



MetLink
Royal Meteorological Society

Changing UK Climate



Background Information for Teachers

Current UK Climate Change

The climate of the UK has always changed. Over past decades, it has been getting warmer and the number of extreme rainfall events has been increasing. We expect the climate to continue to change as a result of past, current and future greenhouse gas emissions. The twenty-first century will bring warmer, drier summers, and milder, wetter winters to the UK; the number of extreme weather events and their severity will increase. Flood risks from sea level rise and extreme rainfall events are of significant concern, as well as potential water shortages. Although there remains uncertainty in projections, the data is unequivocal, and although the effects will vary, it is certain that our daily lives, our landscapes, and our flora and fauna will face significant change in the next 80 years and beyond.

The Central England Temperature Record

The CET dataset is the longest instrumental record of temperature in the world.

The data represents the temperature in a roughly triangular area of the United Kingdom enclosed by Lancashire, London and Bristol.

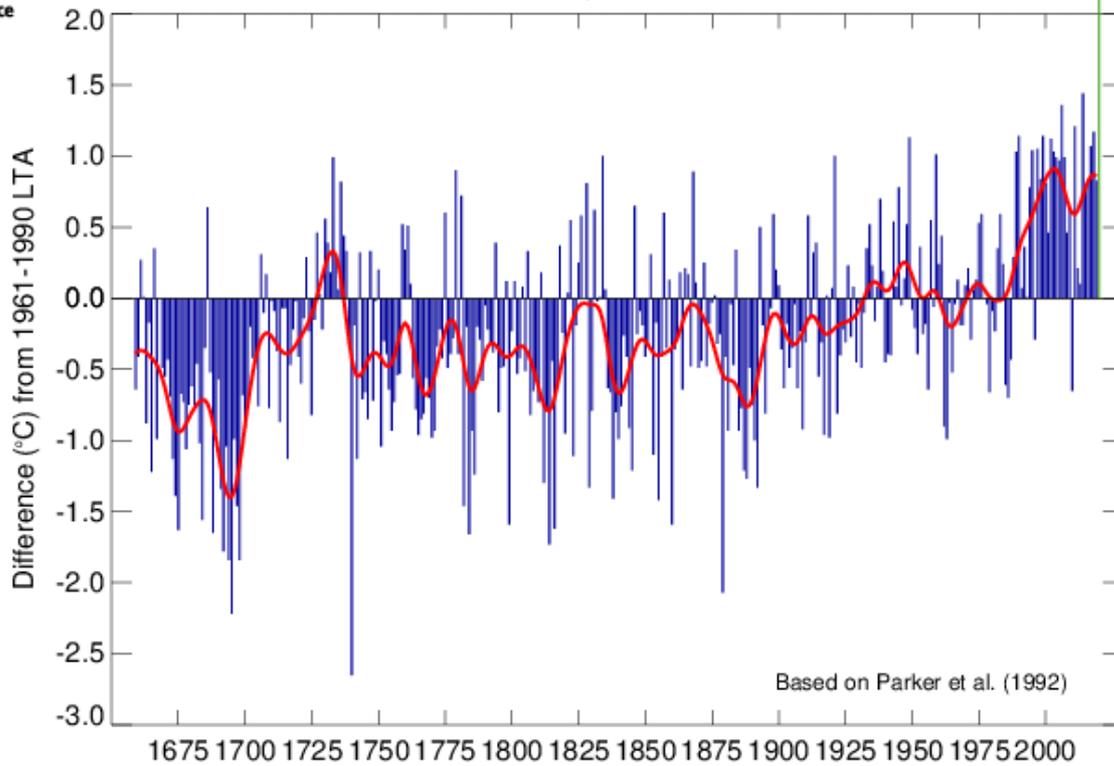
The sources of the data include records kept by individuals around the country, all carefully combined and corrected for factors such as changing instruments over time etc. The precision of the data published for each year reflects the number, accuracy, reliability and geographical spread of the temperature records that were available for that year – so early in the record, the data may only have a precision of 1°C or 0.5°C, whereas more recent data has a precision of 0.1°C.

The mean monthly temperature record starts in 1659 (with daily data being available from 1772 and maximum and minimum daily and monthly data beginning in 1878).

The full dataset and references can be found at www.metoffice.gov.uk/hadobs/hadcet

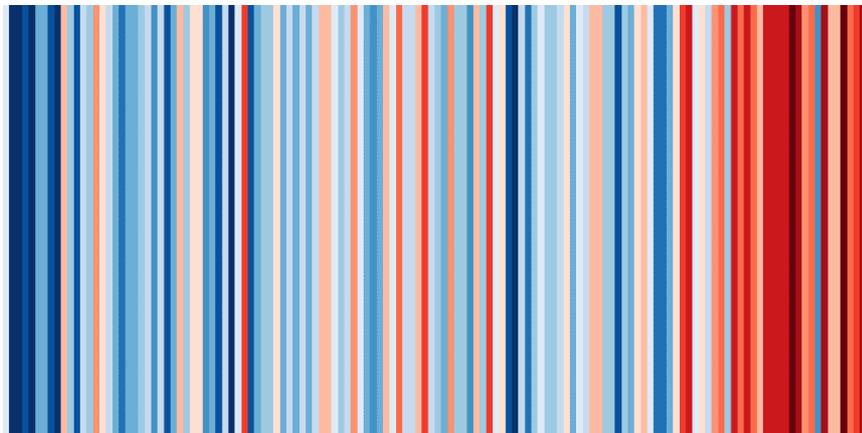


Mean Central England Temperature Annual anomalies, 1659 to 3rd Mar 2020



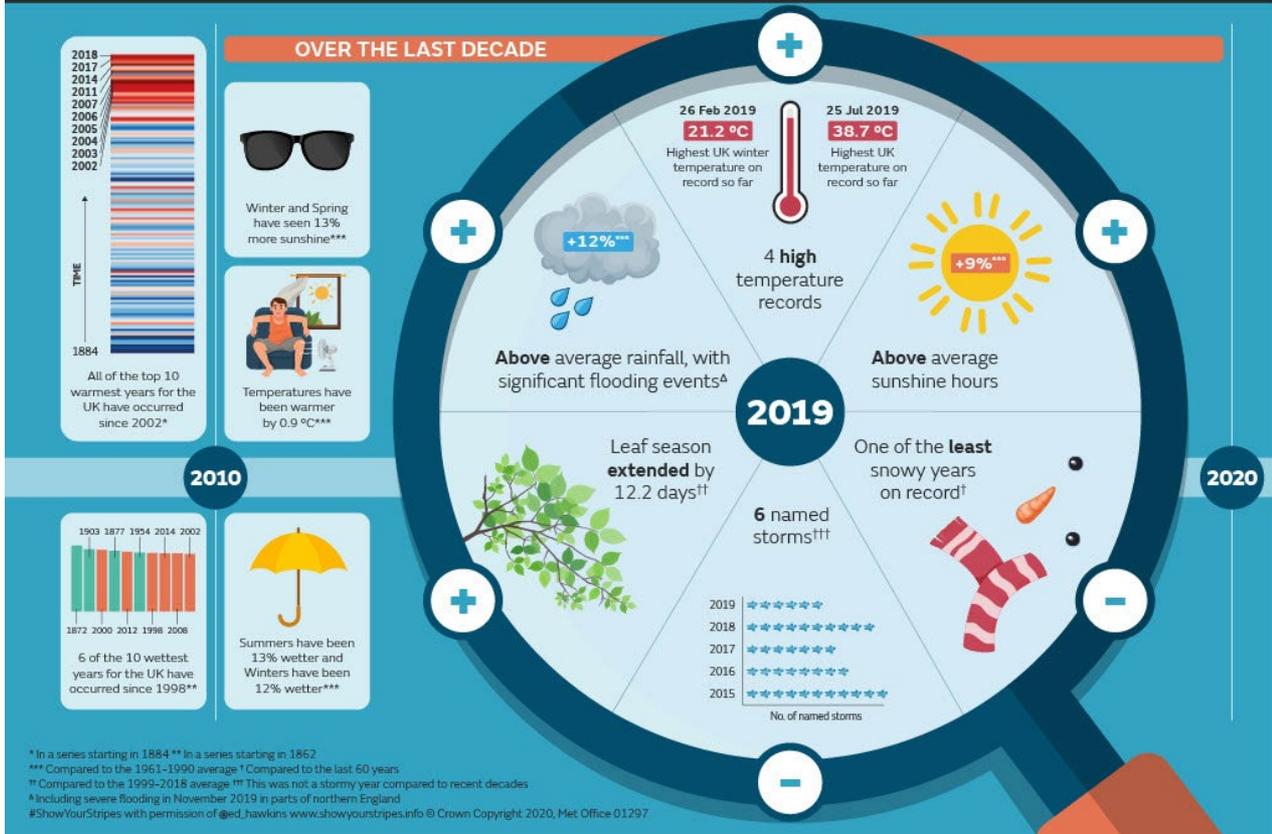
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A different visualisation of changing UK temperatures from 1884-2018:



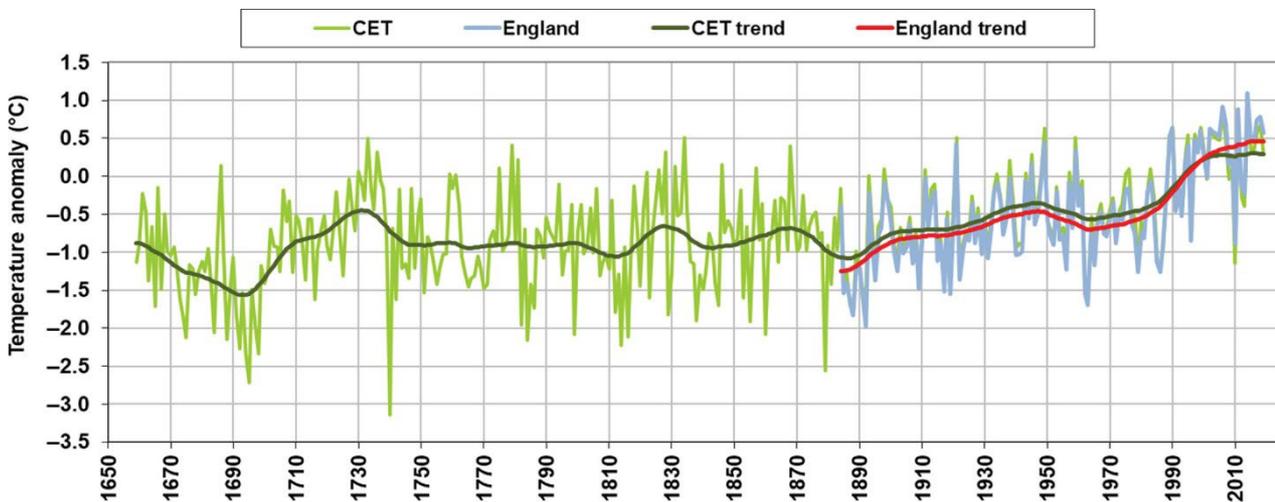
UK climate change stripes from <https://showyourstripes.info>

The Royal Meteorological Society publishes an annual report on the current state of the UK:



© Crown copyright, Met Office

Source: <https://rmets.onlinelibrary.wiley.com/doi/10.1002/joc.6726>



Variable	1961-1990 average	1981-2010 average	2010-2019 average	2019
CET	9.5	10.0	10.2	10.3
England	9.0	9.7	10.0	10.2

Source: <https://rmets.onlinelibrary.wiley.com/doi/10.1002/joc.6726>

Projections for UK Climate Change

The magnitude, effects and impacts of global climate change are modelled and published by the **Intergovernmental Panel on Climate Change (IPCC)**, a body created by the **World Meteorological Organisation (WMO)** and **United Nations Environment Programme (UNEP)** in 1988 that synthesises the peer-reviewed inputs of thousands of climate scientists into a series of reports published every 6-9 years.

Due to the magnitude and regional variation in forecast risks, national meteorological organisations run localised models that provide higher accuracy forecasts for their locale. In the UK, the body that completes this work is the **Met Office**.

The Met Office publishes an annual **State of the UK climate report**, which summarises current weather and climate in the context of the past, as well as [UK Climate Projections](#) which provide the most up-to-date assessment of how the climate of the UK may change over the 21st century. Over the 21st century, the UK climate will have warmer, wetter winters, and hotter, drier summers. Within this broad statement, though, lies significant spatial variation and uncertainty as to the exact magnitude of the changes. Some of the uncertainty in projections of the future are due to not knowing how the world will develop - how will population numbers and distributions change, how will different countries develop economically, what laws will be passed to limit emissions? All of these factors will have an impact on greenhouse gas emissions and consequently on climate change on both a global and regional scale.

In addition, we don't know how natural climate forcing mechanisms such as volcanic eruptions and the behaviour of the Sun will change, and there are also some parts of the climate system which are relatively poorly understood; as a result, some important elements of the climate, such as clouds, are not well represented in climate models.

All these factors are taken into account in the vast computer models used to make climate projections, giving us an 'ensemble' or group of forecasts from which a probability-based prediction is made. This tells us what changes are most likely.

Within a climate projection, the smaller the area scale, or the shorter the time scale you want to know about, the greater the uncertainty. It is much easier to make a projection for 2050-2100 climate for the Northern Hemisphere, for example, than it is for Birmingham in the 2060s.

However, it is this kind of detailed information that planners need.

Summer and winter changes by the 2070s

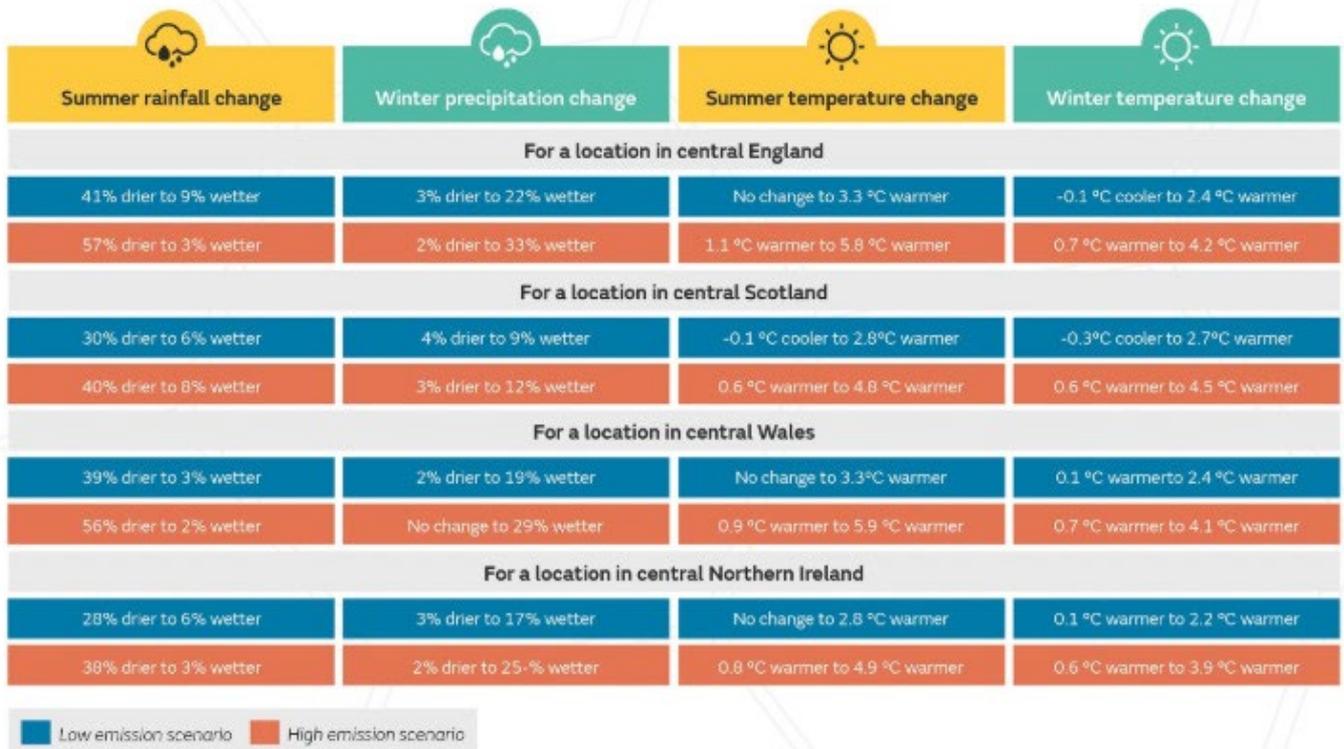


Image from the 2018 [UK Climate Projections](#) © Crown copyright, Met Office

Sea-level rise

Increase will generally be greater in the south than in the north

■ Range in low emission scenario ■ Range in high emission scenario

(by 2100 relative to 1981-2000)



Image from the 2018 [UK Climate Projections](#) © Crown copyright, Met Office

In the sea level rise graphic above, sea level rise by 2100 is shown for four cities with a low (blue) and high (orange) greenhouse gas emission scenario. Sea level rises will be higher with higher emissions. The sea level rise will not be the same in all locations.

The following images show the perceived risks and opportunities from climate change in the UK:

Key:

Climate change risks

Opportunities

Both a risk and opportunity

(relevant evidence report chapter(s) in brackets)

URBAN (▲):

- ▲ Increasing flood risks, including from sewers (Ch4, Ch5, Ch6)
- ▲ Heat-related health impacts, including in hospitals etc (Ch5)
- ▲ Climate impacts combined with social vulnerability (Ch8)
- ▲ Risks to air quality (Ch5)

- ▲ Infrastructure at risk from multiple hazards (Ch4, Ch6)

MARINE (*):

- * Risks to offshore infrastructure from storms and waves (Ch4)
- * Risks of water-borne pathogens, eg. vibro (Ch5)
- * Changing mix of species in UK waters (Ch3)

UPLANDS (◆):

- ◆ Loss of peatlands (Ch3)
- ◆ Water quality risks from dissolved organic compounds (Ch3)
- ◆ Loss of species due to lack of suitable climate space (Ch3)

RURAL (■):

- Increasing river and coastal flood risks (Ch4, Ch5, Ch6)
- Limited water for abstraction, loss of fertile soils (Ch3)
- Risks to freshwater species from high temperatures (Ch3)
- Poor water quality during periods of low flows (Ch3)
- Risks to private water supplies (Ch5)

- Changing species in natural and farmed countryside (Ch3)

- New and emerging pests and diseases (Ch3, Ch5)

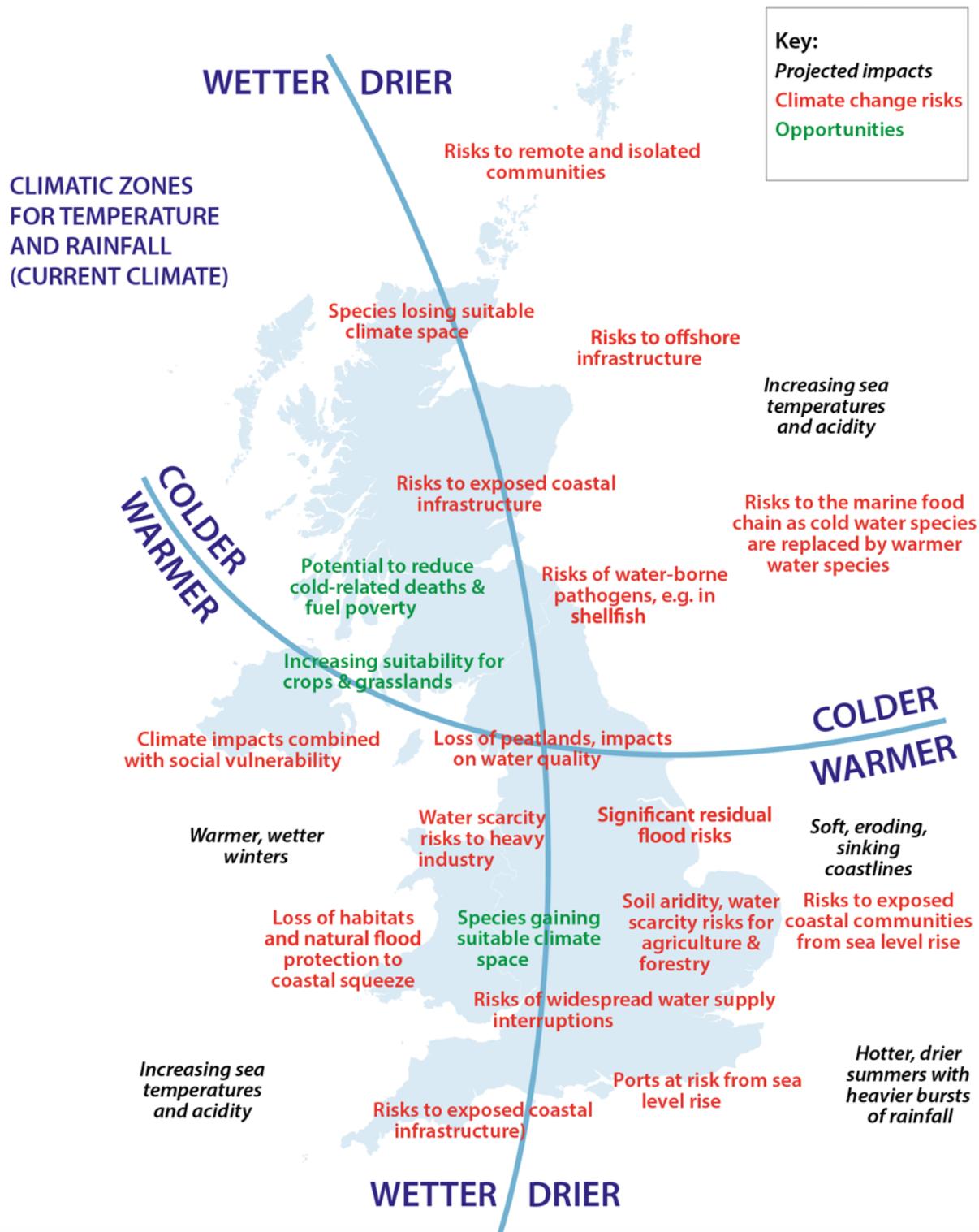
- Wildfire risks to farming and forestry (Ch3)

- Potential for increased productivity in some crops, forestry (Ch3)

COASTAL (●):

- Climate risks combined with social vulnerability (Ch8)
- Viability of low-lying coastal communities (Ch5, Ch6)
- Infrastructure at risk of flooding and coastal erosion (Ch4)
- Loss of habitats and natural flood protection from sea level rise (Ch3)
- Opportunities for tourism and outdoor activity (Ch5, Ch6)

UK CCRA 2017 Synthesis Report Committee on Climate Change
 Summary diagram illustrating the threats (red) and opportunities (green) from climate change in the UK (the Chapter numbers refer to the UK CCRA report)



UK CCRA 2017 Synthesis Report Committee on Climate Change
 Summary diagram showing the regional risks (red) and opportunities (green) from climate change in the UK

Figure SR.1: Top six areas of inter-related climate change risks for the United Kingdom



UK CCRA 2017 Synthesis Report Committee on Climate Change

Diagram illustrating the changing risk from various aspects of climate change in the UK from now (left) to the future (right)

The various hazards combine to have an impact on specific industries and activities. For example, the hot dry weather in 2018 led to UK wheat yields being 6% down on the 5-year average (as reported in Farmers Weekly). This was compounded by the fact that the drought was long lasting and widespread across Europe, leading to high wheat prices. The summer was preceded by a cold wet spring during which livestock were kept inside for longer, requiring more food. It became too hot for them in the summer, so they were moved back inside after only a short period grazing outside. Therefore, their feed (hay and silage) was in short supply and also became very expensive.

Current Pledges and Legislation

The UK government established an independent, statutory body – **The Committee on Climate Change** (The CCC) – under the Climate Change Act 2008. The CCC provides independent analysis and advice, and tracks progress towards policy goals. It also publishes a UK-wide **Climate Change Risk Assessment** (CCRA) every five years that assesses the risks from current and predicted climate change.

The UK is an Annex 1 (see Chapter 12) country and submits an annual inventory of its Greenhouse Gas emissions to the UNFCCC as well as providing information on emissions and removals of greenhouse gases; national circumstances; policies and measures; vulnerability assessment; financial resources and transfer of technology; education, training, and public awareness. In a Biennial report, Annex 1 countries also provide information about their provision of financial, technological, and capacity-building support to non-Annex I Parties.



This infographic, published by the UK's Committee on Climate Change (CCC), visualises the risks and benefits that climate change will present to different areas of the UK through the 21st Century.

Sources of Information

Climate stripes <https://showyourstripes.info> (can be specific to UK, England, Scotland, N. Ireland and Wales)

State of the UK Climate <https://www.metoffice.gov.uk/research/climate/maps-and-data/about/state-of-climate>

UK Climate Change Committee reports <https://www.theccc.org.uk/publications/> including risks specifically for England, N. Ireland, Scotland and Wales.

UK Climate Projections

<https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/index>