



Climate

Northern Ireland

ENVIRONMENT & AGRICULTURE

Northern Ireland Climate Change Risk Assessment
Risks & Opportunities



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About Climate NI

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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

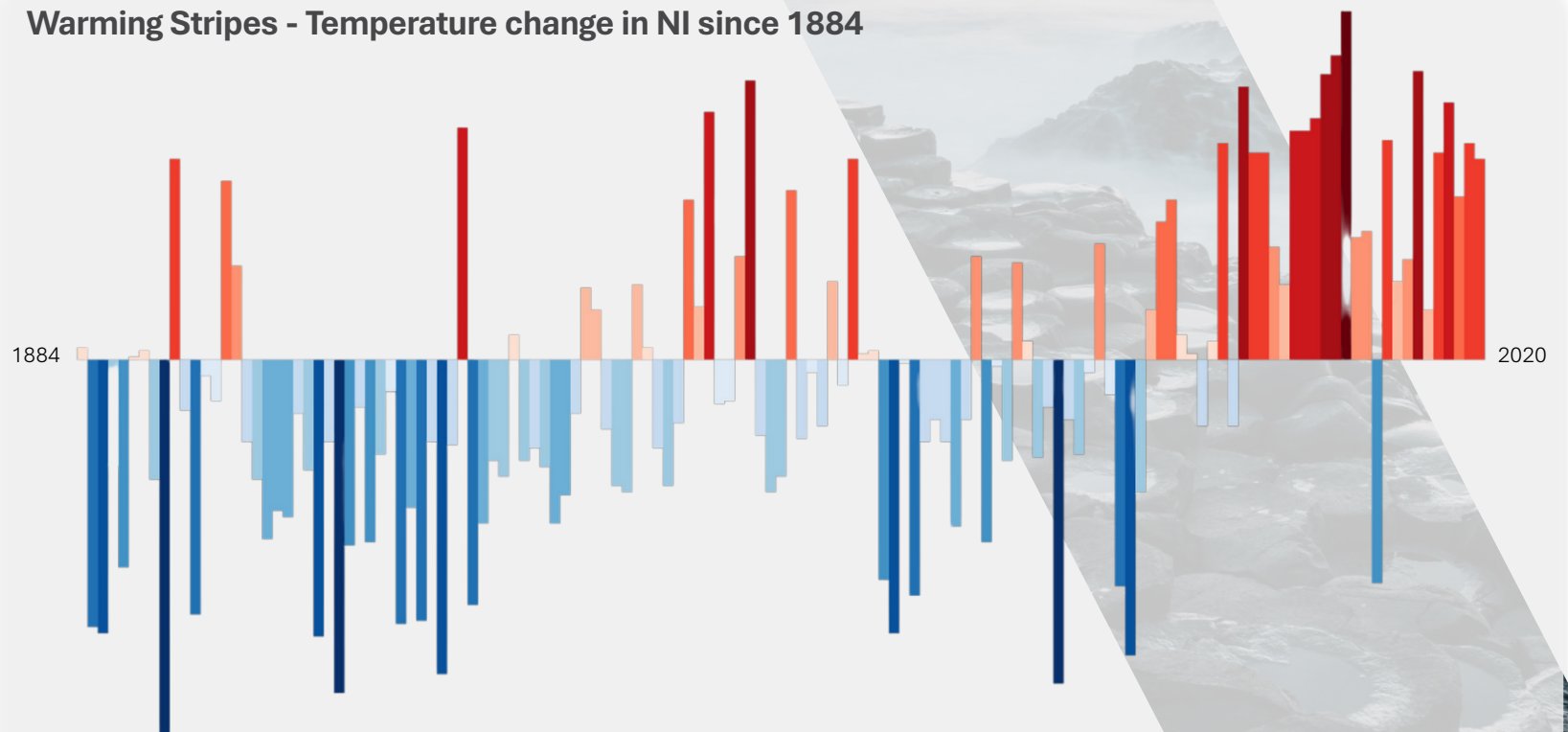
NI's climate is changing in line with the global average temperature.

“ 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	Urgency score
N1: Risk of changing climatic conditions and extreme events, including temperature change, water scarcity, wildlife, flooding, wind, and altered hydrology (including water scarcity, flooding and saline intrusion affecting terrestrial species and habitats)	More action needed
N2: Risk of pests, pathogens and invasive species affecting terrestrial species and habitats	More action needed
N3: Opportunities for terrestrial species and habitats of new species colonisation	Further investigation
N4: Risks of changing climatic conditions, including seasonal aridity and wetness affecting soils	More action needed
N5: Risks and opportunities for changing climatic conditions, including temperature change and water scarcity affecting natural carbon stores, carbon sequestration and GHG emissions	More action needed
N6: Risks and opportunities for extreme events and changing climatic conditions (including change, water scarcity, wildfire, flooding, coastal erosion, wind and saline intrusion) affecting agricultural and forestry productivity	More action needed
N7: Risks of pests, pathogens and invasive species affecting agriculture	More action needed

Risk	Urgency score
N8: Risks of pests, pathogens and invasive species affecting forestry	More action needed
N9: Opportunities for agricultural and forestry productivity by new/alternative species becoming suitable	Further investigation
N10: Risks of aquifers and agricultural land from saltwater intrusion	Watching brief
N11: Risks of changing climatic conditions and extreme events, including higher water temperatures, flooding, water scarcity and phenological shifts affecting freshwater species and habitats	More action needed
N12: Risks of pests, pathogens and invasive species affecting freshwater species and habitats	More action needed
N13: Opportunities for freshwater species and habitats from new species colonisations	Sustain current action
N14: Risks for changing climatic conditions, including ocean acidification and higher water temperatures affecting marine species, habitats and fisheries	More action needed
N15: Opportunities for marine species, habitats and fisheries from changing climatic conditions	More action needed
N16: Pests, pathogens and invasive species affecting marine species and habitats	More action needed
N17: Coastal flooding, erosion and climate factors affecting coastal species and habitats	More action needed

Risk in Northern Ireland



“Lough Neagh: Blue-green algae at 'level not seen since the 1970s’” – B B C

Potentially harmful blue-green algae have appeared on Lough Neagh at a level not seen since the 1970s, monitoring scientists have said.

Algal blooms can produce toxins and remove oxygen from the water as they decompose.

The Agri-Food and Biosciences Institute (AFBI) said surface temperature readings were higher than usual for the time of year, with 21C detected. The June average in recent years has been 15C.

The algal bloom has been caused by the recent spell of warm, settled weather coupled with unusual levels of water clarity.

In Lough Neagh, multiple factors led to blooms of blue-green algae at levels not seen for half a century. The algae are in fact bacteria, which can cause skin irritation and sickness in people who come into contact with it, but the biggest risk is to pets, livestock and wildlife. A number of dog deaths were reported after the animals swam in affected waters.

Run-off of fertiliser from surrounding fields increased the nutrients in the water, feeding the bacteria's growth. Along with invasive species in the form of water-clearing zebra mussels, and the weather effects of climate change, the perfect conditions were created for the potentially toxic algae to bloom from the depths where it has always been present.



N1: Risk of changing climatic conditions and extreme events, including temperature change, water scarcity, wildlife, flooding, wind, and altered hydrology (including water scarcity, flooding and saline intrusion affecting terrestrial species and habitats

- There is considerable evidence of the current and potential future effects of climate change and associated drivers on land dwelling flora and fauna across the UK and island of Ireland.
- This includes **impacts on individual species and their distribution**, as well as the composition and abundance of populations.
- Expected climate changes including **droughts, waterlogging and wildfire** can lead to losses or gains of species in a community or geographic area, while changes in distribution can represent opportunities for the receiving area.

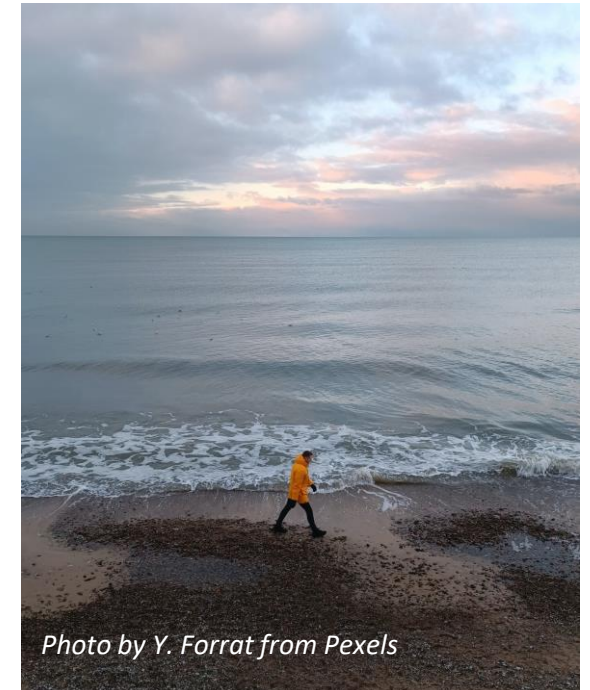


Photo by Y. Forrat from Pexels

N2: Risk of pests, pathogens and invasive species affecting terrestrial species and habitats



Photo by J. Redgate from Pexels

- Pests and invasive species have negative impacts on species and habitats but involve native and non-native species respectively.
- Pathogens are native or non-native species that cause disease and can include their vectors.
- Many of the drivers of change and adaptation options for native pests and pathogens also apply to invasive non-native species (INNS).
- The **relationship with climate depends on the individual pest or pathogen** but includes maximum and minimum temperature, precipitation, humidity and potentially wind direction.
- Changes in these risks are primarily influenced by socioeconomic drivers, including cross-border trade, within-country movements, biosecurity measures and land use change.

N3: Opportunities for terrestrial species and habitats of new species colonisation

- As species respond to climate change by moving and/or expanding their ranges towards the Poles, they could colonise new areas.
- This can occur in one of two ways.
 - Either the species can be new to the UK or Ireland, although the level of migration is restricted as they are both islands. If it interacts negatively with native species, or alters habitat condition, then it is considered an INNS or a pest.
 - The alternative is that the species may be new to a UK country or region.
- In both cases, they can enhance species richness and contribute to community adaptation to climate change.
- Also, while both scenarios can be consistent with climate change, often it is a complex situation involving other drivers.

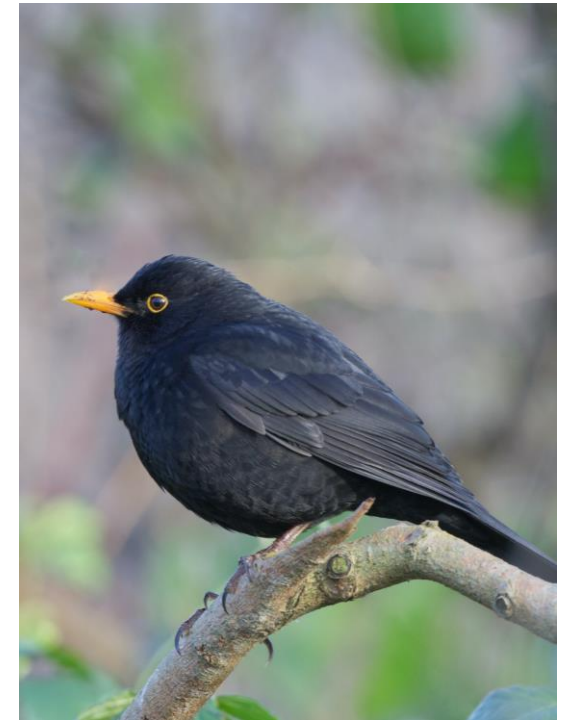


Photo by P. Mithcell from Pexels

N4: Risks of changing climatic conditions, including seasonal aridity and wetness affecting soils

- Risks to soils are identified as **requiring more action** in Northern Ireland.
- The magnitude of **risk increases from medium at present to high by the 2050s** on all pathway scenarios and, although awareness of this threat has improved, the necessary adaptation responses are not yet commensurate with this level of risk.
- Climate is one of the key factors influencing soil formation, processes and properties, therefore changes in climate can be expected to have a significant impact on soils and their key functions.
- Temperature, precipitation, evapotranspiration and wind can all impact on soil productivity. Soils are extremely complex and can vary even at field level, with over 700 soil types present in the UK, adding to uncertainties around the scale and specifics of the change that is likely to be seen.

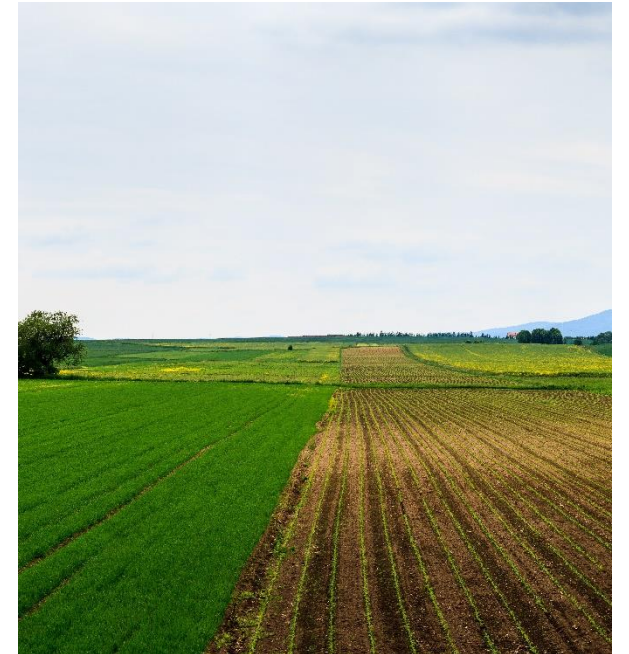


Photo by L. Szmigiel from Unsplash

N5: Risks and opportunities for changing climatic conditions, including temperature change and water scarcity affecting natural carbon stores, carbon sequestration and GHG emissions



Photo by Sigmund from Unsplash

- Important stores of carbon considered in the CCRA analysis includes soils (peatlands), coastal and marine habitats including saltmarsh and kelp forests ('blue carbon') and trees.
- The CCRA updates evidence that peatland degradation and carbon losses will be exacerbated by runoff during intense rainfall events, in addition to increased oxidation from warmer and sometimes drier conditions.
- There is also **projected to be a much greater risk of loss of coastal and marine carbon sequestration at higher magnitudes of climate change globally**, associated with both warmer temperatures and acidification risks for marine organisms, as well as sea level rise.
- The magnitude of **risk increases from medium at present to high in future**, but currently there is only limited inclusion of adaptation planning with carbon and GHG emissions assessments. Partly this is due to limited information, indicating a need for further research.

N6: Risks and opportunities for extreme events and changing climatic conditions (including change, water scarcity, wildfire, flooding, coastal erosion, wind and saline intrusion) affecting agricultural and forestry productivity

- Potentially could impact not only land managers and rural communities but also the whole population through changes in domestic food supply and other commodities.
- This risk **increases from medium at present to high in future**, with a **significant adaptation gap in addressing this risk, especially for agriculture**.
- Suitability for tree species is expected to change.
- In Northern Ireland, the 2014 'Going for Growth' strategy, which aims to enhance production capacity, has recently been complemented by a Sustainable Agricultural Land Management Strategy. It includes a progressive roadmap that recognises the synergies between production gains and improved environmental outcomes.

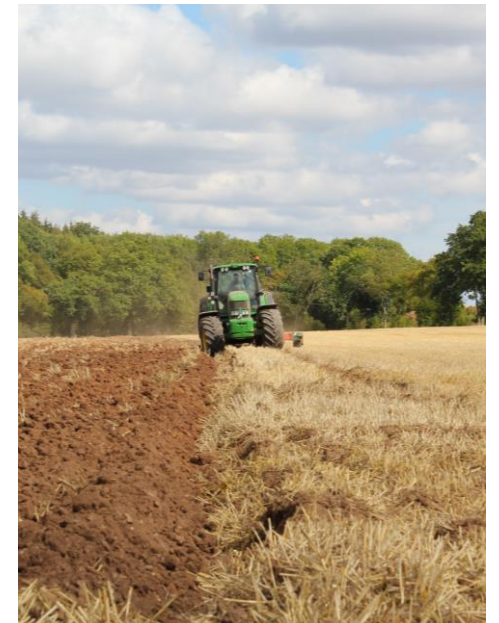


Photo by R. Bell from Unsplash

N7: Risks of pests, pathogens and invasive species affecting agriculture



Photo by L. Thornton from Unsplash

- Pests, pathogens and invasive non-native species (INNS) present serious risks to agricultural productivity, with consequences for livelihoods and businesses.
- Large-scale outbreaks may also have ramifications for food security.
- The relationship with climate depends on the individual pest or pathogen but includes maximum and minimum temperature, precipitation, humidity and potentially wind direction. In addition, socioeconomic factors are highly influential, both management factors at farm level and large-scale drivers such as trends towards globalisation of trade and travel.
- The combined risk factors, both climatic and non-climatic, clearly suggest that the magnitude of this **risk is increasing from medium at present to high by the 2050s** and beyond across the UK.

N8: Risks of pests, pathogens and invasive species affecting forestry

- Pests, pathogens and INNS present serious risks to forest productivity, with consequences for livelihoods and businesses, and for the multiple ecosystem services that forests provide.
- The combined effect of risk factors (climate and non-climate) indicates the magnitude of this risk is increasing in Northern Ireland from medium today to high by the 2050s.
- Across the limited set of known risks, this risk is assessed as increasing from medium at present to high in the future.

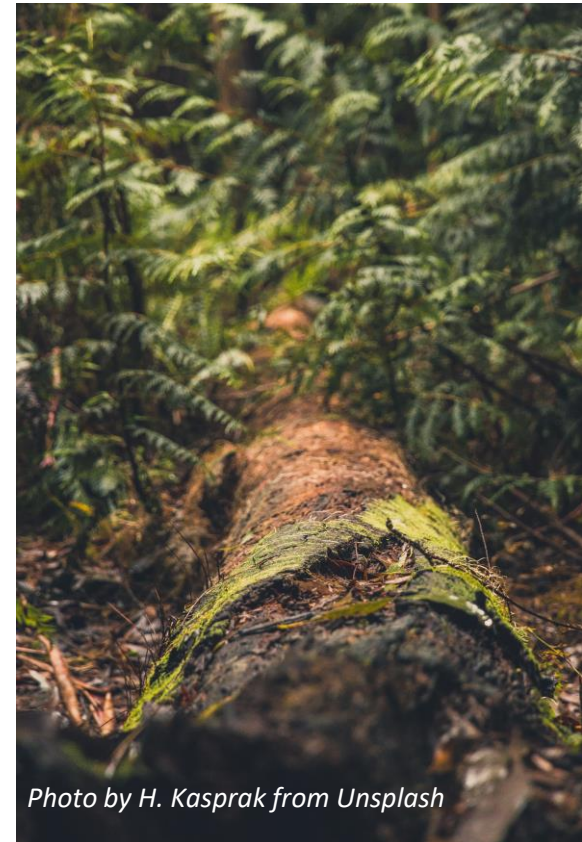


Photo by H. Kasprak from Unsplash

N9: Opportunities for agricultural and forestry productivity by new/alternative species becoming suitable

- This opportunity is defined in the broader sense to include climate-related developments that are occurring through new species and varieties, together with new opportunities for agriculture.
- It also includes the potential for movement of existing species in one UK country or region into another country or region, therefore presenting novel opportunities in the new location.
- In each of these cases, agricultural or forest productivity may be enhanced.
- Emphasis will need to be placed on tree species selection matched to the right soil type and other conditions such as soil moisture and biodiversity considerations.



Photo by T. Dinger from Unsplash

N10: Risks of aquifers and agricultural land from saltwater intrusion

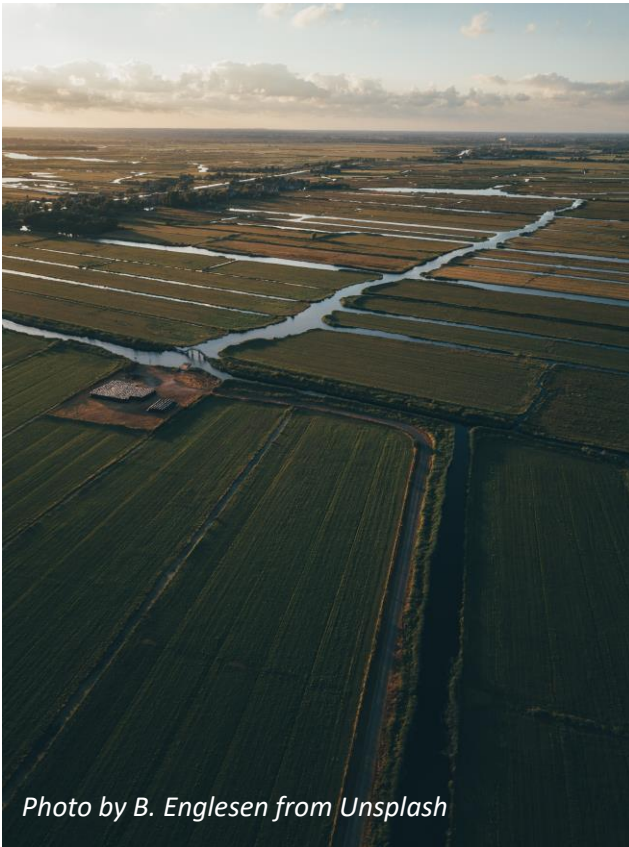


Photo by B. Englesen from Unsplash

- This risk defines the threat that saline intrusion, as associated here with sea level rise, poses for coastal aquifers and agricultural land.
- If sea levels rise relative to fresh groundwater levels, saltwater can enter the aquifer and increase salinity in agricultural land.
- The risk is **currently low at present and most likely to remain low in future** unless a much greater rate of sea level rise was to occur than most estimates expect.

N11: Risks of changing climatic conditions and extreme events, including higher water temperatures, flooding, water scarcity and phenological shifts affecting freshwater species and habitats

- Freshwaters provide the UK with a wide array of socioeconomically important ecosystem services including water supply, pollution removal, and recreational potential.
- Freshwater habitats are particularly vulnerable to changes in water availability and higher water temperatures in the face of climate change.
- These risks could lead to aquatic species exceeding their thermal tolerance or bringing about detrimental habitat changes including algal blooms, loss of sensitive species, changes in hydrology, and changes in timing of life cycle stages (phenology) and species composition.
- Some birds, such as those associated specifically with lakes, could also be affected by changing air temperatures.
- The magnitude of current and future risks to freshwater habitats and species is judged to be medium by the 2050s, increasing to high for the 2080s under a 4°C warming scenario.

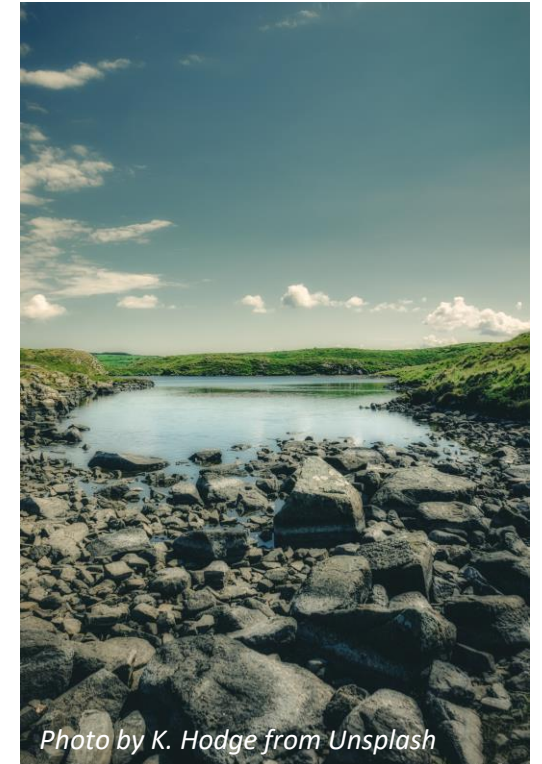


Photo by K. Hodge from Unsplash

N12: Risks of pests, pathogens and invasive species affecting freshwater species and habitats



Photo by A. Nygard from Unsplash

- Impacts on freshwater ecosystems from climate change include changes in the distribution and spread of various diseases and INNS, changes in the rate at which invaders competitively displace native species, and greater competition for food with native species.
- The **current level of risk for Northern Ireland is assessed as medium**; seven out of the 11 widespread INNS are associated primarily with freshwater or wetland habitats.
- Human interactions and activities are the most significant factors in the spread of INNS, with temperature being a relatively insignificant factor in most cases. However, future projections under the high emissions scenario suggest currently unsuitable locations increasingly will become suitable, and hotspots of invasion suitability will be around major cities and river systems.

N13: Opportunities for freshwater species and habitats from new species colonisations

- The colonisation of new species has the potential to enhance species richness and contribute to community adaptation to climate change.
- However, the **opportunities from climate change are assessed as low for Northern Ireland**, both currently and in the future, as there is low evidence of these opportunities to date and climate change is likely to play a smaller part in the benefits of colonisation compared to other factors.
- Many of the adaptation actions that are taken to combat the risk to freshwater species will facilitate species realising opportunities and thus sustaining current action is recommended.
- There is only limited evidence of which freshwater species could benefit from a changing climate at this stage in Northern Ireland.



Photo by K. Hodge from Unsplash

N14: Risks of changing climatic conditions, including ocean acidification and higher water temperatures affecting marine species, habitats and fisheries



Photo by K. Hodge from Unsplash

- Marine ecosystems are impacted by climate change through both direct and indirect effects on the distribution and abundance of species groups. This includes plankton, invertebrates, fish, seabirds, marine mammals and habitats.
- The general pattern for future change is likely to be the further replacement of cold-water species with warm-water species, with the rate of change dependent on climate change scenario and regional sensitivities.
- The reduction of pH has been more rapid in UK waters compared to the whole North Atlantic which may impact corals, molluscs and seaweeds including maerl.

N15: Opportunities to marine species, habitats and fisheries from changing climatic conditions

- The arrival of warm water species into UK waters could provide potential new opportunities for fisheries and changes in the biodiversity of UK seas.
- Future climate projections indicate continued ocean warming to 2100 and beyond, with most projections in the range 0.2 to 0.4°C per decade. More warm-water species will potentially move into UK waters as cold-water species are displaced.
- Examples set out for this opportunity include marine mammals (such as striped dolphins) and commercial fish species (e.g. Northern hake). However, detailed evidence for individual species in terms of expected rates of change in occurrence and abundance remains limited and much of the adaptation opportunity for marine species and new fisheries remains unrealised.
- For any benefits of new species arriving, there will also be corresponding losses of other species.
- The opportunity is given a medium magnitude rating now, increasing to high by the 2050s and beyond across the UK.

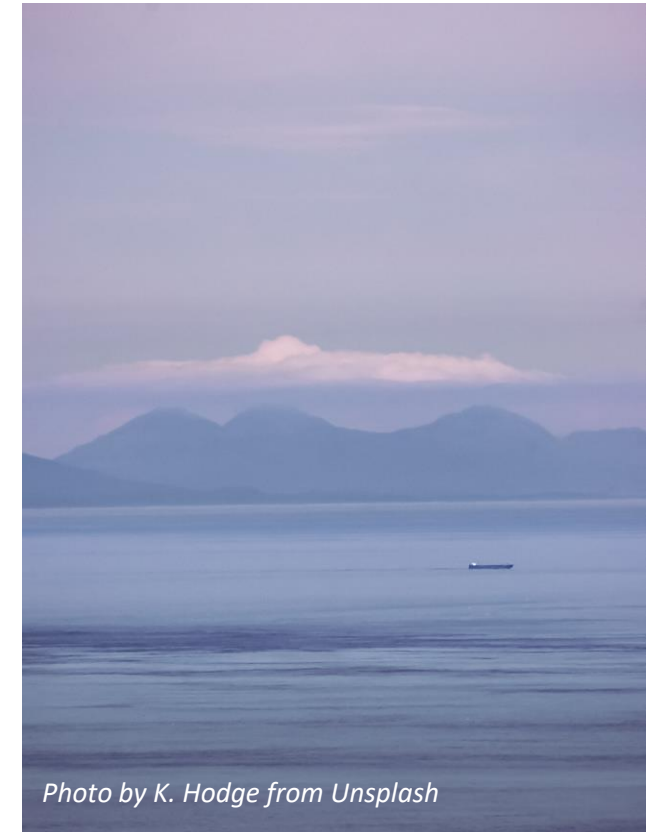


Photo by K. Hodge from Unsplash

N16: Risks of pests, pathogens and invasive species affecting marine species and habitats



Photo by K. Hodge from Unsplash

- The primary risk factor for initial establishment of harmful species and microorganisms in the UK is transport by ships, usually associated with international trade.
- Climate change is therefore acting as an additional risk factor, principally through its influence on warming of seas, which can encourage establishment and spread of pests, pathogens and INNS at a magnitude not experienced previously.
- The scientific consensus is that risks from pests, pathogens and INNS will increase in proportion to the degree of future additional marine warming but there is considerable uncertainty on how this will occur, due in a large part to the scale and complexity of the marine environment.

N17: Risks of coastal flooding, erosion and climate factors affecting coastal species and habitats

- Coastal habitats occur at the boundary of terrestrial and marine environments and include both intertidal and supratidal environments; notably saltmarsh, machair, shingle, saline lagoons, sand dunes and sea cliffs.
- Coastal flooding and erosion are driven by extreme water levels which arise as combinations of four main factors: waves; astronomical tides; storm surges and relative mean sea level. The scale of flooding and erosion is dependent on the underlying coastal morphology (topography, rock type, slope of beach etc.) and the influence of rainfall and high levels of river discharge including increased sediment supply can also be significant in some estuaries.
- The percentage of **coastlines vulnerable to erosion in Northern Ireland is 19.5%**.

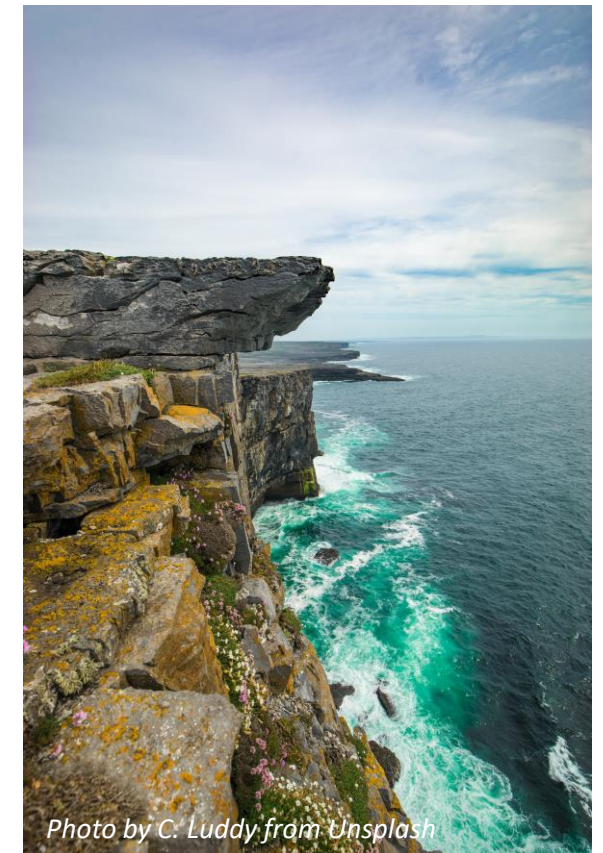


Photo by C. Luddy from Unsplash

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](#)

