



Independent Assessment of UK Climate Risk (June 2021) Summary

Executive Summary

- CCRA3 highlights that the UK is not keeping pace with the rate of increase in climate risks.
- Eight risk areas require urgent attention — 20% more are marked as the 'highest urgency' compared with CCRA2 (2016).
- The UK has the capacity and resources to respond effectively to these risks, yet it has not done so and acting now will be cheaper than waiting to deal with the consequences.
- At risk: natural and built environment, food supplies, human health, wellbeing and productivity.

Introduction

The UK Government is required to conduct a UK Climate Change Risk Assessment (CCRA) every five years as set out in the UK Climate Change Act (2008). The Assessment is made up of a series of reports: Technical Report, Valuation Report (and supporting research reports), Summaries and the Advice Report — the final being the subject of this summary. Following the UK Government's publication in 2022, each UK nation is then required to produce a 'National Adaptation Plan' as soon as practicable.

The third UK Climate Change Risk Assessment (CCRA3) concludes that 'progress with adaptation policy and implementation is not keeping up with the rate of increase in climate risk and that risks to all aspects of life in the UK have increased over the last 5 years', and that the gap between the level of risk we face and the level of adaptation underway has widened. Although the UK has the capacity and the resources to respond effectively to these risks, it has not yet done so and acting now will be cheaper than waiting to deal with the consequences. In fact, examples of the failure to adapt since CCRA2 include the building of 570,000 new homes in England which are not resilient to future high temperatures.

The Report identifies eight risk areas which require the most urgent attention in the next two years along with 61 risks and opportunities. The need for additional adaptation has increased in the past five years has revealed a greater degree of risk; 56% of the risks and opportunities assessed in the Technical Report have received the highest urgency score, compared with 36% for the last assessment in 2016.

The highest priorities for further adaptation in the next two years:

- Risks to the viability and diversity of terrestrial and freshwater habitats and species from multiple hazards. Following Brexit, there is an opportunity (albeit time limited) to build adaptation into policies to protect terrestrial and freshwater habitats and species.
- Risks to soil health from increased flooding and drought.
- Risks to natural carbon stores and sequestration from multiple hazards leading to increased emissions.
- Risks to crops, livestock and commercial trees from multiple hazards.
- Risks to supply of food, goods and vital services due to climate-related collapse of supply chains and distribution networks; enhancing supply chain resilience should be a priority in a post-COVID world and in the development of new trade agreements post-Brexit.
- Risks to people and the economy from climate-related failure of the power system; there are enhanced risks associated as dependence on electricity grows and the volatility of weather increases.
- Risks to health, wellbeing and productivity from increased exposure to heat in homes and buildings.
- Multiple risks to the UK from climate change impacts overseas; there is growing risk of weather-related hazards to spark cascading impacts globally (akin to COVID-19).

Principles for effective risk assessment and adaptation planning:

- Set out a vision for a well-adapted UK including measurable outcomes which can be achieved by the end of the next reporting period (2023-2029).

- Integrate adaptation into policies, particularly for infrastructure, buildings and the natural environment.
- Adapt to 2°C and assess the risks up to 4°C.
- Avoid ‘lock-in’: it is essential to ensure early adoption action before impacts actually occur, particularly where decisions have long lifetimes or long planning processes such as large infrastructure projects.¹
- Prepare for unpredictable extremes and assess interdependencies, for example, a flood will have significant knock-on impacts which will amplify the resulting risk across different sectors.
- Understand ‘threshold effects’, the point at which a non-linear change in a system occurs because of change in a climate variable, such as temperature.
- Climate change is likely to widen existing inequalities and a lack of action today stores up negative impacts for future generations. The Report recommends the UK Government addresses the unequal impacts of climate change as part of its levelling up agenda.
- Consider opportunities from climate change, such as warmer winters (and thus reduced winter heating costs). The changing climate can also bring opportunities to businesses from new markets for goods and services. UK businesses have a potential for market leadership through early adaptation.
- Support the implementation of adaptation through funding, resources, indicators, and research to link adaptation actions to reductions in risk; despite new initiatives such as TCFD, there is still a need to foster the continued growth of green financing at the national and local level.

Chapter 1: The UK’s changing climate

Five key conclusions have been reached: the UK’s climate has already changed over recent decades², further changes in the UK’s climate are expected by mid-century, a wide range of future UK climates remains possible in the second half of the century, the UK’s weather and climate will continue to be highly variable and low likelihood, high-impact climate changes outside the envelope considered in current projects could still be possible. Please refer to the appendix below and table 1.1 of the CCRA3 for more information.

These conclusions have several implications for adaptation policy. Continued change in the UK’s climate change should be expected and changes in the UK’s climate out to 2050 are largely insensitive to the trajectory of global GHG emissions — there is significantly more certainty in the range of UK climates that could occur by 2050 than over longer time periods. Such information can focus decision making for policy, assets and infrastructure which have a lifetime of only a few decades. Finally, very long-lasting policy and investment decisions being made today will need to consider a wide range of change in climate for the second half of the century and build in flexibility mechanisms.

It is necessary to go beyond average changes to fully understand the extent of the hazards and the range of outcomes that resilience needs to be built for and new resolution modelling is helping generate predictions from which policies can be made — this technology also considers low likelihood, high impact events such as a warm autumn followed by a wet spring which would lead to severe drops in agricultural harvests.

Chapter 2: Assessing UK climate risk

This section synthesises the assessment from the CCRA3 Technical Report on the risks and opportunities that climate change will bring to the UK and what issues need to be considered in effective risk assessments. The report concludes that the UK faces risks from climate change to its natural environment, its food and water supplies, its infrastructure, the health and wellbeing of its population and disruption to its businesses. Furthermore, it also concludes that: there is an increase in high magnitude risks between today and 2100, there are significant economic costs from negative impacts in the absence of future adaptation, key government and societal goals will be harder to meet because of climate change, effective risk assessments need to consider interacting risks and threshold effects, climate change may also present some opportunities for the UK, and that the UK is less well prepared for climate change now than it was five years ago. For more information, do read The [Technical Report](#) and separate Valuation Report. Table 1.2 in the Appendix outlines the risks and opportunities by urgency score.

¹ One example is building houses, where retrofitting windows and shutters is around four times more expensive than including them at design stage.

² The UK’s annual average temperature has rise by around 0.6°C above the average of the 1981-2000 period. In this time, the level of the seas has risen by around 6.5cm and the average duration of heatwaves has increased over time along with the number of very wet days across the UK.

Chapter 3: The adaptation return

Chapter 3 synthesises the results of the risk assessment on the benefits further adaptation can bring in addressing risks and opportunities from climate change. The report concludes that: ‘good adaptation’ should minimise the risks and maximise the opportunities from climate change, the case for urgent short-term Government action now has been made clearer, early adaptation action should be taken to avoid lock-in and minimise inequalities, only a combined approach of reducing emissions and building resilience will be successful in protecting the UK from the worst effects of climate change, taking further adaptation action will generate benefits from avoided damages for almost every risk assessed in the Technical Report, benefit-cost ratios for adaptation actions are largely positive, there is a lack of available evidence about the size and value of climate change opportunities and the adaptation actions that will deliver them and adaptation measures can have important wider benefits such as improving human health and the natural environment.

Good adaptation seeks to prepare for the changing climate while maximising social benefits, it should also adhere to the principles for policy appraisal set out in the UK Government’s Green Book. Another important consideration is that both adaptation and mitigation are needed together to address climate change: out of 15 relevant major UK Government announcements linked to addressing climate change. Perhaps most significantly, the CCRA3 Technical Report has identified that climate change poses significant risks to the UK’s ability to reach Net Zero greenhouse emissions by 2050; understanding the challenges of achieving Net Zero in the context of a changing climate should therefore be a priority for further analysis. The CCCs latest estimates put the net cost of achieving Net Zero at less than 1% of GDP through to 2050 when taking into account the benefits from the falling prices of low-carbon technologies. For nearly every risk and opportunity considered, there are benefits to further action in the next five years, from habitat creation to rainwater harvesting systems to businesses continuity planning and regulation — such adaptations can also have wider benefits to societies.

Implementing these changes requires an active green finance market which is presently emerging in the UK, this should help to create the right market conditions for adaptation funding if it is integrated as a core aim. Examples of recent developments include: the use of green ‘resilience bonds’, UK sovereign green bonds and the National Environmental Investment Readiness Fond (NEIRF) which was launched in 2021. Green finance offers the potential to fund adaptation actions with wide-ranging benefits across climate change mitigation, adaptation and biodiversity protection. However, funding mechanisms are still not in place for some adaptation measures, and in other cases mechanisms exist but are not incentivising a scale-up in action as adaptation is not considered as a core aim; missing markets and barriers to action do not yet exist to encourage effective measures at scale from householders, local authorities or businesses. In sum ‘a key component of the next iteration of national adaptation plans should be a commitment to enable sufficient funding for the necessary scaling up of adaptation action, setting out the mechanisms by which this will be achieved, with a focus on those adaptation actions that have no relevant funding streams at present’.

Chapter 4: Priorities for action

Low adaptation scores have contributed to the large increase in the number of risks and opportunities falling into the most urgent ‘more action needed’ category for government action. You can read about each of the eight priority risk areas in greater detail in this chapter (pp. 123 to pp. 137).

Appendix

Table 1.1

Table 1.1 Observed and projected changes in UK hazards due to climate change			
Observed change	Expected change by mid-century	Global warming of 2°C above preindustrial levels by 2100	Global warming of 4°C above preindustrial levels by 2100
0.6°C from 1981 – 2000	~1.3°C from 1981 – 2000	~1.5°C from 1981 – 2000	~3°C from 1981 – 2000
10 – 25% chance of a '2018 summer', up from <10% a few decades ago	~50% chance each year	~50% chance each year	>>50% chance each year
0 no significant long term trend	~10% drier than over 1981 – 2000	~15% drier than over 1981 – 2000	~30% drier than over 1981-2000
0 no significant long term trend	~5% wetter than over 1981 – 2000	~5% wetter than over 1981 – 2000	~20% wetter than over 1981 – 2000
0 Some increase, but no significant long-term trend	~10% increase	~20% increase	~50% increase
~6.5cm above 1981-2000	10 – 30cm above 1981-2000	25 – 45cm above 1981-2000	55 – 80 cm above 1981-2000
 Average annual UK temperatures	 'Hot summer' occurrence	 Average summer rainfall	 Average winter rainfall
 Heavy rainfall	 Sea level rise		
<p>Notes:</p> <p>* Changes to mid-century are taken from across RCP2.6, 4.5 and 6.0 scenarios for UKCP18 probabilistic projections (50th percentiles).</p> <p>** Changes are taken from the 50th percentile of the RCP2.6 probabilistic projections from UKCP18 averaged over 2081 – 2100 (approximately consistent with a global warming level of 2°C above preindustrial levels).</p> <p>*** Estimated from the UKCP18 Derived Projections for a global warming level of 4°C above preindustrial levels using the median model realisation. Values given are indicative of the middle of the range of local changes expected across most of the UK.</p> <p>Heavy rainfall is here defined as the mean of the wettest 5% in the distribution of hourly rainfall overwinter. Future projections taken from Sayers et al. (2015) Projections of future flood risk for the UK.</p> <p>Future sea level changes are given as a range across UK capital cities (50th percentile of projections). Future projections are taken from the UKCP18 Marine Projections for the RCP2.6 and RCP8.5 scenarios which correspond to global warming levels of 2°C and 4°C by 2100 respectively (50th percentiles). Change to 2050 are the range of 50th percentile change across UK capital cities and the RCP2.6 – RCP8.5 scenarios.</p> <p>Throughout this table values are rounded. Climate response uncertainty means that a broader range of changes are possible around the central estimates presented in this table.</p>			

This table is taken from page 44 of the CCRA3 and shows the change in aspects of the UK's weather and climate as the fundamental drivers of climate risks that the UK will face in the future.

Table 1.2

Table 2.2 CCRA3 Risks and Opportunities by Urgency Score (UK-wide scores)				
N1 Risks to terrestrial species and habitats	N2 Risks to terrestrial species and habitats from pests, pathogens and INNS	N4 Risk to soils from changing conditions, including seasonal acidity and wetness	N5 Risks to natural carbon stores and sequestration from changing conditions	N6 Risks to and opportunities for agricultural and forestry productivity
N7 Risks to agriculture from pests, pathogens and INNS	N8 Risks to forestry from pests, pathogens and INNS	N11 Risks to freshwater species and habitats	N12 Risks to freshwater species and habitats from pests, pathogens and INNS	N14 Risks to marine species, habitats and fisheries
N16 Risks to marine species and habitats from pests, pathogens and INNS	N17 Risks and opportunities to coastal species and habitats	I1 Risks to infrastructure networks from cascading failures	I2 Risks to infrastructure services from river and surface water flooding	I5 Risks to transport networks from slope and embankment failure
I6 Risks to public water supplies from reduced water availability	I12 Risks to transport from high and low temperatures, high winds, lightning	H1 Risks to health and wellbeing from high temperatures	H3 Risks to people, communities and buildings from flooding	H4 Risks to people, communities and buildings from sea level rise
H6 Risks and opportunities from summer and winter household energy demand	H8 Risks to health from vector-borne diseases	H11 Risks to cultural heritage	H12 Risks to health and social care delivery	H13 Risks to education and prison services
B1 Risks to business sites from flooding	B2 Risks to business locations and infrastructure from coastal change	B6 Risks to business from disruption to supply chains and distribution networks	ID1 Risks to UK food availability, safety, and quality from climate change overseas	ID6 Risks to international law and governance from climate change overseas that will impact the UK
ID4 Risks to the UK from international violent conflict resulting from climate change	ID9 Risk to UK public health from climate change overseas	ID7 Risks from climate change on international trade routes	ID10 Risk multiplication from the interactions and cascades of named risks across systems and geographies	N3 Opportunities from new species colonisations in terrestrial habitats
N9 Opportunities for agricultural and forestry productivity from new species	N10 Risks to aquifers and agricultural land from sea level rise, saltwater intrusion	N15 Opportunities for marine species, habitats and fisheries	N18 Risks and opportunities from climate change to landscape character	I3 - Risks to infrastructure services from coastal flooding and erosion
I4 Risks to bridges and pipelines from flooding and erosion	I6 Risks to hydroelectric generation from low or high river flows	I7 Risks to subterranean and surface infrastructure from subsidence	I9 Risks to energy generation from reduced water availability	I10 Risks to energy from high and low temperatures, high winds, lightning
I13 Risks to digital from high and low temperatures, high winds, lightning	H2 Opportunities for health and wellbeing from higher temperatures	H6 Risks to building fabric	H7 Risks to health and wellbeing from changes in air quality	H9 Risks to food safety and food security
H10 Risks to health from poor water quality and household water supply interruptions	B3 Risks to businesses from water scarcity	B5 Risks to business from reduced employee productivity - infrastructure disruption and higher temperatures	B7 Opportunities for business - changing demand for goods and services	N13 Opportunities to marine species, habitats and fisheries
I11 Risks to offshore infrastructure from storms and high waves	B4 Risks to finance, investment, insurance, access to capital	ID8 Risk to the UK finance sector from climate change overseas	ID2 Opportunities for UK food availability and exports	ID3 Risks to the UK from climate-related international human mobility
ID6 Opportunities (including Arctic ice melt) on international trade routes				
		More Action Needed	Further Investigation	Sustain Current Action, Watching Brief

Source: The Third UK Climate Change Risk Assessment Technical Report (Betts, R.A., Howard, A.B. and Pearson, K.V. (eds)). Prepared for the Climate Change Committee, London

Notes: A UK-wide score has been derived using the highest urgency score awarded across the four UK nations for each risk or opportunity.

This table is taken from page 60 of the CCRA3 and shows the CCRA3 Risks and Opportunities by Urgency Score - UK wide.