



Climate

Northern Ireland

BUILT ENVIRONMENT

Northern Ireland Climate Change Risk Assessment
Risks & Opportunities



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About Climate NI

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 Northern Ireland
**environment
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Climate NI Programme Vision

“ *Climate Northern Ireland is a cross-sectoral partnership devoted to understanding and enabling adaptation and mitigation actions in Northern Ireland that can address the climate emergency.* ”

Climate NI Programme Aims

- **Support development and implementation of climate policy** by enabling the exchange of expertise and advice between Government Departments, public bodies, and civil society.
- **Engage the research community** to help define and address evidence needs for climate policy and action.
- **Increase co-ordination and awareness on climate change** through partnership and clear communication.
- **Enable delivery of climate action in NI** by addressing barriers and building capacity at local, regional and national levels.

Funded via the Carrier Bag Levy by:

 Department of
**Agriculture, Environment
and Rural Affairs**
www.daera-ni.gov.uk

An Roinn
**Talmhaíochta, Comhshaoil
agus Gnóthaí Tuaithe**

Department of
**Fairmin, Environment
an' Kintra Matthers**

Climate Northern Ireland is funded by DAERA to raise awareness of and support climate change policy development through stakeholder engagement.

Climate Change & Northern Ireland

Changes in average temperatures

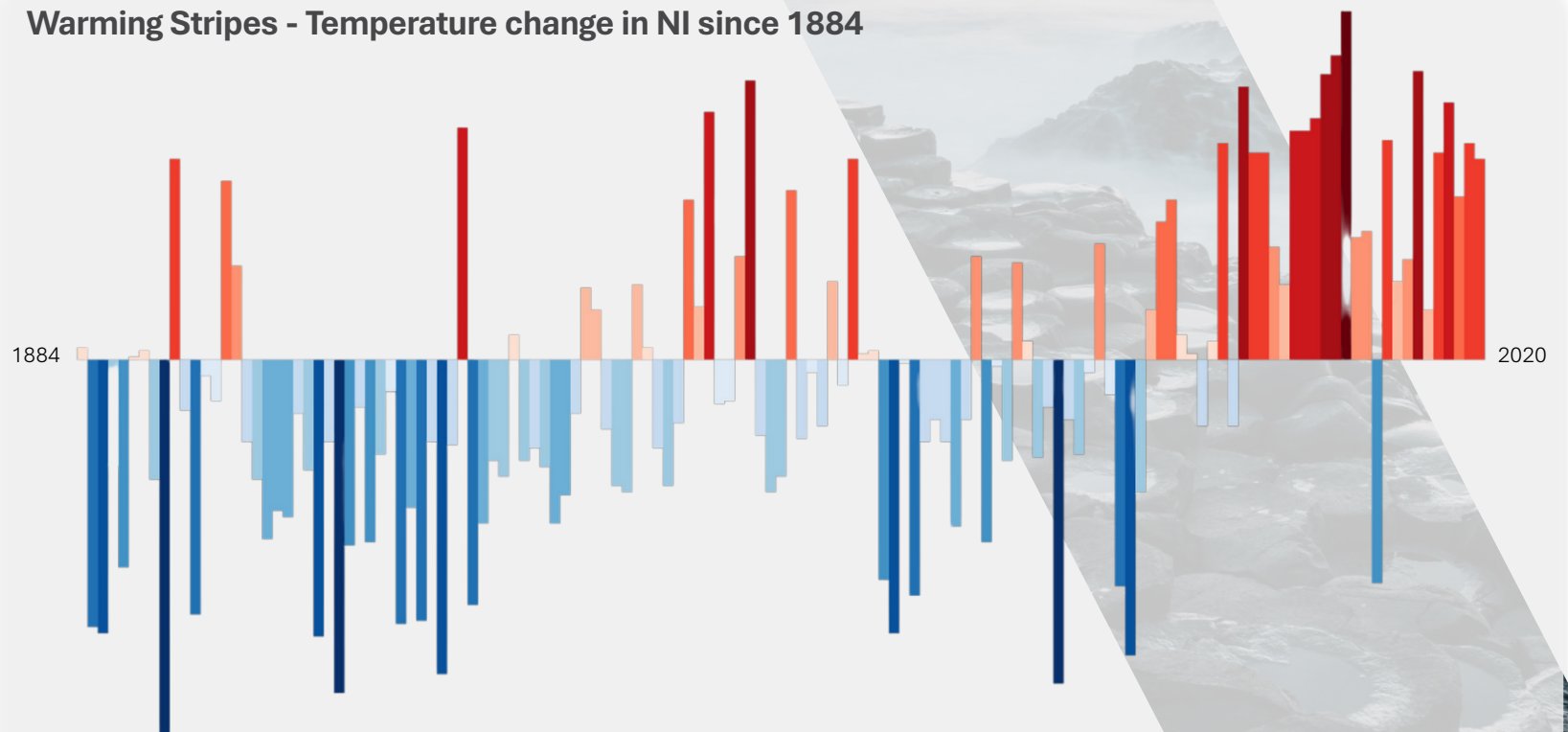
NI's climate is changing in line with the global average temperature.

“ An increased chance of warmer, wetter winters and hotter, drier summers along with an increase in frequency and intensity of extremes.

Met Office

Northern Ireland is **locked in to at least 11cm of sea-level rise by 2100**, but unless global emissions decline, that number could be as much as 94cm.

Warming Stripes - Temperature change in NI since 1884



Data source: Ed Hawkins- Showyourstripes.info

Climate Change Risk Assessment

The Third UK Climate Change Risk Assessment (CCRA3)

The evidence for the third UK **Climate Change Risk Assessment** (CCRA3) is compiled by the UK Government's independent advisors, the **Climate Change Committee** (CCC).

61 risks and opportunities were assessed in detail. Alongside technical reports a summary was produced for each region, including Northern Ireland.

Each risk is assessed by answering the following questions:

- 1** What is the current and future level of risk?
- 2** To what extent is the risk going to be managed?
- 3** Are there benefits of further action in the next five years, over and above what is already planned?



For detail on the climate risk for NI and a range of short sector briefing papers, check out:

[ukclimaterisk.org](https://www.ukclimaterisk.org)

Climate Change Risk Assessment

Urgency score for Climate Change Risk Assessment

Category	Description
More action needed	<p>New, stronger or different Government action, whether policies, implementation activities or enabling environment for adaptation – over and above those already planned – are beneficial in the next five years to reduce climate risks or take advantage of opportunities. This will include different responses according to the nature of the risks and the type of adaptation:</p> <p>Addressing current and near-term risks or opportunities with low and no-regret options (implementing activities or building capacity).</p> <p>Integrating climate change in near-term decisions with a long life-time or lock-in.</p> <p>Early adaptation for decisions with long lead-times or where early planning is needed as part of adaptive management.</p>
Further investigation	<p>On the basis of available information, it is not known if more action is needed or not. More evidence is urgently needed to fill significant gaps or reduce the uncertainty in the current level of understanding in order to assess the need for additional action. <i>Note the category of 'Research Priority' in CCRA2 has been replaced with 'Further investigation' in CCRA3. This is because of some confusion following CCRA2 that 'research priority' only denoted that more research was needed, when in fact the urgency is to establish the extent to which further adaptation is required.</i></p>
Sustain current action	<p>Current or planned levels of activity are appropriate, but continued implementation of these policies or plans is needed to ensure that the risk or opportunity continues to be managed in the future.</p>
Watching brief	<p>The evidence in these areas should be kept under review, with continuous monitoring of risk levels and adaptation activity (or the potential for opportunities and adaptation) so that further action can be taken if necessary.</p>

Risk Overview

Risk	Urgency score
H3: Risk of flooding to buildings	More Action Needed
H4: Risk of sea level rise to coastal communities	Further Investigation
H5: Risk of moisture, wind and driving rain to building fabric	Further Investigation
H6: Risk of summer and winter temperature changes on household energy demand	More Action Needed
H7: Risk of changes in indoor and outdoor air quality affecting health and wellbeing	Further Investigation
B1: Increased flood risk and flooding of business sites	More Action Needed

Risk	Urgency score
B2: The risk of coastal flooding, extreme weather, erosion and sea level rise on coastal business locations and infrastructure	More Action Needed
B5: The risk of infrastructure disruption and higher temperatures in working environments to reduced employee productivity in businesses	Further Investigation
B6: The risk of extreme weather to disruption to business supply chains and distribution networks	More Action Needed
B7: The risk of long term climate change to changes in demand for goods and services.	Further Investigation
I7: Risk of subsidence to subterranean and surface infrastructure	Further Investigation
ID7: The risk of climate hazards affecting supply chains to international trade routes	More Action Needed

Risk in Northern Ireland

45K NI Homes at
flood risk



In the 2017 Derry City and Strabane flood, there was rainfall of 60-70mm in 9 hours. This is equivalent to 63% of the average August rainfall. Water rose to unprecedented levels which washed away five bridges and caused 100s of homes to flood, damaged roads, and closed the airport.

FUTURE – MORE INTENSE & FREQUENT FLOODING

- Public safety & mental health
- Agriculture & business disruption
- Water pollution
- Heritage & biodiversity damage

94CM
Sea Levels Rise



Sea levels in NI will rise at least 11cm by 2100. Unless global emissions decline, this could be up to 94cm.

FUTURE CLIMATE – SEA LEVEL RISE

- Loss of homes, biodiversity & cultural sites
- Sea water damage to farmland
- Transport & tourism disruption



70 MPH
Gusts



FUTURE CLIMATE – MORE INTENSE EXTREME EVENTS

- Disruption to vulnerable groups & communities
- Cost of repairs
- Environmental damage

H3: Risk of flooding to buildings

- The main associated risks are death or injury, long-term and severe impacts on mental health and wellbeing, damage to property, disrupted access to employment, education and health services, and illness from water-borne pathogens or chemical contaminants.
- The **dominant source of flood risk is from rivers** but if current levels of adaptation continue, **surface water and coastal risks will increase** in their relative contribution to Northern Ireland's flood risk. Groundwater continues to have a limited contribution at national scale, although will be important locally.
- Key challenges relate to **continued development on the floodplain**, the **management of surface water flooding** via SuDS, the **low take up of Property Flood Resilience (PFR)** and the **lack of UK-wide standards**.



Photo by C. Gallagher from Unsplash

H3: Risk of flooding to buildings

- According to the Northern Ireland Flood Risk Assessment 2018, approximately **45,000 properties (c. 5%)** in Northern Ireland are located within either the 1% Annual Exceedance Probability (AEP) fluvial floodplain or in areas at risk of flooding from a 0.5% AEP surface event with a flood depth greater than 300mm.
- **Direct expected annual damages** from flooding in Northern Ireland for residential properties are currently around **£21.3m**, which equates to a high magnitude score.
- In future, climate change will **increase the number of properties at risk of flooding** from all sources, and these could be in areas that have not previously been at risk of flooding. The largest increase in risk in Northern Ireland is related to **coastal flooding**, which is **projected to increase by 550% by 2080s** (in a high population scenario and with 4°C global warming at 2100)

H4: Risk of sea level rise to coastal communities



Castlerock. Photo by K. Mitch Hodge from Unsplash

- This risk is focused on coastal change, that is, the physical change to the shoreline caused by coastal erosion, coastal landslip, permanent inundation or coastal accretion that is of such severity that the long-term sustainability and viability of coastal communities (which also includes those living, working, or visiting coastal locations) is threatened.
- It is the **combination of sea level rise with storminess and coastal processes** such as sediment movement and erosion that creates a risk of such magnitude that it can **threaten the long-term sustainability of whole communities.**
- The most recent mapping of Northern Ireland estimates 32% of the coast is manmade structures and 68% is natural and about **19.5% of the Northern Ireland coastline is currently at risk from erosion.**
- Approximately **2,720 households are at risk of coastal flooding** in NI.

H5: Risk of moisture, wind and driving rain to building fabric

- This risk is primarily concerned with homes and costs to households, resulting from damage to dwellings from moisture, high winds, subsidence, and insect damage.
- **Damp buildings cause harm to health and wellbeing**, and damage to dwellings from high winds can also risk injury.
- The analysis for this risk is largely described at the UK level.

Future change to climate variable	Projected future impact
Increases in precipitation	<ul style="list-style-type: none"> • Requirement for increased ventilation to remove indoor moisture. • Winter ingress in building fabric after heavy rainfall events. • Increased water penetration of vertical walls in dwellings. • Increased indoor moisture detrimental to health of occupants.
Increases in temperature	<ul style="list-style-type: none"> • May help to reduce moisture content, although likely to be counterbalanced by precipitation increases. • Minor benefit of higher surface temperatures could reduce risk of mould growth but would likely be counterbalanced by an increase in air moisture content.
Increases in windstorms	<ul style="list-style-type: none"> • Climate change is likely to lead to increases in wind driven rain. Wind-driven rain is associated with storms and the intensity of rainfall in storm events is projected to increase (although there is limited evidence available to illustrate the impact of climate change on storm frequency and location).
Increase in heatwaves	<ul style="list-style-type: none"> • This could lead to an increase in subsidence and tends to be a greater risk for older properties, and new developments on clay soils.

How climate change could affect building fabric (Recreated from Health, Communities and Built Environment Technical chapter).

H5: Risk of moisture, wind and driving rain to building fabric

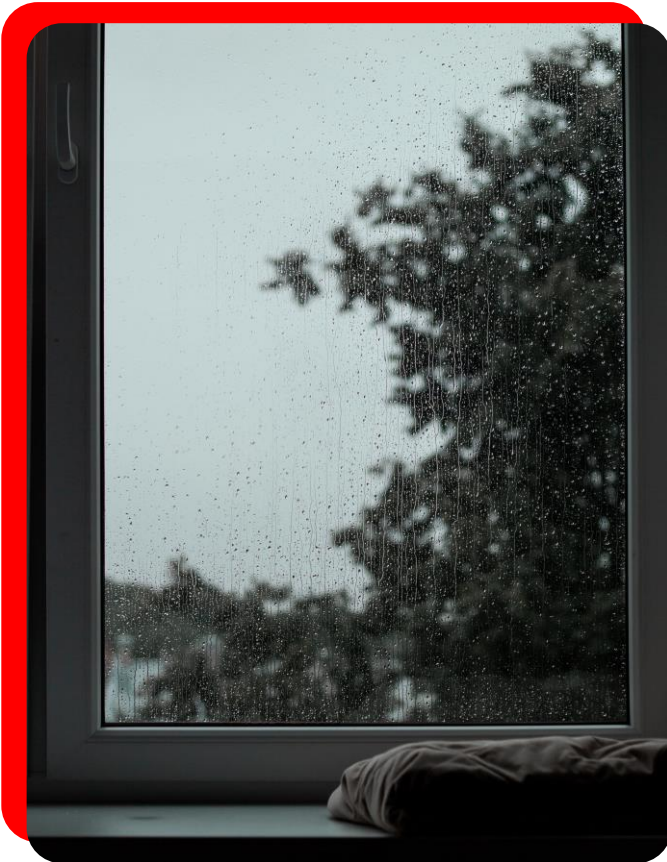
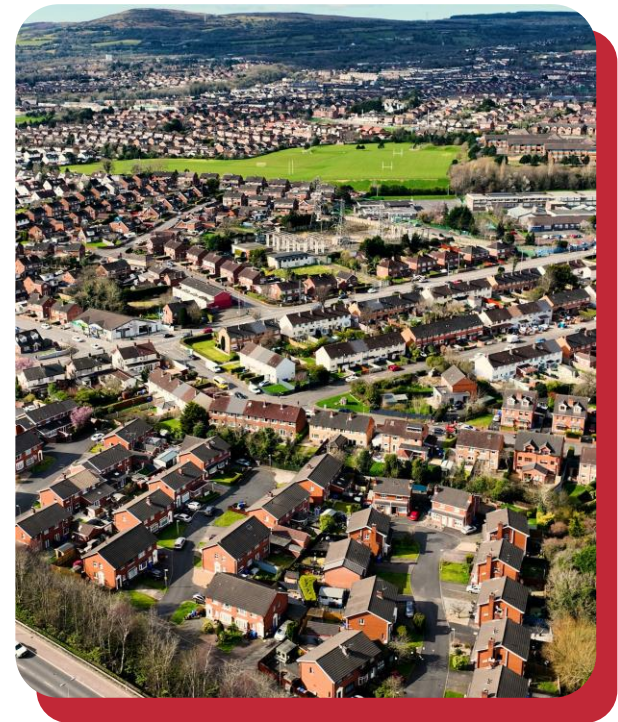


Photo by T. Sara from Unsplash

- Damp or excessive moisture due to flooding and intense rain.
- Damp buildings causing harm to occupant health and wellbeing.
- Insufficient building regulations and standards to manage risks from moisture and damp.
- Structural damage and injury due to high winds.
- Subsidence caused by drought and dry soil.
- Costs to homeowners for repair.

H6: Risk of summer and winter temperature changes affecting household energy demand

- Climate change will **reduce future heating demand** and the magnitude of this opportunity is high in the future in Northern Ireland.
- The opportunities from reduced heating costs are not being fully realised and there is **insufficient action being undertaken** to understand and take advantage of the future warmer climate.
- The **future level of benefit is uncertain** and depends on numerous factors such as socioeconomic factors, building standards and energy prices.
- There is **limited data for future cooling demand in Northern Ireland** but higher temperatures in summer may increase the potential need for cooling.
- Net zero policies will have big interactions with these risks and opportunities which may present additional costs to households to increase energy efficiency.



Aerial view of Residential homes in Belfast, Northern Ireland Cityscape. Photo by Peter Steele

H7: Risk of changes in indoor and outdoor air quality affecting health and wellbeing



Photo by F. Jones from Unsplash

- Indoor air quality is dependent on building characteristics, ventilation, emissions from indoor sources and external air quality. Indoor air quality could be affected by interventions for Net Zero that can affect the ventilation of buildings.
- There is **very little evidence for the impact of climate change on indoor air quality**. Although, higher temperatures may improve or reduce indoor air quality. If temperatures are higher people may open windows more which could provide increased air circulation. However, in instances of poor outdoor air quality this could reduce the quality of indoor air.
- Natural (non-anthropogenic) sources of air quality related to pollen and mould that affect health. Pollen risks are likely to change with climate change although the implications for health are not clear.

B1: Increased flood risk and flooding of business sites

- The **expected direct annual damages for non-residential properties** in Northern Ireland at present is **£42m**, comprising of 6% of total UK damages.
- In the future, the expected annual damages for non-residential properties in Northern Ireland are to **increase by 22% by 2050 and 33% by 2080** given present day levels under a +2°C by 2100 scenario and to increase by 39% by 2050 and 69% by 2080 under a +4°C by 2100 scenario.

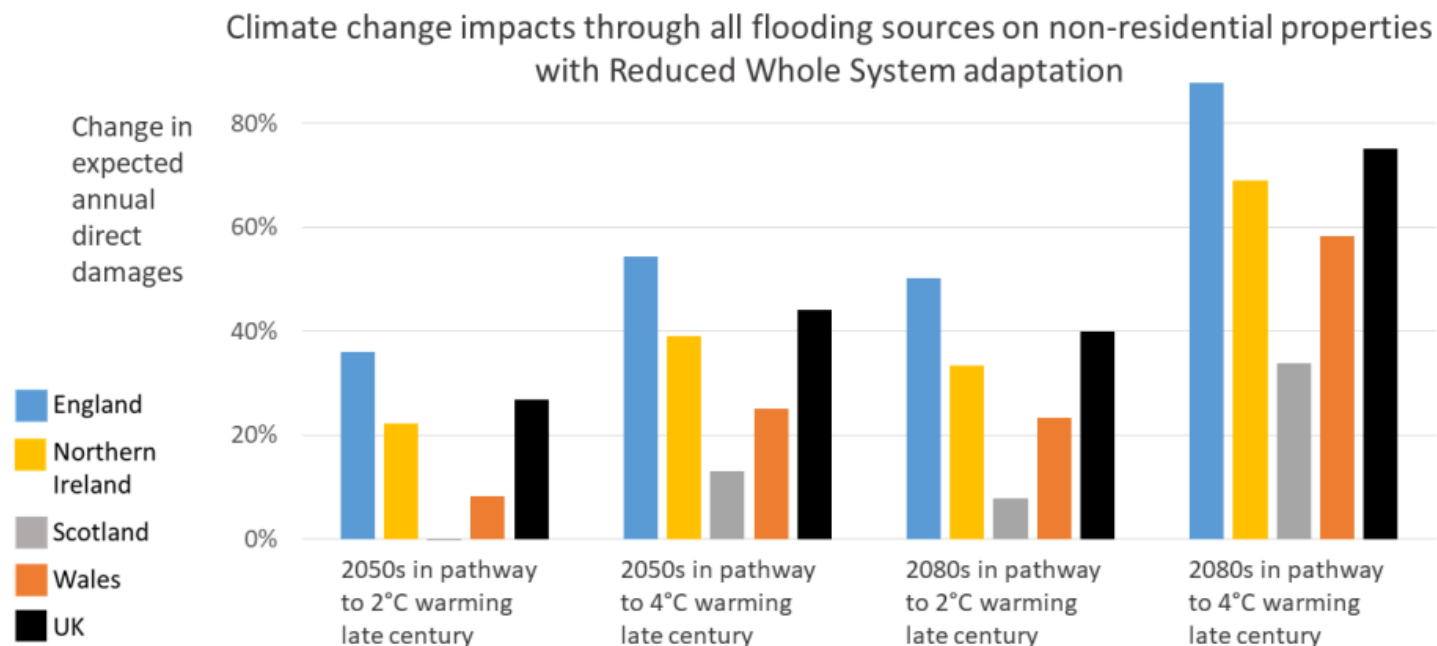


Figure 15. Future risks: Percentage change in expected annual damages to non-residential properties for a +2°C and +4°C at 2100 scenario, all sources of flooding, direct, £millions (%).

B2: The risk of coastal flooding, extreme weather, erosion and sea level rise on coastal business locations and infrastructure

- For most of the UK, a considerable amount of industrial and commercial activity, as well as infrastructure occurs along the coast.
- **Flooding and coastal change** risk to businesses is a **medium risk** now, is expected to rise to high risk in the future for Northern Ireland.
- Northern Ireland faces **increasing risks from coastal erosion** (c.19.5% of the coast is at risk of erosion) **and marine flooding**.
- The expected annual damages for UK-wide non-residential properties from coastal flooding is expected to increase by 30% by 2050 and 73% by 2080 given present day levels, under a +2°C at 2100 scenario and increase by 82% by 2050 and 181% by 2080 under a +4°C at 2100 scenario.



Portrush. Photo by K. M. Hodge

B5: The risk of infrastructure disruption and higher temperatures in working environments to reduced employee productivity in businesses

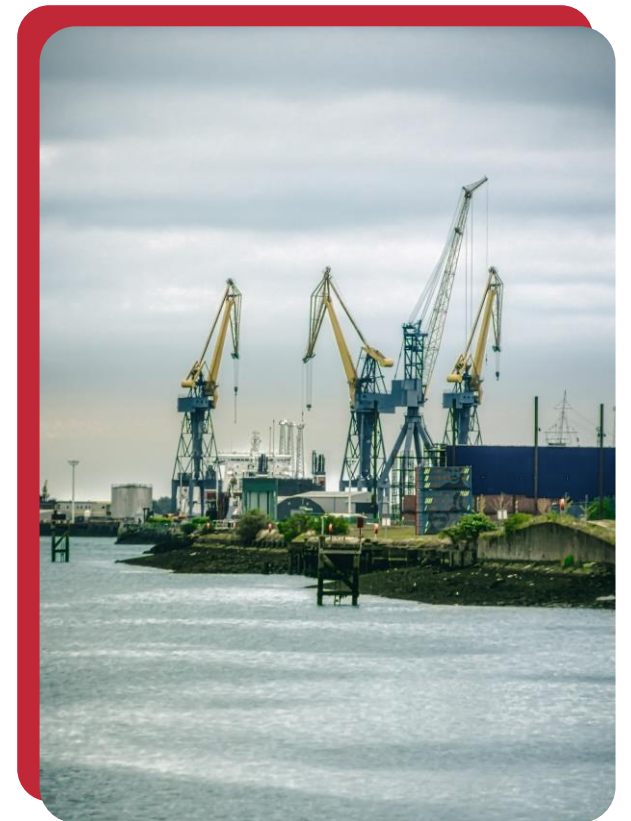


Photo by I. Andrade from Unsplash

- A changing climate has the potential to affect productivity, potentially both negatively and positively, as well as indirectly through infrastructure disruption and higher temperatures in working environments.
- There are **risks associated with extreme high temperatures**, which can have **negative impacts on employees' health and wellbeing and ability to commute to work**. There is some evidence that businesses are experiencing these impacts already.
- Workers engaged in certain occupations, for example heavy outdoor manual labour, are likely to be at the greatest risk of heat stress.

B6: The risk of extreme weather to disruption to business supply chains and distribution networks

- Adverse weather has the potential to affect the profitability of entire sectors through impacts on local and global supply chains.
- The magnitude of risk is currently medium but considered unknown in future.
- Similarly, risks from pests and diseases, long term soil erosion, port closures, power outages, acidified oceans disrupting cod habitats and reproduction, negative effects of extreme heat on workers, and financial pressures on the supply chain.
- Supply chain risks can be locked in if UK companies invest in transport routes, distribution hubs or production centres that are more exposed or vulnerable to climate hazards.
- In the UK, heavy rainfall and surface water flooding and heating and high temperatures are the weather types that cause the greatest number of weather-related supply chain disruptions, causing significant negative impacts. However, risks specific to Northern Ireland are more difficult to determine.



Shipping container cranes at Belfast shipyards and docks. Photo by K. M. Hodge

B7: The risk of long-term climate change to changes in demand for goods and services

- Climate change will affect the **production costs and demand** for certain goods and services, increasing the profitability of some and decreasing that of others.
- The **adaptation services sector** in the UK is slow-growing compared to other countries, but there is an **opportunity for the Government to support its accelerated growth**.
- Businesses that anticipate changing markets may be able to gain an advantage, but various barriers exist that could prevent this (e.g. upfront cost barriers to entering new markets, as well as inertia, especially for SMEs) and suggest a role for government intervention.
- Recent evidence shows that many Northern Ireland farms have diversified, expanding business into other crops they do not currently grow and using land for business activities beyond traditional farming. This is an area where more opportunities may be realised.
- The current magnitude of opportunity is low, rising to medium by the end of the century, although there is low confidence in this evidence.

17: Risk of subsidence to subterranean and surface infrastructure

- Ground subsidence can occur due to shrinking and swelling of clay soils due to changes in soil water content and can also occur due to collapse of pre-existing cavities in the ground such as voids in soluble rocks and mine workings.
- The majority of damage from subsidence occurs to residential and commercial property.
- **Transport infrastructure and buried infrastructure is vulnerable to damage and disruption** due to climate change driven subsidence effects.

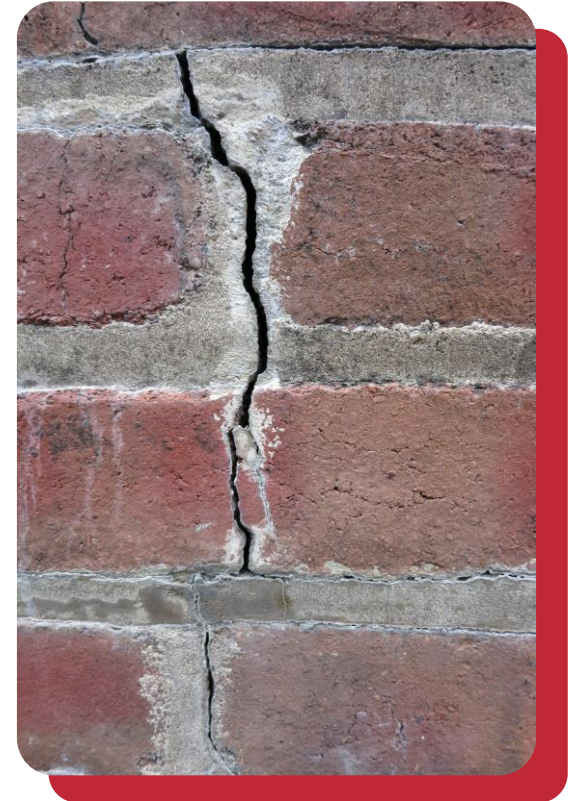


Photo by H. Rudolph from Unsplash

ID7: The risk of climate hazards affecting supply chains to international trade routes

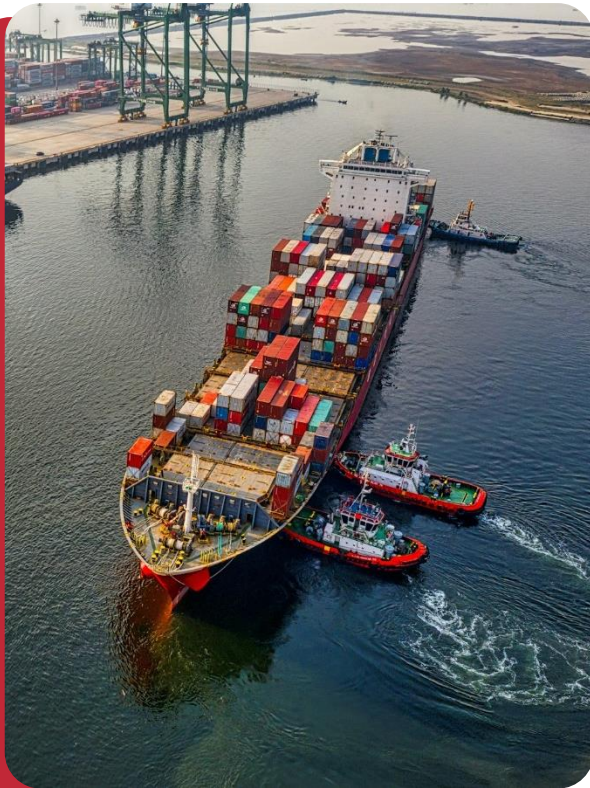


Photo by William William from Unsplash

- **Climate-related disruption to non-food supply chains may occur in production facilities**, for example floods affecting factories or mines, but perhaps is more likely to impact on supply-chain logistics, which can be interrupted in multiple ways.
- COVID-19, for example, disrupted supply chains through the closure of centralised processing facilities, the interruption of transport flows due to grounding of vehicles, lack of labour and delays at borders.
- With globalised supply chains characterised by ‘just-in-time’ delivery, high efficiency but low redundancy, they can be fragile and lack resilience to disruptions.
- Given the projected and observed increase in disruptive events, this risk may become more potent in future.

References

1. [UK Climate Risk Website](#)
2. [UK Climate Risk Independent Assessment \(CCRA3\) Technical Report](#)
3. [Evidence for the third UK Climate Change Risk Assessment \(CCRA3\) Summary for Northern Ireland](#)

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