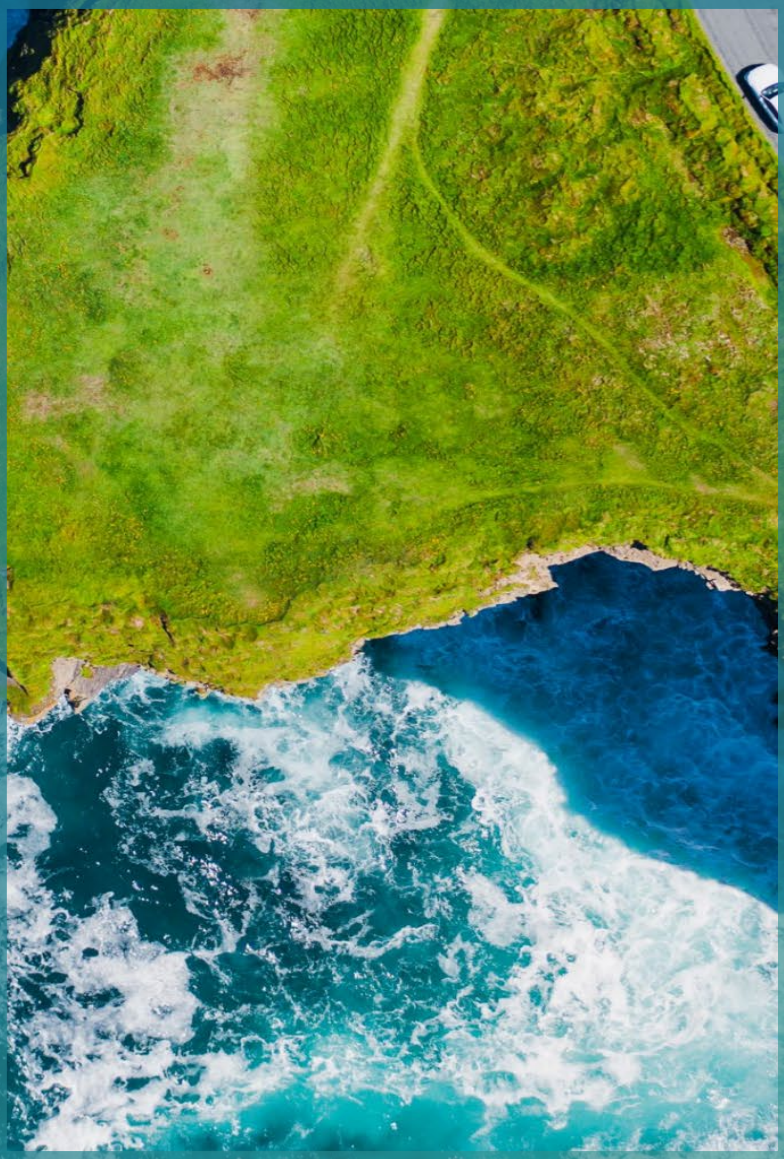
Rialtas
na hÉireann
Government
of Ireland

National Climate Change Risk Assessment

Summary for Policymakers

June 2025



Our Climate Is Changing

Ireland's climate is changing in line with global trends. These changes are unprecedented, and it is now established fact that human activities are resulting in the warming of our climate system.

Over the last century, Ireland's climate is becoming warmer, patterns of precipitation are changing, and sea levels are rising. These changes in our average climate condition are also being reflected in changes in the frequency and severity of extreme weather events.

Projections indicate that changes to Ireland's climate will continue and intensify, with far reaching consequences for Ireland's environment, economy, and society.

Why assess Climate Risk?

Assessing climate risk is a key component of risk management and strategic planning. It enables government, businesses, and communities to understand and prepare for climate change impacts. Climate risk assessments provide a sound and systematic basis for identifying and prioritising what actions need to be taken to adapt to climate change.

The EPA's State of the Environment Report 2024 concludes that Ireland must manage a range of existing environmental issues and risks, including those associated with the energy transition, biodiversity loss, water quality, transition to a circular economy, harmful exposures to humans, and insufficient investment in infrastructure. The impacts of climate change are already or will begin to exacerbate many of these issues as the century progresses. Understanding where, how, and when this is likely to occur, is vital if we are to manage these risks and achieve a truly sustainable society.

Policy Context: Ireland's National Adaptation Framework

The National Adaptation Framework sets out the Irish government's approach to reducing Ireland's vulnerability to climate change risks. It outlines:

- A whole of government and society approach to climate change adaptation in Ireland.
- Guiding principles for the preparation of Sectoral Adaptation Plans[1] by government departments and local authorities.
- The requirement for the revision of Sectoral Adaptation Plans and Local Authority Climate Action Plans every five years.

[1] Sectoral Adaptation Plans are prepared by government departments for priority areas which they are responsible for. They identify the key risks faced in departmental sectors, and set out the approach being taken to address these risks and build climate resilience for the future.

Ireland's First National Climate Change Risk Assessment

Ireland's first National Climate Change Risk Assessment (NCCRA) provides a comprehensive national overview of how Ireland may be impacted by climate changes. Led by the EPA with extensive stakeholder input, the NCCRA:

- Identifies, ranks, and prioritises national climate change risks.
- Identifies areas where action needs to be prioritised to make Ireland more resilient to the impacts of climate change.
- Supports the prioritisation of adaptation-related investments in infrastructure and improve the robustness of policy development in climate-sensitive sectors.
- Provides a consistent evidence base on which to inform the development of the National Adaptation Framework and other adaptation responses at a national level, such as the Central Bank of Ireland's Climate Risk and Sustainable Finance Forum.
- Provides a national reference for conducting and updating sectoral, local, and other stakeholder adaptation plans in Ireland.

A robust and thorough engagement has been conducted with a wide range of stakeholders to build the evidence-base which has informed the NCCRA.

The NCCRA was delivered through three key stages:

STAGE 1: IDENTIFICATION OF RISKS & OPPORTUNITIES

Identified risks and opportunities for Ireland.

Prioritised these for detailed assessment.

115 risks and **7** opportunities for further detailed Stage 2 assessment.

STAGE 2: ASSESSMENT OF RISKS & OPPORTUNITIES

Examined the **115** climate risks in terms of timing, spatial extent and cascading impact.

Determined the level of consequence of each risk for two climate scenarios and three time periods.

Detailed information on risks based on level of exposure, vulnerability, and timing of potential impact.

STAGE 3: ADAPTATION AND DECISION URGENCY

Assessed existing adaptation measures and their effectiveness for reducing risk.

Assessed the urgency for making adaptation decisions.

Identified **43** significant risks and **5** opportunities for Ireland.

The outputs of the risk assessment are contained in three reports:

- The **NCCRA Summary Report for Policymakers** (this report), which provides a concise summary of policy-relevant aspects of the risk assessment.
- The NCCRA Main Report, which provides an overview of the methodology and findings, as well as recommendations to improve future climate risk assessments.
- The NCCRA Technical Report, which sets out the evidence base for the assessment and further detail on the risk assessment findings, including knowledge gaps for each system, as well as qualitative descriptions of exposure, vulnerability, and consequence.

What the National Climate Change Risk Assessment does not address

Some aspects of climate risk were beyond the scope of the NCCRA:

- **Detailed Local Assessments**: The NCCRA assesses climate risks at a national level, considering impacts across eight subregions, but local impacts require more detailed assessments.
- **Changes in Non-Climate Related Factors**: Climate risks are influenced by additional factors like urbanisation, pollution, and population growth. The NCCRA does consider future population changes but does not take account of other non-climate related factors.
- **Transboundary Risks**: The NCCRA identifies potential international risks but lacks sufficient data to fully assess the consequences of these risks in Ireland.
- **Transition Risks:** Transitioning to a low-carbon economy involves major changes that can create economic and operational risks. However, the NCCRA focuses on physical risks, leaving transition risks unaddressed.
- **Low-Likelihood High-Impact Events**: Events with a low or unclear probability and a high impact, such as the collapse of Atlantic Meridional Overturning Circulation (AMOC), are not addressed as the scenarios used within the NCCRA do not account for these types of events.

Ireland's Changing Climate

Met Éireann, the Office of Public Works, the EPA, and the Intergovernmental Panel on Climate Change (IPCC) have developed projections that inform the NCCRA based on two emissions scenarios: a moderate emissions scenario (RCP4.5), and a high emission scenario (RCP8.5). The NCCRA assesses risk for three time periods: up to 2030 (current), 2050 (mid-century), and 2100 (late-century). Below we provide an overview of project changes in Ireland's climate by mid-century (2050) under a high emissions scenario:

Ireland's climate is projected to get warmer with average temperature increasing across all seasons and on an annual basis, while the number of heatwaves is also projected to increase.

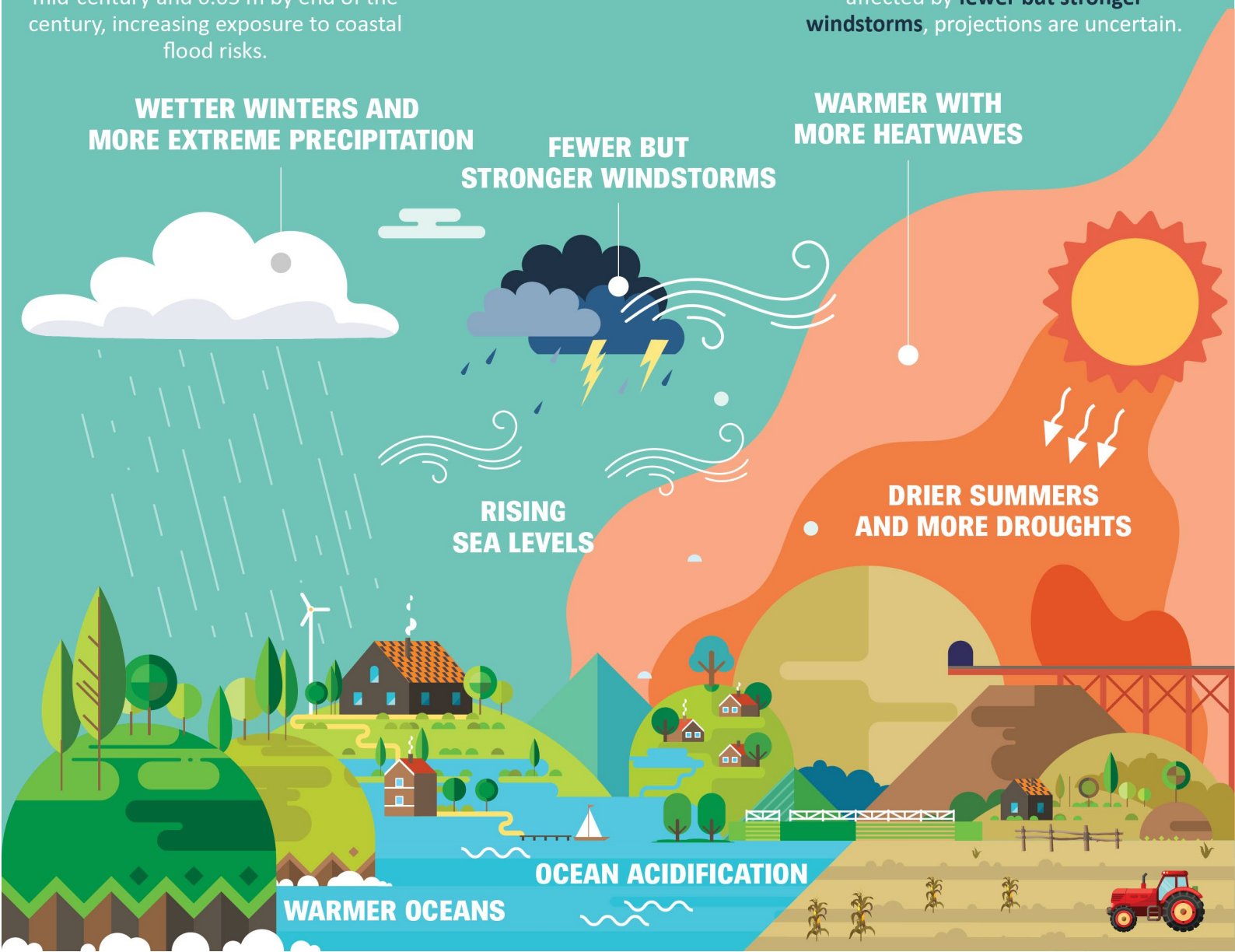
Ireland is projected to become wetter overall with an increase in average annual rainfall.

Increased seasonality in rainfall is projected with wetter winters and drier summers, with **more frequent droughts projected** for Summer and Spring months.

Sea levels are projected to continue to rise around Ireland's coastal areas with an average increase of 0.26 m by mid-century and 0.65 m by end of the century, increasing exposure to coastal flood risks.

Ireland's oceans are projected to **become more acidic**.

A minor decrease in average windspeeds is projected for Ireland. While northern Europe could be affected by **fewer but stronger windstorms**, projections are uncertain.



Findings of the National Climate Change Risk Assessment

The National Climate Change Risk Assessment identifies 115 risks and five potential opportunities due to projected changes in climate conditions. There are a total of 43 significant risks identified for Ireland.

Risks are categorised into nine different systems. These systems make up Ireland's society and economy, encapsulating multiple economic sectors:

Biodiversity & Ecosystems

Encompasses diverse natural habitats and their ecological functions.

Built Environment

Includes human structures to support daily life, including buildings, transport, and communications.

Energy

Covers the production, conversion on energy system, and distribution of energy resources.

Economy and Finance

Includes the financial and insurance markets and economic stability

Food Production and Supply Chain

Involves the processes and systems for growing and distributing food.

Health

Includes medical services and overall human well-being.

Marine and Coastal Ecosystems

Relates to oceanic and coastal habitats and their biodiversity.

Social

Encompasses societal structures and governance systems

Water Security

Focuses on the availability and management of water resources.

115
IDENTIFIED RISKS

43
SIGNIFICANT RISKS

5
OPPORTUNITIES

RISKS BY SYSTEM

Biodiversity & Ecosystems	Built Environment	Economy and Finance	Energy	Food Production and Supply Chain	Health	Marine and Coastal Ecosystems	Social	Water Security
17	37	3	15	11	17	8	2	5

Significant Climate Risks for Ireland

The NCCRA identifies priority risks that require additional action in the next five years to increase resilience.

- Extreme Wind: The risks of disruption and damage to both energy transmission and distribution infrastructure and communication infrastructure due to extreme wind are considered priority risks for Ireland, as these infrastructures provide critical services and functions that other systems require to operate. Ireland's exposure to these risks was recently demonstrated through the unprecedented number of power and communications outages from Storm Éowyn in February 2025. While climate projections show limited changes in the frequency and intensity of extreme wind events in the future, there is a high degree of uncertainty associated with these projections. Current measures are deemed insufficient to offset current and potential future adverse impacts, with more action needed in the next five years to increase the resilience of the energy transmission and distribution infrastructure and communication infrastructure.
- Coastal Erosion and Coastal Flooding: Ireland's coastline is already experiencing the impacts of coastal erosion and flooding; these impacts are projected to increase in the future under all future climate scenarios. Buildings and transport infrastructure concentrated in coastal areas in and around Dublin, the southeast, and the southwest are considered particularly exposed to the impacts of coastal erosion and coastal flooding. On a national basis, more action is needed in the next five years to enhance the resilience of coastal areas and transport infrastructure to cope with projected increases in the frequency and intensity of coastal erosion and coastal flooding. This includes ensuring that the best available estimates of potential coastal change and associated hazards and risks are identified, refined, and updated on an ongoing basis.
- Flooding: Changes in precipitation patterns will result in an increase in the frequency and severity of river, surface water, and groundwater flooding events. Due to the prevalence of hard surfaces which exacerbate flood risk, the Built Environment is considered particularly exposed to flood-related impacts, with transport infrastructure and buildings highly exposed, with the consequence of these risks increasing to critical by mid-century, with potential to reach catastrophic levels of consequence by the end of the century. Flooding also poses a risk to the health of human populations, including both physical (e.g. injuries and deaths) and mental health impacts (e.g. chronic anxiety, depression and post-traumatic stress disorder). Current measures are deemed insufficient to fully offset adverse impacts of flooding with further investigation required, such as development of projections of groundwater flooding and national hazard maps of surface water flooding, to determine areas of exposure and the actions that are required to enhance the resilience of the buildings, transport infrastructure, and communities to flood risk.
- Heat: By the end of the century extreme heat is identified as a priority risk. This is due to projected increases in the frequency and severity of extreme heat events, combined with a projected increases in population and an increase in the those considered vulnerable to heat-related impacts, i.e., those over 65-years old. Current understanding of these risks is limited with further investigation required, this includes increasing the understanding of the relationships between changing climate conditions and potential impacts to support robust risk assessments. For example, at the national scale, there is a requirement for more

detailed assessment of the impacts of changing climate conditions on levels of exposure to UV radiation, aero-allergens and air quality. Further investigation is also needed to determine how different communities and populations are or become more vulnerable to extreme heat and increased temperatures, due to factors such as socio-economics or pre-existing health conditions.

Figure 1 below shows the most significant risks related to climate change.

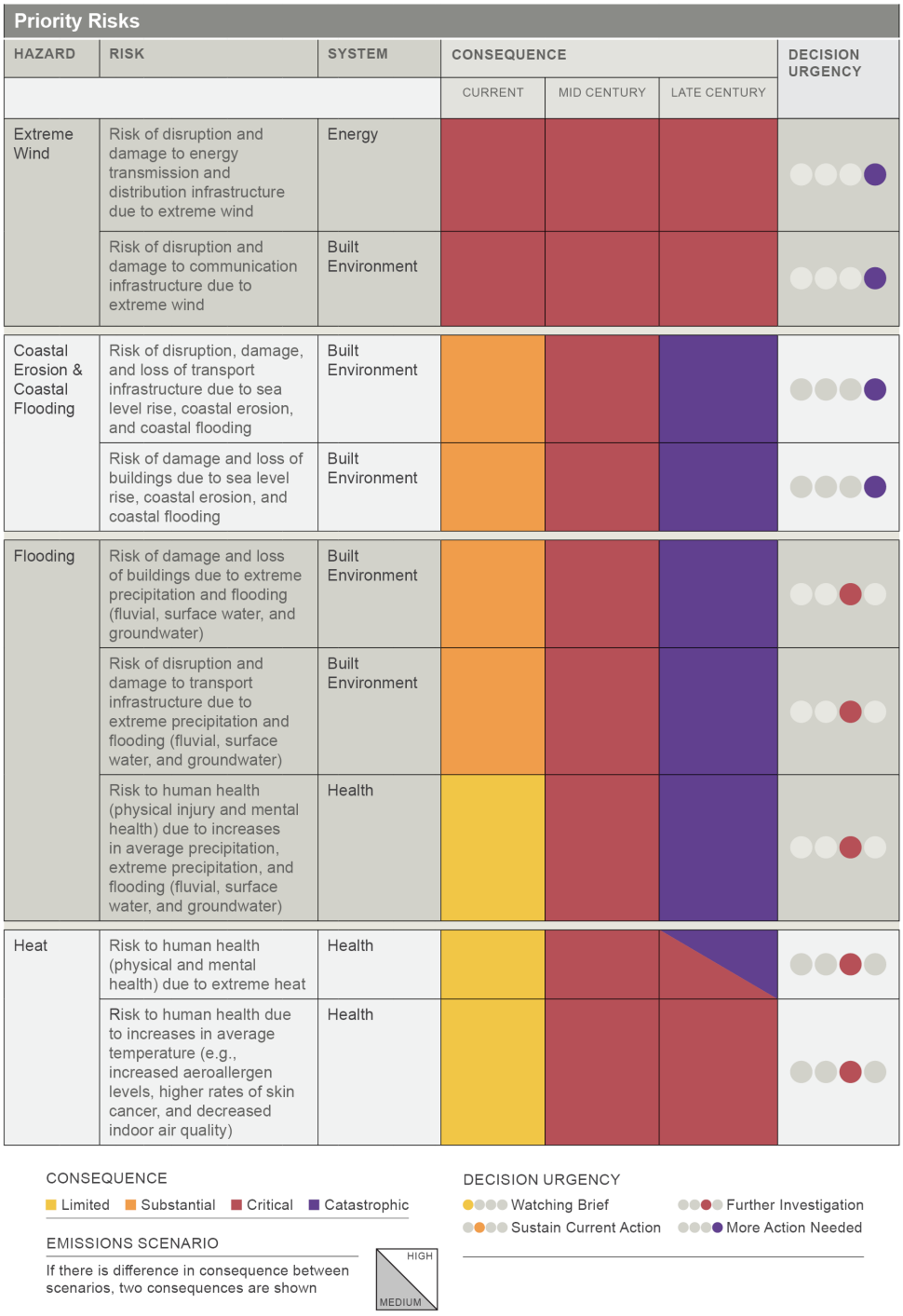


Figure 1: The most significant risks for Ireland identified through the National Climate Change Risk Assessment based on timing of impact and level of consequence.

System Risks

The significant risks for each of the nine systems are shown below. Significant risks are risks that reach a Critical level of consequence in any time period, and in any climate scenario.

Biodiversity and Ecosystems

Natural habitats and their ecological functions

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Flooding	Risk of deterioration of freshwater quality due to overland flows as a result of flooding (fluvial, surface water, and groundwater)				
Heat	Risk of decreased freshwater quality due to reduced water flows as a result of drought conditions				
Heat	Risk of degradation/loss of peatland ecosystems and habitats due to extreme heat and drought conditions				
Heat	Risk of damage to forests due to wildfire				
Heat	Risk of alteration of freshwater flora and fauna due to changes in freshwater temperature				
Other	Risk of increases in occurrence of invasive species resulting in habitat disturbance due to changes in climate conditions				
Other	Risk of degradation and loss of terrestrial ecosystems and habitats due to phenological changes				
Heat	Risk of increased stress and tree mortality within forests due to increased dispersal and survival of pests and diseases as a result of changing climate conditions				
Heat	Risk of degradation and loss of terrestrial habitats due to extreme heat and drought conditions				
Other	Risk of reduced yields from managed forests due to phenological changes				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

HIGH
MEDIUM

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Built Environment

Human structures and systems supporting daily life

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Extreme Wind	Risk of disruption and damage to communication infrastructure due to extreme wind				
Coastal	Risk of disruption, damage, and loss of transport infrastructure due to sea level rise, coastal erosion, and coastal flooding				
Coastal	Risk of damage and loss of buildings due to sea level rise, coastal erosion, and coastal flooding				
Flooding	Risk of damage and loss of buildings due to extreme precipitation and flooding (fluvial, surface water, and groundwater)				
Flooding	Risk of disruption and damage to transport infrastructure due to extreme precipitation and flooding (fluvial, surface water, and groundwater)				
Flooding	Risk of disruption and damage to water services infrastructure due to flooding (fluvial, surface water, and groundwater)				
Heat	Risk of disruption and damage to transport infrastructure due to extreme heat				
Flooding	Risk of disruption and damage to communication infrastructure due to flooding (fluvial, surface water, and groundwater)				
Heat	Risk of overheating within buildings due to extreme heat				
Heat	Risk of operational issues (i.e. changes to water treatment operations) for water services infrastructure due to increases in average temperature				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Economy and Finance

Financial and insurance markets and economic stability

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Other	Risk of increased insurance claims and premia and widening protection gap due to climate change				
Other	Risk of increased probability of default and loss of asset value due to climate change				
Other	Risk of reduced tax revenues, increased government expenditure, lower credit ratings and increased cost of borrowing due to climate change				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

HIGH
MEDIUM

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Energy

Production, conversions, and distribution of energy resources

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Extreme Wind	Risk of disruption and damage to energy transmission and distribution infrastructure due to extreme wind				
Heat	Risk of increased cooling demand (i.e. air conditioning) on energy generation and conversion infrastructure due to increases in temperature and extreme heat				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

HIGH
MEDIUM

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Food Production and Supply Chain

The processes and systems for growing and distributing food

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Other	Risk of reduced crop yields due to changes in climate conditions				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Health

Medical services and overall human well-being

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Flooding	Risk to human health (physical injury and mental health) due to increases in average precipitation, extreme precipitation, and flooding (fluvial, surface water, and groundwater)				
Heat	Risk to human health (physical and mental health) due to extreme heat				
Heat	Risk to human health due to increases in average temperature (e.g., increased aeroallergen levels, higher rates of skin cancer, and decreased indoor air quality)				
Flooding	Risk of disruption and damage to healthcare services and facilities due to extreme precipitation and flooding (fluvial, surface water and groundwater)				
Heat	Risk of increased demand on healthcare services and facilities due to extreme heat				
Heat	Risk of overheating in healthcare services and facilities due to extreme heat				
Other	Risk of increased antimicrobial resistance due to changes in climate conditions				
Other	Risk of increased vector-borne diseases (e.g., West Nile virus) due to changes in climate conditions				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Marine and Coastal Ecosystems

Oceanic and coastal habitats and their biodiversity

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Changes in average ocean conditions	Risk of marine habitat and ecosystem disturbances due to changes in average ocean conditions				
Changes in average ocean conditions	Risk of decreases in reproduction rates of marine species due to changes in average ocean conditions				
Changes in average ocean conditions	Risk of species distribution shifts and changes in ecosystem dynamics to changes in average ocean conditions				
Ocean acidification	Risk of increased mortality of cold-water coral reefs and shellfish due to ocean acidification				
Changes in phenology	Risk of degradation and loss of marine ecosystems and habitats due to phenological changes				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Social

Societal structures and governance systems

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Other	Risk of compromised emergency responses, loss of public trust in government, and exacerbation of social justice issues due to maladaptation to climate change.				
Other	Risk of exacerbating societal inequalities as a result of impacts on community wellbeing, employment, education, and social services due to climate change.				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Water Security

Availability and management of water resources

Hazard	Risk	CONSEQUENCE			DECISION URGENCY
		CURRENT	MID CENTURY	LATE CENTURY	
Flooding	Risk of water supply contamination as a result of overland flows of pollutants to watercourses due to extreme precipitation				
Heat	Risk of reduced water supply and increases in water demand due to drought conditions and extreme heat				

CONSEQUENCE

Limited Substantial Critical Catastrophic

EMISSIONS SCENARIO

If there is difference in consequence between scenarios, two consequences are shown

DECISION URGENCY

Watching Brief
Further Investigation
Sustain Current Action
More Action Needed

Cascading Risks

The NCCRA identifies 115 risks for the nine systems. However, identified risks within one system have the potential to cascade and impact upon other systems. For example, extreme winds during Storm Darragh in December 2024 and Storm Éowyn in February 2025 resulted in damage and disruption to the energy system resulting in approximately 395,000 households, farms and businesses losing power. This also led to cascading impacts on other sectors, including communication networks and water treatment and supply.

It is important to understand the relationship between systems and the associated cascading impacts so that a risk can be appropriately managed. In assessing the consequence of identified risks, the NCCRA identifies the cascading impacts across systems, with the Biodiversity & Ecosystem, Economy & Finance, Health, and Social systems, particularly impacted by risks from other systems. Further information is available within the NCCRA Main Report.

Potential Opportunities Arising from Climate Change

Warmer temperatures, increased precipitation, and warmer seas present potential opportunities for certain economic sectors in Ireland, including:

- A longer season for outdoor activities, encouraging economic activity related to tourism due to higher average temperatures.
- Increased hydropower generation because of increased rainfall.
- Greater shellfish growth and marine species diversity due to warmer seas.
- Longer growing season and improved livestock nutrition and grazing because of higher average temperatures
- Improved physical and mental health for people from spending more time outdoors because of higher average temperatures.

Impacts of Overseas Risks on Ireland

Climate change impacts experienced overseas pose risks for Ireland, highlighting how global factors and cross-border interactions shape national climate change risks. Such risks include the global impacts of climate change on food security, supply chains, economic stability, and migration which will need to be managed. The NCCRA identifies that:

- Risks to global food security pose a significant risk. Ireland relies heavily on imports for vegetables, fruits, grains, fertilisers, and animal feed. Disruptions in the supply of food, i.e., due to extreme weather events, can lead to shortages, increased food prices, and potential food insecurity, especially for vulnerable households.
- Climate change is increasingly recognised as a critical threat to global supply chains, impacting logistics, manufacturing, and energy networks. These disruptions can lead to significant economic losses and supply shortages worldwide, including in Ireland.
- Climate change poses significant risks to Ireland's economy by disrupting global financial systems where extreme weather events can increase financial exposure for insurance companies, banks, and investment firms, affecting Ireland's financial stability.

- Extreme weather events caused by climate change can lead to forced displacement and changes in international migration patterns.

Recommendations

Key recommendations to inform and strengthen future iterations of the NCCRA includes the following (see the NCCRA Main Report for further detail):

- Continue the development of climate and hazard data to address data gaps, and to develop data that is consistent across geographic areas, timeframes, and climate projections.
- Further integrate non-climatic drivers of risk such as urbanisation, pollution, socioeconomic processes, population growth, and land use change, to account for their influence on the overall level of risk from climate change hazards.
- Include financial quantification of the estimated direct and indirect costs of climate risks, such as the costs of response and repair, interruption to business activity, and implementing adaption actions.
- Address transition risks, i.e., risks emerging because of the transition to a low carbon and more sustainable economy.
- Address compounding and interacting hazards (where multiple hazards occur at the same time or sequentially, increasing the overall severity of risk).
- Expand the assessment of transboundary risks which cross national boundaries and assess multiple countries by assessing the level of consequence, uncertainty, decision urgency, and cascading impacts of transboundary risks.

Next Steps

The NCCRA provides government, businesses, communities, and other stakeholders with the best available evidence and analysis to inform climate adaptation and resilience in Ireland at a national level. The risk assessment will support the development of Sectoral Adaptation Plans by key government departments, will guide the development of Local Authority Climate Adaptation Plans, and inform other national-level adaptation responses, such as that by the Central Bank of Ireland.

This first climate change risk assessment suggests key priorities to improve the robustness of the assessment process going forward, by further developing the available evidence base and expanding the scope and methodology of the NCCRA. The implementation of the NCCRA's recommendations will be critical in contributing to the next iteration of Ireland's national climate change risk assessment.

Future iterations of the NCCRA should precede future sectoral and local authority plan iterations and will be advanced by addressing these knowledge gaps. Given the potential for significant impacts on society because of climate change, improving understanding and knowledge of climate change risks is critical to build resilience and enhance adaptation.

ISBN: 978-1-80009-284-6