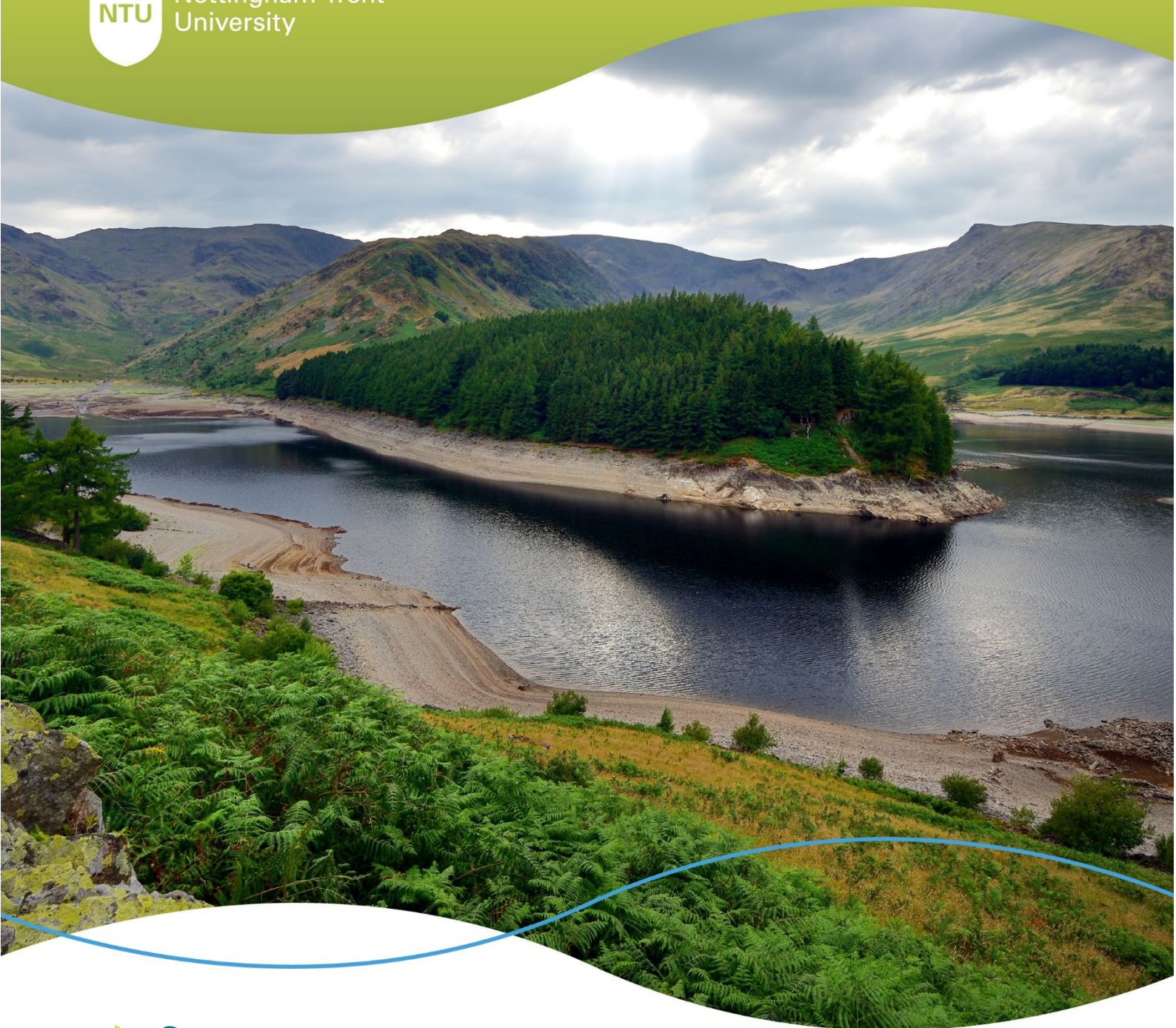




Nottingham Trent
University



► Summary

Cumbria Climate Risk Analysis 2026

The evidence on climate risk in Cumbria

April 2026

Megan Lindeman, Westmorland & Furness Council based on full report by
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Westmorland
& Furness
Council

Working for Cumberland Council and
Westmorland & Furness Council



Department
for Environment
Food & Rural Affairs



Environment
Agency

Introduction

This report summarises the findings of the Cumbria Climate Risk Analysis (CCRA).



Full report:
The evidence on
climate risk in
Cumbria



Area profiles



**Interactive data
dashboard**

You can read the full report, area profiles, and view the interactive data dashboard at:

 www.cumbriaobservatory.org.uk

The main report and related data were produced by Nottingham Trent University¹ for Cumbria Innovative Flood Resilience (CiFR). The interactive data dashboard was developed by the Data and Insights team at Westmorland and Furness Council.

CiFR is part of Department for Environment, Food and Rural Affairs (DEFRA)'s £200 million Flood and Coastal Innovation Programme (FCIP) managed by the Environment Agency. It is supported by both Cumberland and Westmorland & Furness Councils.

The CCRA is made available free of charge. It aims to build knowledge of climate change impacts and support the development, delivery and monitoring of climate adaptation plans across Cumbria.

Understanding climate change and why we need to analyse the risks

Climate change is the long-term shift in global temperature and weather patterns.

Global average temperatures have already warmed by 1.2°C since pre-industrial times and are predicted to warm further².

Increased global average temperature can cause increased heat, drought, more intense storms, more rainfall, and rising sea levels.

The Climate Change Committee recommends that adaptation planning should³:

- ▶ **Prepare for the impacts of a 2°C rise** in global average temperature
- ▶ **Consider the risks for a 4°C rise** in global average temperature

Climate change is happening now and will affect everybody

We are already seeing increasingly intense weather events in Cumbria. These weather events can damage property and infrastructure, impact on our economy, harm wildlife and habitats, and cause serious disruption to people's livelihoods and health and wellbeing.

Even if all countries implement all their current climate commitments, we are still likely to see 2.3–2.5°C of warming by 2100⁴.

More needs to be done to reduce greenhouse gas emissions if we are to limit the scale of climate change, but we also need to adapt to the changes that we will inevitably see.

If we are to adapt to our changing climate and be more resilient, we first need to understand what our future climate could look like*.

*There are several long-term climate scenarios or 'tipping points' that could occur in the future. One of these is the collapse of the Atlantic Meridional Overturning Circulation (AMOC), which would result in the UK seeing winter temperatures similar to that of Russia or Norway. This report presents the scenarios that are most likely to occur within the next 75 years. Collapse of the AMOC is very unlikely within this timeframe but could happen in the future.

What the CCRA does (and doesn't do)

The CCRA provides the evidence to support current and future adaptation planning and action across Cumbria.

The **CCRA**:

- ▶ Identifies, quality assures and synthesises existing sources of climate risk information to make sense to Cumbrian stakeholders and communities
- ▶ Provides climate projections for Cumbria, each Local Authority area, and at Lower layer Super Output Area (LSOA)[†]
- ▶ Outlines the climate risks that should be considered now and into the future when developing adaptation and mitigation solutions for Cumbria

[†]LSOAs are created from census data. They comprise between 400 and 1,200 households and have a usually resident population between 1,000 and 3,000 persons.

The CCRA is not a risk matrix, nor is it a risk rating. The context-dependent nature of climate risks means that the risk will vary depending on the user or receptor. Each organisation or community will therefore need their own risk assessment.

The CCRA does not outline adaptation or mitigation measures. It identifies the risks that should be considered, but each sector, organisation, or community will need to develop their own actions in response to this information.

It is important to recognise that averages are usually used to analyse large amounts of data. However, **averages can discount the rare but very extreme events that cause the largest impact.** Whilst average projections may only change a small amount, the magnitude of less frequent but more severe events is likely to get much larger. Averages can also hide spatial variations between one place and another within Cumbria. The interactive data dashboard tries to represent this spatial variability.

Using the findings of the CCRA

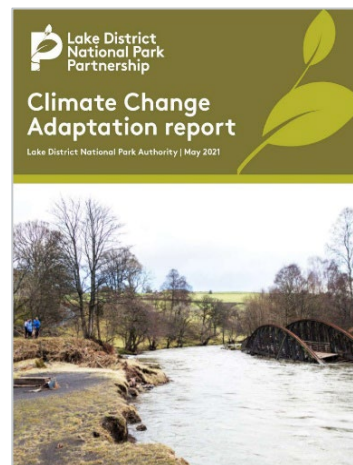
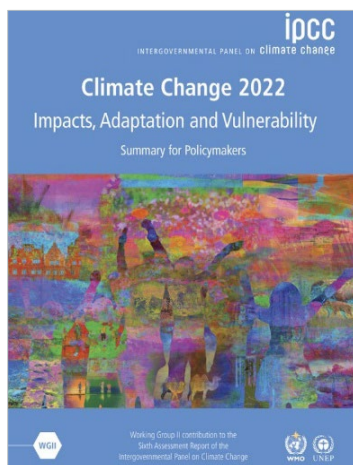
The CCRA is primarily for those who want to understand how our climate may change and the risks that could bring.

It can be used to support those in **leadership, responsibility, or decision-making positions** within Cumbria, and for the communities they serve.

It provides the evidence base to allow **organisations, communities, and individuals** to develop their own climate adaptation and mitigation action plans.

Developing the CCRA

The CCRA seeks to identify, analyse and contextualise available data and information to the geography and population of Cumbria.



International

The **Intergovernmental Panel for Climate Change** has global predictions and reports outlining risk assessments for different sectors or risks.

National

The **Climate Change Act 2008** requires the Government to conduct a national Climate Change Risk Assessment every five years.

The third **UK Climate Change Risk Assessment (CCRA3)** was published in 2022 with CCRA4 expected in 2027.

The CCRA3 uses climate data from the UK Met Office called **UK Climate Projections (UKCP18)*** to project how our climate may change in the future.

Local

The national data has been used to produce **local projections** for how our climate may change in Cumbria.

Where available, **local information and literature** has been used to inform the identification and analysis of potential risks.

*The UK Met Office uses several different Representative Concentration Pathways (RCPs) as a method for projecting different climate scenarios. The CCRA uses RCP 8.5, which is a high emissions scenario. This is the scenario we are currently tracking most closely to.

Projected changes to our climate in Cumbria

The CCRA data projections outline the changes that we can expect to see to our climate by 2090 (4°C rise in global average temperature) compared to the 1981-2000 baseline.

Warmer winters

Cold spells will become less frequent and severe. There will be fewer days below freezing, with minimum winter temperatures typically **5.7°C warmer**.



More severe flood events



Peak river flows could increase by up to 49%, leading to a higher risk and severity of flooding.

Wetter winters



Winters will see less snowfall and more rain, with rainfall events becoming more frequent and intense.

Peak rainfall during storm events could increase by 35%.

Windier weather

Wind 'power' and the **risk of extreme wind** events is likely to increase, although this is difficult to capture when assessing average wind speed.



Hotter summers

Average summer temperatures are likely to get up to **4°C hotter**, with up to **four days per year exceeding 30°C**.

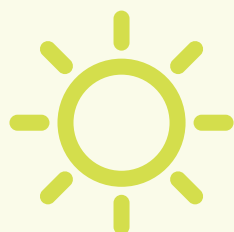


Flash flooding



When it does rain in the summer months, this is more likely to be in **intense, thundery downpours**.

Drier summers



Droughts are likely to become more frequent and severe, with up to **28% less summer rainfall**.

Higher sea levels

The **coastal sea level could rise by 69 cm**, increasing the risk of flooding and erosion.



Table 1. Climate change projections for Cumbria for 2030-2050 (2°C rise in global average temperature) and 2070-2090 (4°C rise in global average temperature) compared to the 1981-2000 baseline, and how we compare to national trends.

Theme	Parameter	Projected change 2030-2050	Projected change 2070-2090	Trend
Heat 	Average summer temperature	+1.9°C	+3.9°C	↑
	Max. summer temperature	+3.0°C	+6.1°C	↑
	Hot days above 30°C	+0.9 days	+4.3 days	↑
Cold 	Average winter temperature	+1.4°C	+2.9°C	↑
	Min. winter temperature	+3.6°C	+5.7°C	↑
	Cold days below 0°C	-2.6 days	-3.5 days	↓
Rain & drought 	Average summer precipitation	-9%	-28%	↓
	Average winter precipitation	+6%	+18%	↑
	Peak rainfall	+25-30%	+30-35%	↑
Wind 	Average spring windspeed	-2%	-2%	↓
	Average summer windspeed	-8%	-11%	↓
	Average autumn windspeed	-2%	-2%	↓
	Average winter windspeed	0%	0%	—
Flooding & erosion 	Peak river flow	+14-30%	+25-49%	↑
	Sea level	+33 cm	+69 cm	↑

Compared to the rest of the UK, Cumbria will be particularly affected by increases in peak rainfall, peak river flows, and subsequent flooding. Whilst our summers will get warmer and drier, we will remain cooler and wetter on average than more southern parts of the UK.

Potential impacts and opportunities from projected climate change in Cumbria



Environment and ecological systems

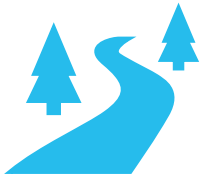
This includes flooding and coastal change, marine, freshwater, and terrestrial habitats, and wildfire.

Impacts

- More **coastal erosion and flooding** from tidal surges and wave height caused by storms
- **Damage or loss of habitats** and the species they support
- More storms occurring when trees are in full leaf, increasing the **risk of storm damage**
- More **new diseases** which could impact the species and age of trees and woodlands
- **Increased risk of flooding** from streams, rivers, and surface water
- **Increased surface water temperatures**, reducing habitat suitability for sensitive species (such as Arctic charr), and increasing the risk of algal blooms
- **Reduced water quality and quantity** affecting water security and aquatic habitats and species
- Reduced soil stability, leading to **erosion and landslides**
- Loss and/or damage to specialist upland habitats and species which are more sensitive to climate warming
- **More invasive species** outcompeting native species
- **Increased risk of wildfire**, particularly in the summer

Opportunities

- **Nature-based solutions** could help to deliver adaptation responses in Cumbria
- **New species adaptation and migration** could bring opportunities to Cumbria



Landscape, heritage and culture

This includes land use, land-use change and forestry, agriculture and food, and culture and heritage.

Impacts

- **Spreading and storage of slurry and fertilisers** may have to be revised at a local level in line with predicted future rainfall levels in order to minimise run off
- Less **availability of water** for private water supplies and livestock
- Increasing temperatures and the resulting **impact on water balance** could impact on fisheries
- Traditional building stock, which tends to be made of solid stone and slate, has limited adaptation options. **Tensions between heritage and culture, preservation, and adaptation** are likely to increase.
- **Visitor numbers could continue to increase**, as the climate in current popular tourist destinations becomes uncomfortable. Visitor periods might also extend in length as well as numbers

Opportunities

- **Milder winters** may extend growing seasons
- **Increasing forestry** could be an attractive ecological and economic way of mitigating the potential changes and impacts from the changing climate in Cumbria
- **Local produce** provides opportunities by restricting the length of the supply chain and increasing resilience
- Changes to our climate could provide the opportunity for horticulture to expand beyond the current crops used in Cumbria
- Many Cumbrian communities already have **good principles of community and public inclusion** that can be built upon



People, homes and houses

This includes health, social care, and housing.

Impacts

- **Increased disruption to health and social care services**, particularly from floods and heatwaves, could impact on patients, residents and health workers
- **Disruption to critical services** (water, energy, transport) could further impact on the delivery of health and care services
- Increased disruption to education and prison services
- **Degradation of emergency and civil contingencies systems**, as they may not have the time to recover capability and capacity between events
- Widening social and health inequalities
- **Increases in heat-related deaths and illness**, particularly in vulnerable people in hospitals and care homes as they are difficult to move to cooler locations
- Those living or working inside **traditional or older building stock**, with limited ability to insulate against cold and heat, are more susceptible to associated health conditions
- Difficulties in accessing insurance
- **General risks to buildings**, including consequences of increased indoor moisture accumulation, wind damage from high winds, subsidence, flooding, and insect damage

Opportunities

- **Green energy** can be used to power cooling systems for hotter days
- **Climate smart landscaping**, such as shade banks and green spaces can provide cool areas on hotter days
- **Planning decisions** can limit future impacts by being informed of areas at increased risk, and requiring climate smart building design (that reduces moisture build up, is thermally effective for extreme cool and extreme heat, is resistant to high winds and subsidence, and uses green energy)
- **Retrofitting** adaptations to homes, public buildings and public spaces (including solar panels, insulation, shade banks, urban trees, and sustainable drainage systems) can limit future impacts



Critical infrastructure

This includes energy, transport, water, telecoms and ICT.

Impacts

- **Changes to demand for heating** (depending on temperature, building design, insulation, heating technology, energy prices, and income)
- **Sellafield**, whilst 20-30 m above sea level, could face coastal erosion risks if there isn't ongoing investment in sea defences and the Cumbrian Coast Line railway line (which often acts as a sea defence and flood water barrier as well as a critical transport route)
- **Silting** may disrupt travel around the ports of Barrow, Workington and Silloth, and low summer rainfall could disrupt **recreational and commercial boating**
- Increased risk of **damage to energy, road, and rail infrastructure** in Cumbria through coastal erosion, flooding, landslips, and heat stress
- Increased risk to **water security** for public water supplies, both for Cumbria and the wider parts of the north-west that it supplies
- Wetter winters could increase pressures on the treatment of wastewater and sewage and the degradation or overflows from septic tanks
- Risks to **underground infrastructure** from the stress of the cumulative impacts from snow, ice, thaws, high temperatures and flooding
- **Cascading impacts** mean that residents may be unable to contact the emergency services, travel, or power/heat their homes during an extreme event

Opportunities

- **Greener transport options** (electric cars, public transport, active travel and remote working) have the potential to reduce road casualties and minimise air and noise pollution
- **ICT and communications facilitate many other parts of society** and provide the opportunity to increase resilience with limited risk of lock in (as technology advances rapidly) whilst learning from where such technology already exists in places with more extreme climates



Commerce

This includes business, including tourism and agriculture.

Impacts

- **Businesses may face higher costs** from damage or loss of physical infrastructure and stock from storms, and **difficulties in accessing insurance**
- **Increased farm costs** include needing to over winter livestock indoors, and disruption to diversification ventures from flooding and changing weather patterns.
- Many caravan parks and campsites are vulnerable to flooding and damage from intense storms
- Increased numbers of visitors will **require education on recommended visitor behaviour**, safety requirements, and the risk of wildfires
- **Decreased workforce productivity** and increased discomfort may be seen during periods of extreme weather
- **BAE Systems**, whilst at 13 m above sea level (which is some way from the medium-longer-term sea-level rise projections), could still face flood risks from storm surges and will require climate adaptation measures, as will planned future investment in the area

Opportunities

- **Agriculture** may stand to benefit from projected climate change due to longer growing seasons, or should new/alternative species become suitable for the UK
- **Increased opportunities in hospitality and tourism** if there is more consistently hot and dry weather, however this needs to be managed sustainably
- Hotter, drier summers are likely to result in **changes in lifestyle, particularly more outdoor recreation activities**, with associated commercial and social benefits
- Expansion of renewable energy technologies or green industry could create opportunities for employment

High temperatures

Average and extreme temperatures will continue to increase across Cumbria, and these are the drivers for all other risks.

- ▶ A warmer atmosphere can hold more moisture, leading to more rainfall.
- ▶ **A warmer atmosphere is also more energetic**, leading to windier weather, higher waves, and tidal surges. Higher temperatures also cause our oceans to expand, leading to rising sea levels.
- ▶ **Warmer winters** will result in fewer freezing days and more wet weather.
- ▶ **Higher temperatures in the summer** will lead to more heatwaves, drought, and thunderstorms.

Conclusions

The impacts of climate change will be felt by everyone and everything. It will affect all aspects of our society.

Extreme events will result in us seeing many of these impacts at once. For example, a winter storm event may bring strong winds, heavy rain and coastal storm surges at the same time.

We need to take action to adapt and build resilience to the increasing risks from climate change.

More needs to be done if we are to limit the scale of climate change, but the timescales needed to reduce the amount of greenhouse gases in our atmosphere mean that we cannot rely on emission reductions alone to protect our communities from the projected changes to our climate.

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