefing_for_second_reading_of_the_Environment_Bill_February_2020.pdf
- Harrabin R (2019) 'Climate Change: UK government "like Dad's Army"', 10 July 2019, BBC. <https://www.bbc.co.uk/news/science-environment-48929632>
- Henfrey TW (2018) 'Designing for Resilience: Permaculture as a transdisciplinary methodology in applied resilience research', Ecology and Society 23, no.2. <https://www.ecologyandsociety.org/vol23/iss2/art33/>
- Herrington R, Boyce A, Lusty P, Murton B, Naden J, Robert S, Smith D and Wall F (2019) 'Leading Scientists set out Resource Challenge of meeting Net Zero Emissions in the UK by 2050', press release, Natural History Museum. <https://www.nhm.ac.uk/press-office/press-releases/leading-scientists-set-out-resource-challenge-of-meeting-net-zero.html>
- Hickel J and Kallis G (2019) 'Is Green Growth Possible?', New Political Economy, pp1–18. <https://www.tandfonline.com/doi/full/10.1080/13563467.2019.1598964>

- HM Government [HMG] (2017) UK Climate Change Risk Assessment 2017. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/584281/uk-climate-change-risk-assess-2017.pdf
- Human Rights Council [HRC] (2019) Climate Change and Poverty: Report of the Special Rapporteur on extreme poverty and human rights. <https://reliefweb.int/report/world/climate-change-and-poverty-report-special-rapporteur-extreme-poverty-and-human-rights>
- Intergovernmental Panel on Climate Change [IPCC] (2014) Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri RK and Meyer LA (eds)]. IPCC, Geneva, Switzerland, 151 pp
- Intergovernmental Panel on Climate Change [IPCC] (2018) Summary for Policymakers. In: Global warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, Masson-Delmotte V et al (eds). <https://www.ipcc.ch/sr15/>
- Intergovernmental Panel on Climate Change [IPCC] (2019) Summary for Policymakers. In: Climate Change and Land. An IPCC special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems [Shukla PR, Skea J, Calvo Buendia E, Masson-Delmotte V, Pörtner H-O, Roberts DC, Zhai P, Slade R, Connors S, van Diemen R, Ferrat M, Haughey E, Luz S, Neogi S, Pathak M, Petzold J, Portugal Pereira J, Vyas P, Huntley E, Kissick K, Belkacemi M and Malley J (eds)]. In press. https://www.ipcc.ch/site/assets/uploads/sites/4/2020/02/SPM_Updated-Jan20.pdf
- Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services [IPBES] (2019) Summary for Policymakers: The global assessment report on biodiversity and ecosystem services. https://ipbes.net/sites/default/files/2020-02/ipbes_global_assessment_report_summary_for_policymakers_en.pdf
- International Energy Agency [IEA] (2018) World Energy Investment 2018, OECD/IEA. <https://webstore.iea.org/world-energy-investment-2018>
- International Monetary Fund [IMF] (2017) World Economic Outlook, October 2017: Seeking sustainable growth: short-term recovery, long-term challenges
- International Monetary Fund [IMF] (2019) '5. Report for Selected Countries and Subjects', World Economic Outlook database, April 2019
- International Trade Union Congress [ITUC] (2018) 'Just Transition Centre'. <https://www.ituc-csi.org/just-transition-centre>
- Jacobs M, Hatfield I, King L, Raikes L and Stirling A (2017) Industrial Strategy: Steering structural change in the UK economy, IPPR. <http://www.ippr.org/publications/industrial-strategy-steering-structural-change-in-the-uk-economy>
- Jennings N, Fecht D and De Matteis S (2019) Co-benefits of Climate Change Mitigation in the UK: What issues are the UK public concerned about and how can action on climate change help to address them?, Grantham Institute, briefing paper no 31. <https://www.imperial.ac.uk/media/imperial-college/grantham-institute/public/publications/briefing-papers/Co-benefits-of-climate-change-mitigation-in-the-UK.pdf>
- Joint Nature Conservation Committee [JNCC] (2019) Sixth National Report to the United Nations Convention on Biological Diversity: United Kingdom of Great Britain and Northern Ireland. JNCC, Peterborough. <http://data.jncc.gov.uk/data/527ff89f-5f6b-4e06-bde6-b823e0ddcb9a/UK-CBD-6NR-v2-web.pdf>
- Jordan R (2019) 'How does Climate Change affect Disease?', Stanford Woods Institute for the Environment, 15 March 2019. <https://earth.stanford.edu/news/how-does-climate-change-affect-disease#gs.5awn1z>
- Karlsson M, Alfredsson E and Westling N (2020) 'Climate Policy Co-benefits: A review'. Climate Policy (2020): 1-25. <https://www.tandfonline.com/doi/full/10.1080/14693062.2020.1724070>
- Kenner D (2015) Inequality of Overconsumption: The ecological footprint of the richest. <https://whygreeneconomy.org/wp-content/uploads/2015/11/Inequality-of-overconsumption.-The-ecological-footprint-of-the-richest-Dario-Kenner.pdf>

- Kent C, Pope E, Thompson V, Lewis K, Scaife AA and Dunstone N (2017) 'Using Climate Model Simulations to assess the Current Climate Risk to Maize Production', *Environmental Research Letters*, 12(5), 054012. <http://iopscience.iop.org/article/10.1088/1748-9326/aa6cb9/meta>
- Klare M T (2019) *All Hell Breaking Loose: The Pentagon's perspective on climate change*, Metropolitan Books
- Lander R (2017) *Councils: Fuelling the Fire*, 350.org, Friends of the Earth, Friends of the Earth Scotland, Platform, and Community Reinvest. <https://631nj1ki9k11gbkx39b3qpz-wpengine.netdna-ssl.com/uk/wp-content/uploads/sites/3/2017/11/Councils-Fuelling-the-Fire-Online-1.2.pdf>
- Lang T (2020) *Feeding Britain*, Pelican
- Laybourn-Langton L, Rankin L and Baxter D (2019a) *This is a Crisis: Facing up to the age of environmental breakdown*, IPPR. <https://www.ippr.org/research/publications/age-of-environmental-breakdown>
- Laybourn-Langton L, Emden J and Rankin L (2019b) *Inheriting the Earth? The unprecedented challenge of environmental breakdown for younger generations*, IPPR. <http://www.ippr.org/research/publications/inheriting-the-earth> Laybourn-Langton L and Hill T (2019) *Facing the Crisis: Rethinking economics for the age of environmental breakdown*, IPPR. <http://www.ippr.org/research/publications/rethinking-economics-for-the-age-of-environmental-breakdown>
- Laybourn-Langton L and Rankin L (2019) *Our Responsibility: A new model of international cooperation for the era of environmental breakdown*, IPPR. <http://www.ippr.org/research/publications/our-responsibility>
- Laybourn-Langton L and Murphy L (forthcoming) *The political consequences of environmental breakdown*, IPPR
- Lebling K, Ge M and Friedrich J (2018) '5 Charts Show How Global Emissions Have Changed Since 1850', *World Resources Institute*. <https://www.wri.org/blog/2018/04/5-charts-show-how-global-emissions-have-changed-1850>
- Lenton TM, Rockström J, Gaffney O, Rahmstorf S, Richardson K, Steffen W and Schellnhuber HJ (2019) 'Climate Tipping Points – Too risky to bet against', *Nature* 575, 592-595. doi: 10.1038/d41586-019-03595-0. <https://www.nature.com/articles/d41586-019-03595-0>
- Linkov I, Trump BD and Hynes W (2019) *Resilience Strategies and Approaches to Contain Systemic Risks*, OECD. [https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC\(2019\)5_Resilience_strategies.pdf](https://www.oecd.org/naec/averting-systemic-collapse/SG-NAEC(2019)5_Resilience_strategies.pdf)
- Mazzucato M and Dibb G (2019) *Missions: A Beginner's Guide*, UCL IPPP. https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/iipp_policy_brief_09_missions_a_beginners_guide.pdf
- Ministry of Defence [MOD] (2018) *Global Strategic Trends: The future starts today*, Development, Concepts and Doctrine Centre, sixth edition. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/771309/Global_Strategic_Trends_-_The_Future_Starts_Today.pdf
- Murphy L (2019) *An Industrial Strategy at the Heart of a Green New Deal*, Common Wealth. https://uploads-ssl.webflow.com/5e2191f00f868d778b89ff85/5e416e0d19eb42bebb12cb_cb_Common-Wealth-GND-work.pdf
- National Research Council [NRC] (2013) *Climate and Social Stress: Implications for security analysis*. National Academies Press
- National Trust (2019) *Written evidence submitted by the National Trust (DEB0018) to the Environmental Audit Committee Draft Environment (Principles and Governance) Bill inquiry*. <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/environment-food-and-rural-affairs-committee/prelegislativescrutiny-of-the-draft-environment-principles-and-governance-bill/written/95616.html>
- New Economics Foundation [NEF] (2017) 'Central Banks, Climate Change and the Transition to a Low-carbon Economy: A policy briefing'. https://neweconomics.org/uploads/files/NEF_BRIEFING_CENTRAL-BANKS-CLIMATE_E.pdf
- New Zealand Treasury (2019) *The Wellbeing Budget*, 30 May 2019. <https://treasury.govt.nz/sites/default/files/2019-05/b19-wellbeing-budget.pdf>

- O'Neill D, Fanning A, Lamb W and Steinberger J (2018) 'A Good Life for all within Planetary Boundaries', *Nature Sustainability*. <https://www.nature.com/articles/s41893-018-0021-4>
- Organisation for Economic Co-operation and Development [OECD] (2018) *National Risk Assessments: A Cross Country Perspective*
- Pinner D, Rogers M and Samandari H (2020) 'Addressing Climate Change in a Post-pandemic World', *McKinsey Quarterly*, April 2020. <https://www.mckinsey.com/business-functions/sustainability/our-insights/addressing-climate-change-in-a-post-pandemic-world>
- Policy Expert (2020) 'Fears that Flooding will Increase Insurance and Bring Down House Prices'. <https://blog.policyexpert.co.uk/house-home/fears-flooding-increase-insurance-bring-down-house-prices/>
- Preston I, Banks N, Hargreaves K, Kazmierczak A, Lucas K, Mayne R, Downing C and Street R (2014) *Climate Change and Social Justice: An Evidence Review*, Joseph Rowntree Foundation. <https://www.cse.org.uk/downloads/reports-and-publications/energy-justice/climate%20change%20and%20social%20justice%20evidence%20review.pdf>
- Raworth K (2017) *Doughnut Economics: Seven ways to think like a 21st-century economist*, Random House
- Rockström J, Steffen W, Noone K, Persson A, Chapin III FS, Lambin EF, Lenton TM, Scheffer M, Folke C, Schellnhuber HJ, Nykvist B, de Wit CA, Hughes T, van der Leeuw S, Rodhe H, Sörlin S, Snyder PK, Costanza R, Svedin U, Falkenmark M, Karlberg L, Corell RW, Fabry VJ, Hansen J, Walker B, Liverman D, Richardson K, Crutzen P and Foley JA (2009) 'A Safe Operating Space for Humanity', *Nature*. <https://www.nature.com/articles/461472a>
- Roderick P (2010) *Taking the Longer View: UK governance options for a finite planet*, WWF and the Foundation for Democracy and Sustainable Development. <https://www.fdsd.org/publications/taking-the-longer-view-uk-governance-options-for-a-finite-planet/>
- Royal Academy of Engineering [RAE] (2016) *Living without Electricity: One city's experience of coping with loss of power*. <https://www.lancaster.ac.uk/media/lancaster-university/content-assets/documents/engineering/RAEngLivingwithoutelectricity.pdf>
- Rudebusch GD (2019) 'Climate Change and the Federal Reserve', Federal Reserve Bank of San Francisco. <https://www.frbsf.org/economic-research/publications/economic-letter/2019/march/climate-change-and-federal-reserve/>
- Scott W (2020) '6 Ways to Bring Climate Change to the Curriculum', *The Times Educational Supplement*, 25 February 2020. <https://www.tes.com/news/6-ways-bring-climate-change-curriculum>
- Scottish Government (2019) *Scotland's Wellbeing – Delivering the National Outcomes*, May 2019. https://nationalperformance.gov.scot/sites/default/files/documents/NPF_Scotland%27s_Wellbeing_May2019.pdf
- Smith L and Priestley S (2020) *Common Library Analysis of the Environment Bill 2019-20*, House of Commons Library. <https://commonslibrary.parliament.uk/research-briefings/cbp-8824/>
- Sovacool BK (2011) 'Hard and Soft Paths for Climate Change Adaptation', *Climate Policy*, 11(4), pp1177-1183
- Steffen W, Richardson K, Rockström J, Cornell SE, Fetzer I, Bennett EM, Biggs R, Carpenter SR, de Vries W, de Wit CA, Folke C, Gerten D, Heinke J, Mace GM, Persson LM, Ramanathan V, Reyers B and Sörlin S (2015) 'Planetary Boundaries: Guiding human development on a changing planet', *Science*, 347(6223), 1259855. <https://openresearch-repository.anu.edu.au/bitstream/1885/13126/3/1259855.full.pdf>
- Stock M and Wentworth J (2019) *Evaluating UK Natural Hazards: The national risk assessment*, POSTbrief 31, April 2019, UK Parliament
- Thunberg G (2019) 'If World Leaders Choose to Fail Us, my Generation will Never Forgive Them', speech to the UN Climate Action summit, New York, 23 September 2019. <https://www.theguardian.com/commentisfree/2019/sep/23/world-leaders-generation-climate-breakdown-greta-thunberg>
- UK Stakeholders for Sustainable Development [UKSSD] (2018) *Measuring Up: How the UK is performing on the UN Sustainable Development Goals*. <https://www.ukssd.co.uk/Handlers/Download.ashx?IDMF=62c71dd6-d83b-4b3b-b98b-e7f9f1e21907>

- United Nations Framework Convention on Climate Change [UNFCCC] (2019a) 'Differentiated impacts of climate change on women and men; the integration of gender considerations in climate policies, plans and actions; and progress in enhancing gender balance in national climate delegations', synthesis report by the secretariat. https://unfccc.int/sites/default/files/resource/sbi2019_inf8.pdf
- United Nations Framework Convention on Climate Change [UNFCCC] (2019b) 'Values of Indigenous Peoples Can Be a Key Component of Climate Resilience', webpage. <https://unfccc.int/news/values-of-indigenous-peoples-can-be-a-key-component-of-climate-resilience>
- Van Lerven F (2018) The Bank of England and a 1.5°C Green Transition: Reshaping finance, New Economics Foundation. <https://neweconomics.org/uploads/files/reshaping-finance.pdf>
- War on Want (2020) 'The UK's Climate Fair Share Infographic', webpage. <https://waronwant.org/resources/uks-climate-fair-share-infographic>
- Water Services Regulation Authority [Ofwat] (2018) Out in the Cold: Water companies' response to the 'Beast from the East'. <https://www.ofwat.gov.uk/wp-content/uploads/2018/06/Thaw-report-FINAL.pdf>
- Watts N et al (2018) 'The Lancet Countdown on Health and Climate Change: From 25 years of inaction to a global transformation for public health', The Lancet, 391.10120 (2018): 581-630. https://secure.jbs.elsevierhealth.com/action/getSharedSiteSession?rc=1&redirect=https%3A%2F%2Fwww.thelancet.com%2Fjournals%2Flancet%2Farticle%2FPIS0140-6736%2817%2932464-9%2Ffulltext%3Fdgcid%3Dtwitter_social_countdown-comm17%26dgcid%3DTheLancetTwitter_social_lancet%26sf125708826%3D1
- Weiss L, Lebrón M and Chase M (2018) Eye of the Storm: Colonialism, capitalism, and climate in the Caribbean. <https://www.tandfonline.com/doi/full/10.1080/10714839.2018.1479417>
- Winston A (2020) 'Is the COVID-19 Outbreak a Black Swan or the New Normal?', MIT Sloan Management Review, 16 March 2020. <https://sloanreview.mit.edu/article/is-the-covid-19-outbreak-a-black-swan-or-the-new-normal/>
- World Bank (2018) 'New Projects to Boost Renewable Energy and Improve Climate Resilience in Marshall Islands', press release. <https://www.worldbank.org/en/news/press-release/2018/06/06/new-projects-to-boost-renewable-energy-and-improve-climate-resilience-in-marshall-islands>
- World Economic Forum [WEF] (2018) The Global Risks Report 2018 – 13th Edition. http://www3.weforum.org/docs/WEF_GRR18_Report.pdf
- World Meteorological Organization [WMO] (2018) 'Greenhouse Gas Levels in Atmosphere Reach New Record', Press Release Number: 22112018, 20 November 2018. <https://public.wmo.int/en/media/press-release/greenhouse-gas-levels-atmosphere-reach-new-record>
- World Resource Institute [WRI] (2019) 'Greenhouse Gas Emissions Over 165 Years', webpage and dataset. <https://www.wri.org/resources/data-visualizations/greenhouse-gas-emissions-over-165-years>
- World Wide Fund for Nature [WWF] (2018) Living Planet Report – 2018: Aiming Higher, Grooten M and Almond REA (eds). https://wwf.panda.org/knowledge_hub/all_publications/living_planet_report_2018/

