



Australian Government

Department of Climate Change, Energy,
the Environment and Water

National Climate Risk Assessment

First pass assessment report

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Acknowledgement of Country

We respectfully acknowledge the deep time connection that First Nations peoples have throughout Australia. We acknowledge their immense connection to Country and their traditional ecological knowledge and cultural practices that has enabled their Caring for Country.

We acknowledge their Elders past and present, and we thank them for their cultural wisdom that continues to be passed down through the generations. We thank the many First Nations voices who have and will contribute to the work of tackling the impacts of climate change on communities throughout Australia.

We seek to empower their voices and create opportunities for their stories to be shared within the work that the Department is doing as part of the development of the National Climate Risk Assessment.

We look forward to a future where First Nations traditional ecological knowledges and cultural practices works alongside contemporary science to create a sustainable and prosperous Australia.

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Introduction

The Department of Climate Change, Energy, the Environment and Water, in partnership with the Australian Climate Service, is delivering Australia's first National Climate Risk Assessment. This assessment aims to help governments, industry and communities prepare for, adapt to, and mitigate risks from a more challenging climate.

Climate change poses a significant societal challenge with wide-reaching implications for all Australians. The frequency of climate impacts is on the rise, accompanied by evolving characteristics of extremes and hazards.

The escalating risks, impacts, and associated losses require proactive preparation, management, and strategic investments in adaptation. It is imperative to safeguard our society, communities, and economy by understanding, and where possible, addressing these effects now.

National Climate Risk Assessment

The Australian Government is developing a National Climate Risk Assessment (the Risk Assessment) in recognition of the Commonwealth's role and responsibilities in providing leadership on national adaptation reform and providing climate information that is meaningful for decision-makers to respond to climate change. The Australian Government is working closely with all levels of government, industry and communities on the Risk Assessment given the different roles that each play in responding to climate change risks.

The Risk Assessment is an ongoing participatory process, and this report is a marker of the progress to date. The release of the first pass assessment provides an opportunity to further progress engagement with experts and stakeholders.

The need to understand climate change and national implications of these changes underscores the importance of conducting a comprehensive climate risk assessment. The Risk Assessment is a systematic way of identifying, analysing and prioritising potential national risks associated with climate change, enabling informed decision-making and proactive adaptation strategies.

The Risk Assessment uses a phased approach with 3 key stages, drawing on international experience in understanding climate risks and undertaking risk assessments:

- A preliminary stage comprised initial scoping of the physical risk assessment and the development of the [Risk Assessment methodology](#) (DCCEEW 2023).
- The first pass assessment, which consisted of a rapid qualitative assessment to identify a list of nationally significant risks and a subset of these as priority risks. The outcomes of the first pass assessment are presented in this report.
- The second pass assessment, which is an in-depth analysis of priority risks using both qualitative and quantitative methods. The second pass assessment is currently underway.

For the first time, Australia will have a shared understanding of the most important risks facing the nation from climate change. The analysis from the Risk Assessment will inform national priorities for climate adaptation and resilience actions through the National Adaptation Plan (the Plan) and will provide a framework for wider public and private assessments of climate risks.

National Adaptation Plan

Adaptation is a critical component of the long-term response to climate change and is crucial to protecting people, livelihoods, and ecosystems. It is vital that governments, industry and communities are proactive in building resilience to natural hazards and other climate impacts and shape our responses in a holistic way.

The Plan will be a key part of fulfilling the Australian Government's role of providing national leadership on climate adaptation.

The Risk Assessment will inform the Plan, which will respond to the priority risks identified in the first pass assessment. It will build an agreed, nationally consistent pathway that prioritises Australia's adaptation actions and opportunities.

Adaptation involves everyone. Together, we can reduce exposure and vulnerability, and enhance the resilience and wellbeing of our industries and communities. The Plan will provide guidance on how we adapt to climate risks, where we need to scale up our adaptation efforts and build our national resilience to climate impacts.

Climate change in Australia

Australia's climate is changing, and despite increasing global action, the impacts of climate change will continue to increase over the coming century.

Australia has always faced risks arising from our highly variable climate. Climate change is exacerbating these risks and creating new ones.

Australia will continue to see an increase in the frequency and intensity of extreme events.

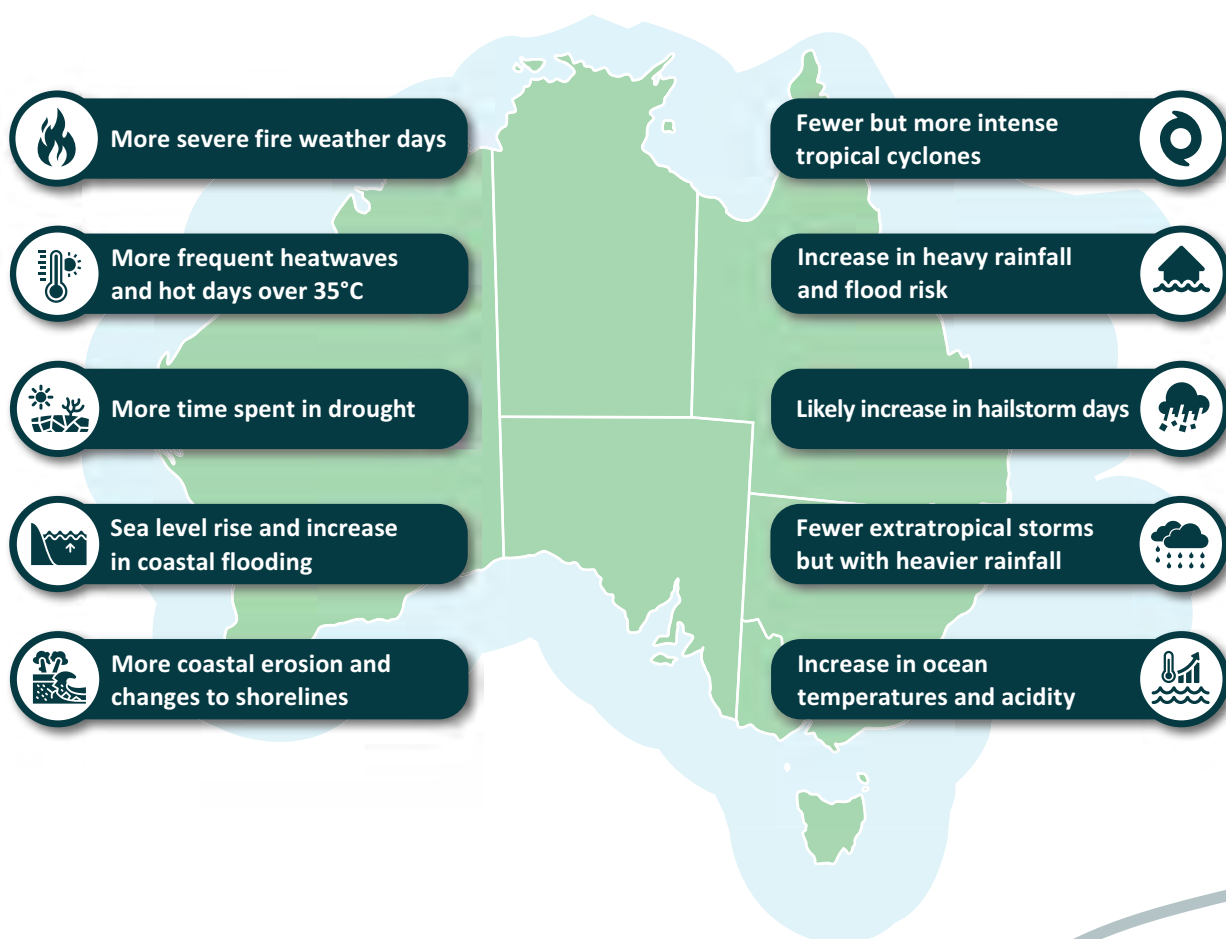
As our climate changes, so do the hazards we face (Figure 1), including:

- increased frequency of large-scale heatwaves and record-high temperatures
- longer fire seasons with more extreme fire danger days
- reduced average rainfall and longer droughts
- an increase in heavy rainfall
- increased frequency of coastal storm surge inundation and erosion.

This has real consequences to social cohesion, human health and wellbeing, environment, infrastructure and economy.

Understanding these risks will allow us to take action to minimise many of the adverse impacts of climate change such as by reducing our exposure to hazards, and protecting vulnerable communities and assets.

Figure 1 Overview of observed and projected trends in Australia's climate hazards



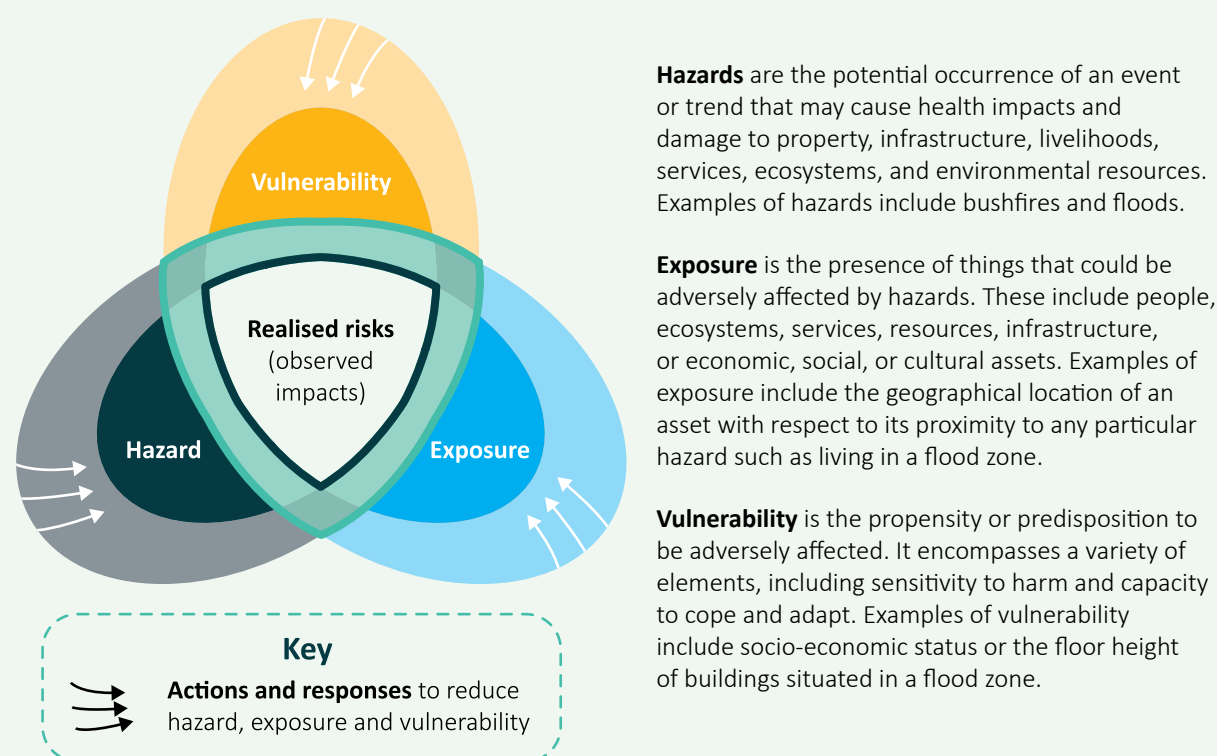
1 Risk assessment design and method

This section outlines the process and key elements from the [National Climate Risk Assessment methodology](#) used in the first pass of the Risk Assessment.

Understanding climate risk

Climate risk is determined by the interaction of a combination of hazard, exposure, vulnerability, and response (Figure 2), as defined by the Intergovernmental Panel on Climate Change (IPCC) [Sixth Assessment Report](#) (IPCC 2022a).

Figure 2 Climate risk components



Climate risk can also be defined as a probability of the occurrence (or likelihood) of a hazard and the severity (or consequence) of its impact. For example, hazards with a low chance of occurring (e.g., ice sheet collapse) may still correspond to a high risk (e.g., from major sea level rise). This Risk Assessment presents risks that have high impact, regardless of whether they have high or low probability of occurrence. This is because a low-probability outcome may still correspond to a high risk if the impact is severe.

The very nature of risks means their impacts are uncertain but decision makers need to consider the most severe possible outcomes – a plausible worst case scenario. Such scenarios are integral for policy planning and decision-making to mitigate and adapt to such risks.

Time horizons

The Risk Assessment uses 4 time periods to assess the change in climate risk (Table 1).

It uses an approximate 50-year historical (pre-industrial) baseline and three 20-year ranges, centered on 2020, 2050 and 2090. Each of these time periods is used to understand current, medium-term and long-term climate impacts. The 2050 and 2090 time horizons are selected for their relevance to various planning cycles, policy frameworks and the ability to provide actionable insights for both short-term and long-term decision making.

Table 1 Time horizons used in the Risk Assessment

Period	Time horizon	Year range
Historical baseline	–	1850-1900
Current climate	2020	2011-2030
Medium term	2050	2041-2060
Long term	2090	2081-2100

Climate scenarios

Climate projections based on global warming levels (GWL) describe the expected warming and impacts on land and oceans that will be experienced in Australia when the world reaches particular levels of global warming as compared to the pre-industrial era. A higher GWL means a greater chance of extreme events.

GWLs are used for the climate scenarios in the Risk Assessment, in line with the latest IPCC [Sixth Assessment Report](#) (Table 2). This approach enables analysis to be based on warming rather than specific emissions pathways.

Table 2 Projected global warming levels used for each time horizon in the Risk Assessment

Time horizon	Global warming level (GWL)
2050	GWL1.5 (low emissions)
	GWL2 (high emissions)
2090	GWL2 (low emissions)
	GWL3 (high emissions)

In the first pass assessment, risks were explored for GWL1.5 and GWL2, corresponding to the 1.5°C and 2°C of average global warming likely to occur in the 2050 time horizon in the low and high emissions scenarios; and GWL2 and GWL3, corresponding to the 2°C and 3°C of average global warming, likely to occur in the 2090 time horizon in the low and high emissions scenarios.

There is scope for exploration of other GWLs and further low-likelihood, high impact events, such as from climate tipping points, in the second pass and for different GWLs to be incorporated into future risk assessments.



Choice of climate scenarios

The GWL climate scenarios used in the Risk Assessment are based on scientific evidence from climate projections and advice from leading climate scientists. The Risk Assessment will use global warming levels (GWL) of 1.5°C, 2°C and 3°C.

The current 20-year average global temperature (i.e. current GWL) is estimated at 1.26°C by the United Kingdom Meteorological Office (Betts et al 2023), and 1.22°C – 1.27°C by the Australian Government’s Bureau of Meteorology (Trewin 2023).

IPCC projections show a median warming of around 2°C by 2050, making GWL1.5 and GWL2 the most credible and plausible choices for the medium-term (IPCC 2022b).

GWL4 was not considered for the long-term (2090) time horizon as the current evidence indicates that this is not scientifically credible to occur by 2100. The most likely range for future global temperatures by the end of the century is around 2.7°C (IPCC 2022b).

GWLs are often misinterpreted as instantaneous values, however they refer to average long-term warming. For example, GWL1.5 does not mean that the scenario assumes that 1.5°C will only be reached in 2050. The GWL value refers to 20-year averages, meaning that, for this example, 1.5°C (and higher or lower warming) will occur between 2041 and 2060 but averages out to 1.5°C.

GWLs are globally averaged surface temperature over ocean and land, and thus temperatures felt in Australia could be higher than the GWL. The GWL scenarios account for regional warming. Using GWL1.5 does not mean that risks are being assessed when Australia reaches 1.5°C, but rather the expected warming that will be felt in Australia based on when global warming levels reach 1.5°C.

Further information on the choice of GWLs is provided in the [Risk Assessment methodology](#).

Priority hazards

The methodology stage identified 10 priority hazards for the Risk Assessment to determine key impacts and climate risks for Australia over the next century. These include:



bushfires, grassfires and air pollution



drought and changes in aridity



changes in temperatures including extremes



extratropical storms



coastal and estuarine flooding



ocean warming and acidification



coastal erosion and shoreline change



riverine and flash flooding



convective storms including hail



tropical cyclones

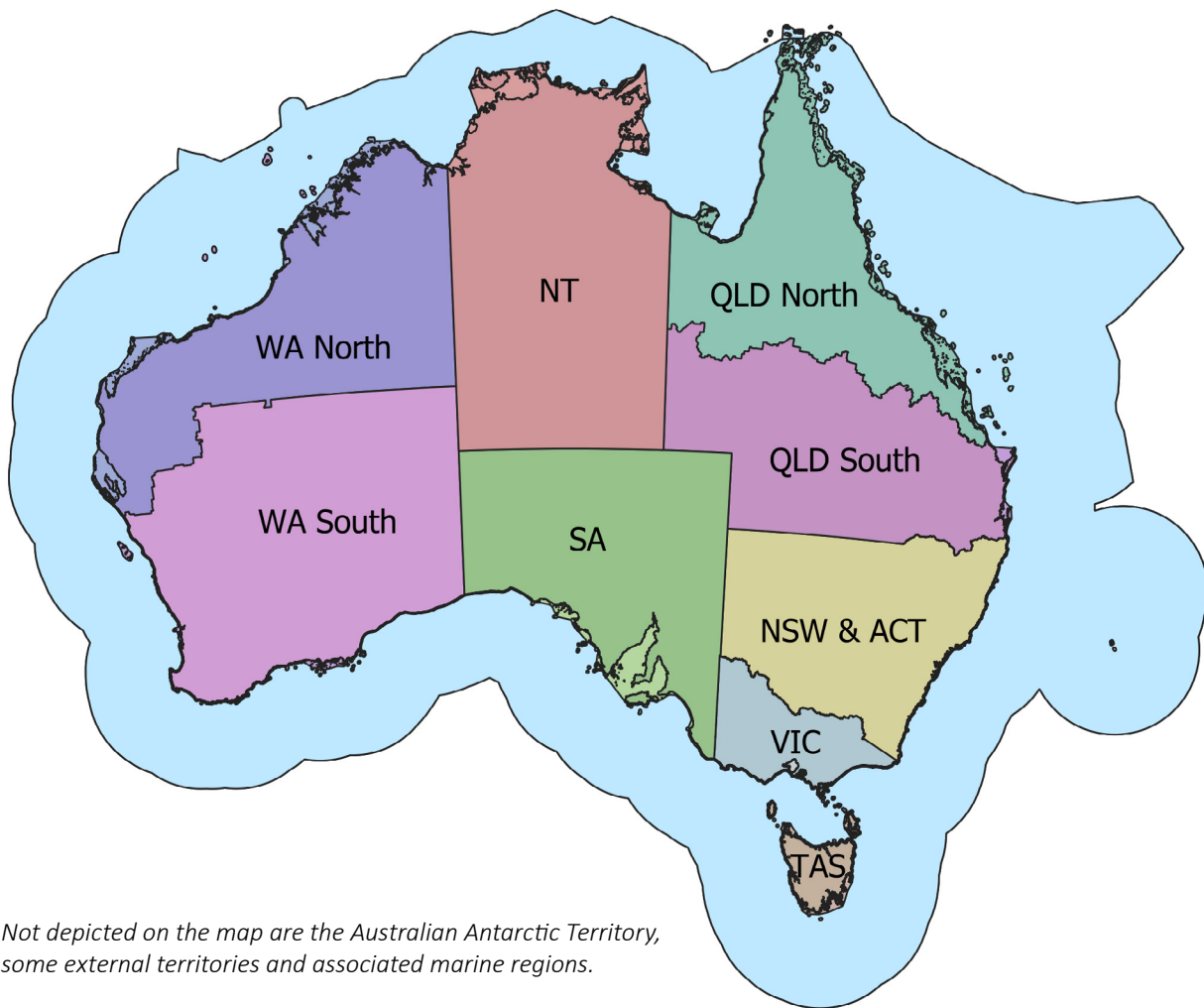
The priority hazards were identified by a review of international practices and consultation with Australian climate scientists, stakeholders and risk assessment users based on a list of around 50 hazards relevant to Australia from the United Nations – Disaster Risk Reduction (UNDRR) Hazard Definition and Classification Review (UNDRR 2020, Murray et al. 2021).

Geographic regions

Ten geographic regions are used to assess risk. These are states and territories, including their coastal zones – with division of Queensland and Western Australia into tropical and sub-tropical regions, and Australia’s oceanic Exclusive Economic Zone including external territories (Figure 3). To provide a comprehensive national picture for the Risk Assessment, it includes areas around the sub-Antarctic Islands and the Australian Antarctic Territory.

These geographical regions were defined to be consistent with major climatic zones and to break down Australia and its maritime regions of responsibility into areas that decision makers can use to assess their climate risk and focus adaptation policies.

Figure 3 Geographic regions for the Risk Assessment



Not depicted on the map are the Australian Antarctic Territory, some external territories and associated marine regions.

Guiding principles that underpin the Risk Assessment

The Risk Assessment has followed an evidence-based process and has been delivered in-line with the following principles:

Robust: Align with international leading practices, be repeatable, use multi-disciplinary approaches, incorporate traditional knowledge and ongoing learning.

Holistic: Take a holistic approach by considering both current and future risks, assessing interdependencies, and accounting for complex, cascading, and compounding risks. Acknowledge gaps and limitations in the assessment and proposed actions.

Actionable: Communicate findings effectively, support improved climate risk decision-making, inform the National Adaptation Plan, and integrate with existing programs.

Precautionary approach: When evidence or confidence is limited, employ a precautionary approach instead of inaction, identifying potential risks and taking necessary actions to mitigate them. Recognise that societal values shift over time.

Inclusivity and empowerment: Ensure that the Risk Assessment process is relevant, participatory, and enabling, involving all relevant stakeholders and recognising their knowledge and experience.

Equity and justice: Address differential impacts of climate risks, avoid exacerbating inequalities, and address inter-generational equity.

First Nations knowledges and traditional owners: Recognise and respect First Nations as traditional owners and custodians, valuing their unique and important traditional knowledge and ways of knowing and seeing to care for Country. Support the self-determination of First Nations communities and enable First Nations-led responses to address climate change.

Collaborative and values-based: Emphasise collaborative decision-making, involve those affected by the risks and consider societal values in determining the importance of a risk.

Sustainable development and caring for Country: Consider the needs and stability of governance structures, market systems, and institutions while assessing risks. Prioritise prosperity for people and the planet in assessing risks. Recognise that all things hold some intrinsic value and add to the unique identity of Australia.

Market activation: Support adaptation through market forces and early leadership while avoiding maladaptation and perverse incentives.



2 First pass risk assessment

Australia needs to understand the risks we face from climate change so we can take action to safeguard the things we value as a society. The first pass risk assessment provides the first ever national level assessment of how climate change puts what we value at risk, now and in the future. It is a comprehensive, qualitative assessment of Australia's nationally significant climate related risks.

The first pass of the Risk Assessment has been produced in collaboration with a range of stakeholders including all levels of government, non-government organisations, industry, academia, and First Nations peoples. This involved over 250 stakeholders and a series of workshops across the country.

In line with the National Climate Risk Assessment methodology, the first pass assessment reviewed climate risks within 8 systems of national importance, presented in alphabetical order:

- Defence and national security
- Economy, trade and finance.
- First Nations values and knowledges
- Health and social support
- Infrastructure and built environment
- Natural environment
- Primary industries and food
- Regional and remote communities

The first pass assessment of First Nations climate risks is still underway. This assessment requires a longer timeframe, recognising the diversity of climate risk interpretations and experiences among First Nations peoples.

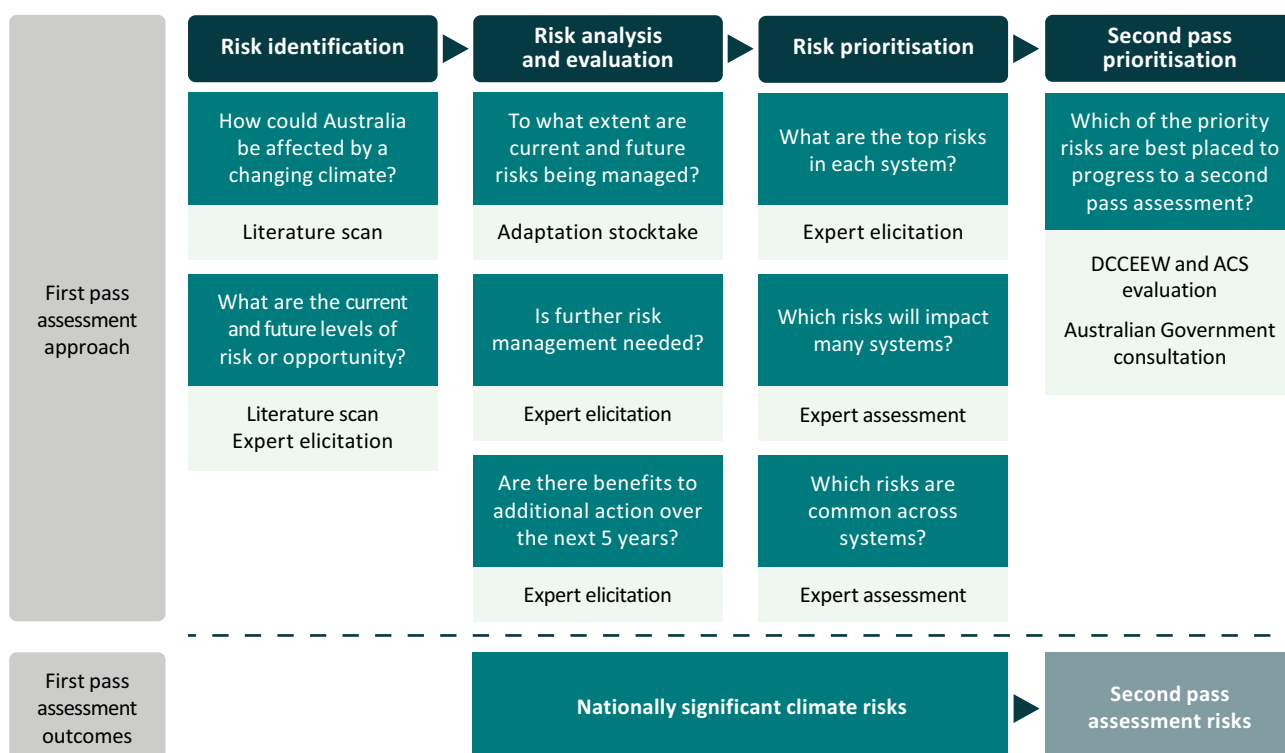
It also considered how risks can compound, cascade, and aggregate across these 8 systems.

This involved a comprehensive literature scan on the direct and indirect impacts of climate change on the 8 systems, a rapid adaptation stocktake to understand what action is already being taken, and a series of expert elicitation workshops to identify and explore the risks (Figure 4).

The outcomes of the first pass assessment reported here are based on scientific evidence on how climate related hazards may change over the next century and expert-led insights into how this may translate into climate risks that are of national importance. Assessing risk inherently involves uncertainty and varying degrees of confidence in the inputs into the assessment. The results of this Risk Assessment are not predictions but are considered plausible scenarios.

Australia now has a nationally comprehensive view of our climate risks, and a better understanding of where we need to focus our efforts to protect the things that we value most as a society.

Figure 4 Overview of the first pass risk assessment approach and outcomes



First pass assessment outcomes

The first pass assessment identified 56 nationally significant climate risks within 7 systems. These risks have differing probabilities of occurring and different impacts.

A number of the 56 risks were found to be common across systems and were consequently recognised as cross-system risks.

The methodology design included a prioritisation process acknowledging the value of going deeper into a number of priority risks.

Consequently, 11 risks were prioritised for further analysis based on 4 criteria:

- severity of impact
- actionability as part of a national adaptation response
- clarity of scope for further analysis in the second pass assessment
- achieving coverage across all systems.

Of the 11 risks identified for the second pass assessment, 4 are cross-system risks.

The full risk description for each risk is included in the [National Climate Risk Assessment: First pass assessment report appendix – risk descriptions](#).



3 Second pass assessment risks

The 11 risks for progression to the second pass assessment have been selected based on their severity of impact, actionability as part of a national adaptation response, clarity of scope for further analysis in the second pass assessment and to achieve coverage across all systems.

The outcomes of the second pass assessment will provide a deeper understanding of how climate change is impacting the 11 risks, including hazards, exposure, vulnerability and response.

The second pass analysis will deliver climate projections, hazard data, and socio-economic scenarios to give a detailed picture of the risks we are facing now, and may face in 2050 and 2090 under different scenarios of global warming.

The output of the second pass will be tailored to inform potential adaptation responses and will include datasets, visualisations and maps.

The second pass of the Risk Assessment will use qualitative and quantitative methods and will also explore complex risk and cross-system dependencies. The first pass assessment found that all systems have cascading, concurrent and compounding risks, with strong interdependencies across multiple systems. Analysis of complex risks is very important as we can only prepare for the impacts of climate change if we understand the way they interact with each other and affect the things we value. Common drivers of cross-system risks will be considered in the second pass assessment to inform actions which could contribute to mitigating risk in multiple areas.

The 11 risks in the second pass assessment are listed on the next page.



Second pass assessment risks



4 Nationally significant climate risks

This section describes the 56 nationally significant climate risks identified across the 7 systems of the first pass.

In each of the following system sections, there is a summary description of the system, a table showing the concern levels of the 10 priority hazards and listing the nationally significant system risks.

The full risk descriptions for each risk are included in the [National Climate Risk Assessment: First pass assessment report appendix – risk descriptions](#).

The hazard tables were built with information from the scientific literature review and tested with climate and system experts.

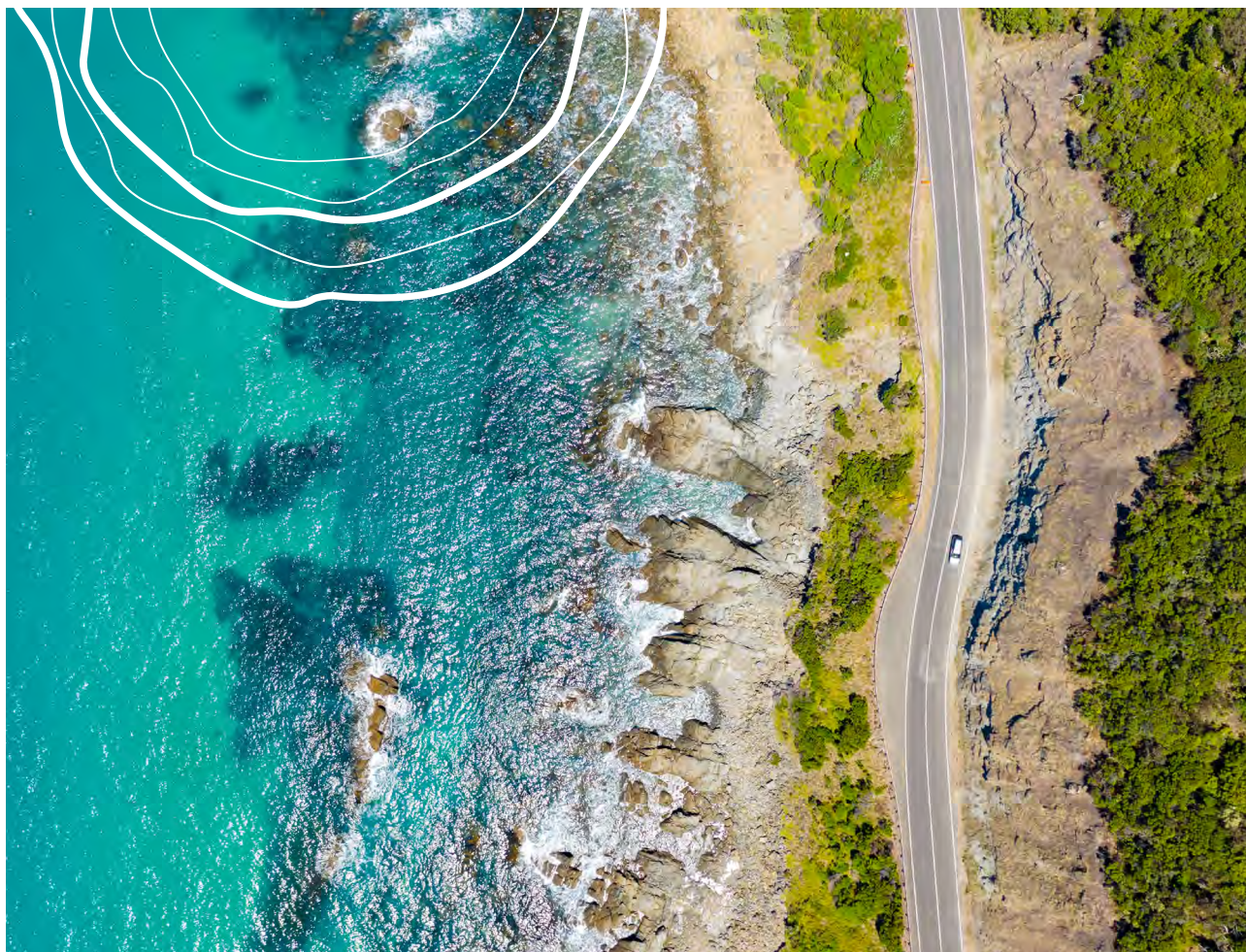
The concern levels were determined by examining the climate science to understand changes in the hazard (and confidence in those changes) and impacts (realised or expected) of the hazards on the system.

The hazards concern levels were then used to help identify the significant risks in each system.

It is important to remember that there are different levels of confidence in the risks faced and how they will affect us. In general, there is a better understanding of how physical hazards such as heat and bushfire will change in the future than there is about how people, communities and the natural environment will respond to these hazards.

This means that the risk statements below are plausible illustrations of what could happen under particular global warming scenarios and where the greatest stresses may be felt, rather than predictions of what will happen in 2050 and 2090.

This highlights the need for regular risk assessments to account for changes in scientific knowledge and the impacts of adaptation responses on our risk exposure.





Defence and national security

System description

The defence and national security system refers to the structures and functions dedicated to safeguarding Australia's domestic stability and international interests, including disaster readiness and risk reduction. This system includes all emergency management services, workforce and volunteers, defence operations and their workforce, particularly with respect to the role of the military in disaster response or geopolitical tensions arising from extreme events.

This system has strongest interdependencies with the health and social support, economy, trade and finance and infrastructure and built environment systems.

Hazards

Scientific analysis identifies extreme heat as the hazard with a high level of concern in the current climate. By 2050, the list of high concern hazards is expected to expand to also include bushfire, sea level rise (through coastal and estuarine flooding), convective storms, drought, extra-tropical storms, riverine and flash flooding, and tropical cyclones (Table 3).

These hazard concern levels were a key consideration in identifying the nationally significant climate risks for this system.

Table 3 Hazard concern-level for the defence and national security system

										
Current (2020)	Medium concern	Medium concern	Insufficient data / lower concern	Medium concern	Medium concern	Medium concern	High concern	Medium concern	Medium concern	Medium concern
2050	High concern	High concern	Medium concern	High concern	High concern	High concern	Medium concern	Medium concern	High concern	High concern
2090	High concern	High concern	Medium concern	High concern	High concern	High concern	Medium concern	Medium concern	High concern	High concern

Insufficient data / lower concern

Some concern

Medium concern

High concern



Nationally significant climate risks – defence and national security system



Economy, trade and finance

System description

The economy, trade and finance system refers to Australia's interconnected insurance and investment markets, import and export markets, the distribution of goods and services, and the institutional arrangements that govern them. This system includes the institutional arrangements governing economic activities and trade networks across all scales.

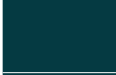
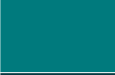
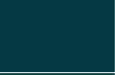
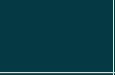
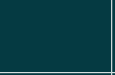
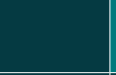
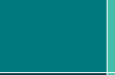
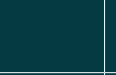
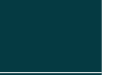
This system has strong interdependencies with the primary industries and food, health and social support, regional and remote communities and infrastructure and built environment systems.

Hazards

Scientific analysis identifies drought and riverine and flash flooding as hazards with a high level of concern in the current climate. By 2050, the list of high concern hazards is expected to expand to also include bushfire, coastal erosion, convective storms, extratropical storms, and tropical cyclones (Table 4).

These hazard concern levels were a key consideration in identifying the nationally significant climate risks for this system.

Table 4 Hazard concern-level for the economy, trade and finance system

										
Current (2020)										
2050										
2090										






Insufficient data / lower concern

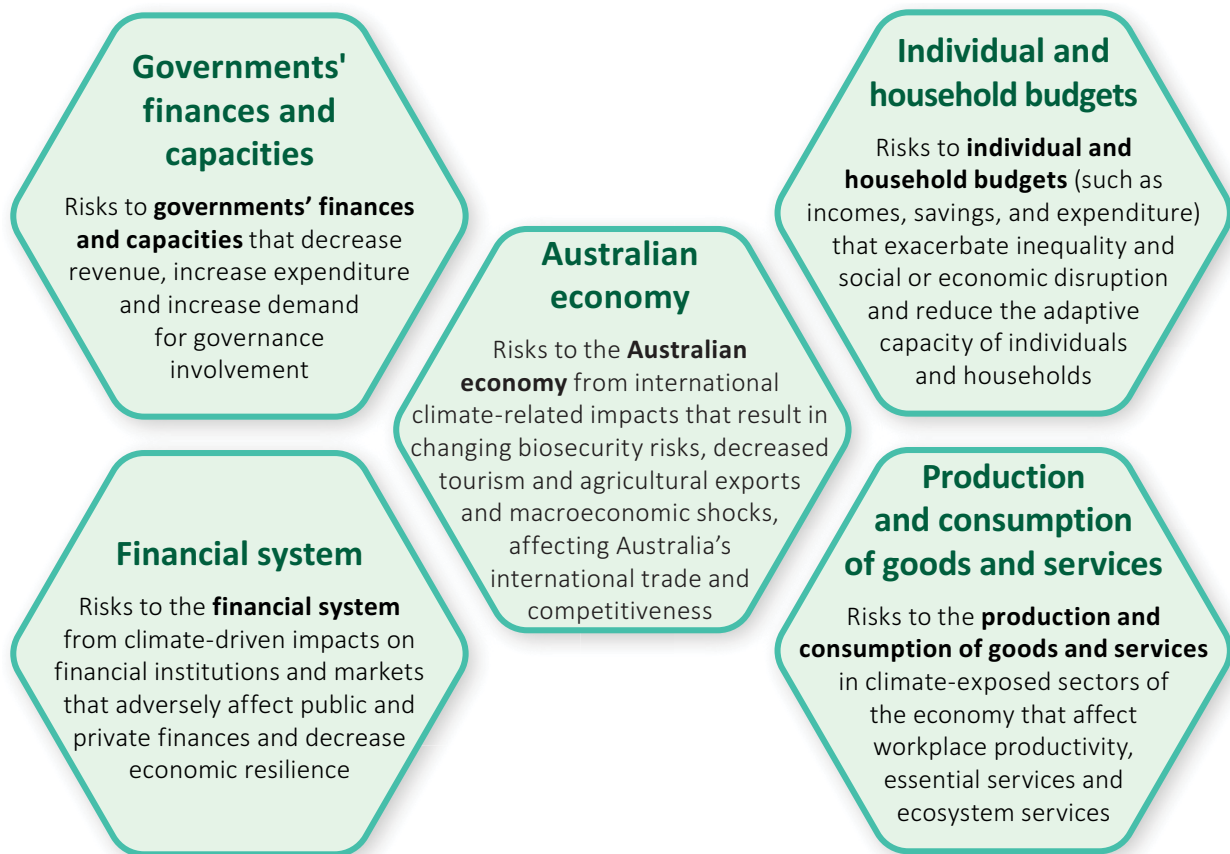
 Some concern

 Medium concern

 High concern



Nationally significant climate risks – economy, trade and finance system





Health and social support

System description

The health and social support system refers to population health and wellbeing, as well as the provision, availability, and access to health, wellbeing and social services. This system includes services that encompass healthcare, public and preventative health, aged care, disability services, housing support, employment and financial wellbeing and their supporting infrastructure.

This system has strongest interdependencies with the regional and remote communities, infrastructure and built environment and First Nations values and knowledges systems.

Hazards

Scientific analysis identifies bushfire, drought, extreme heat, riverine and flash flooding and tropical cyclones as hazards with medium levels of concern in the current climate. By 2050, these hazards have been elevated to high concern and have expanded to also include coastal erosion (Table 5).

These hazard concern levels were a key consideration in identifying the nationally significant climate risks for this system.

Table 5 Hazard concern-level for the health and social support system

										
Current (2020)	Medium concern	Some concern	Some concern	Some concern	Medium concern	Medium concern	Medium concern	Some concern	Medium concern	Medium concern
2050	High concern	Medium concern	High concern	Medium concern	High concern	Medium concern	High concern	Medium concern	High concern	High concern
2090	High concern	Medium concern	High concern	Medium concern	High concern	Medium concern	High concern	Medium concern	High concern	High concern

Insufficient data / lower concern

Some concern

Medium concern

High concern



Nationally significant climate risks – health and social support system



System description

The infrastructure and built environment system refers to the intricate networks of human-made structures across Australia. This system includes physical buildings, green and blue spaces, and their supporting infrastructure such as transport, water, and energy systems.

This system has strongest interdependencies with the primary industries and food, regional and remote communities and economy, trade and finance systems.

Hazards

Scientific analysis identifies bushfire and tropical cyclones as hazards with a high level of concern in the current climate. The hazard concern levels are similar in 2050, but by 2090 the list of high concern hazards is expected to expand to also include, coastal and estuarine flooding, coastal erosion, drought, extratropical storms, extreme heat, and riverine and flash flooding (Table 6).

These hazard concern levels were a key consideration in identifying the nationally significant climate risks for this system.

Table 6 Hazard concern-level for the infrastructure and built environment system

										
Current (2020)	High concern	Medium concern	Medium concern	Some concern	Medium concern	Medium concern	Insufficient data / lower concern	Medium concern	High concern	High concern
2050	High concern	Medium concern	Medium concern	Some concern	Medium concern	Medium concern	Insufficient data / lower concern	Medium concern	High concern	High concern
2090	High concern	High concern	High concern	Some concern	High concern	High concern	Insufficient data / lower concern	Medium concern	High concern	High concern






Insufficient data / lower concern Some concern Medium concern High concern



Nationally significant climate risks – infrastructure and built environment system





Natural environment

System description

The natural environment system refers to Australia's ecosystems, biodiversity, and natural processes. This system includes the oceans around Australia (covering the Exclusive Economic Zone and sub-Antarctic islands), coastal areas and shorelines, as well as the natural environment that is not part of urban or agricultural zones (with some overlap), such as national parks, rangelands, grasslands, forests and bushland and other natural landscapes. Australia has diverse natural environments across regions and states or territories. Plans and adaptations also vary geographically across jurisdictions.

The natural environment system underpins all other systems and has strongest interdependencies with the primary industries and food, regional and remote communities and First Nations values and knowledges systems.

Australia has a wide variety of natural environments, all of which are at risk from climate impacts. Climate change has many direct and some indirect impacts though acute, chronic and slow onset changes which drive a variety of risks to this system, ranging from individual species through to entire landscapes with local, regional, national and international implications.

Hazards

Scientific analysis identifies bushfire and drought as hazards with a high level of concern in the current climate. By 2050, the list of high concern hazards is expected to expand to also include extreme heat and ocean warming and acidification (Table 7).

These hazard concern levels were a key consideration in identifying the nationally significant climate risks for this system.

Table 7 Hazard concern-level for the natural environment system

										
	Bushfires, grassfires and air pollution	Coastal and estuarine flooding	Coastal erosion and shoreline change	Convective storms including hail	Drought and changes in aridity	Extratropical storms	Changes in temperatures including extremes	Ocean warming and acidification	Riverine and flash flooding	Tropical cyclones
Current (2020)	High concern	Medium concern	Medium concern	Insufficient data / lower concern	High concern	Insufficient data / lower concern	Medium concern	Some concern	Medium concern	Insufficient data / lower concern
2050	High concern	Medium concern	Medium concern	Insufficient data / lower concern	High concern	Insufficient data / lower concern	High concern	High concern	Medium concern	Medium concern
2090	High concern	High concern	High concern	Insufficient data / lower concern	High concern	Insufficient data / lower concern	High concern	High concern	Medium concern	Medium concern

Insufficient data / lower concernSome concernMedium concernHigh concern

Nationally significant climate risks – natural environment system





Primary industries and food

System description

The primary industries and food system refers to land, marine, and estuarine commercial activities dedicated to producing food, fibre, wood, fuel, and other products. This system includes agriculture, aqua and mariculture, fisheries, and forestry sectors, spanning large-scale and smallholder operations, both commercial and non-commercial, covering the entire chain from extraction to the consumer.

This system has strongest interdependencies with the regional and remote communities and economy, trade and finance systems.

Climate change has many direct and indirect impacts through acute, chronic and slow onset changes which drive a variety of risks to this system, ranging from individual crops through to entire industries and communities with local, regional, national and international implications. The system may potentially benefit from some opportunities arising from climate change.

Hazards

Scientific analysis identifies drought, extreme heat, and riverine and flash flooding as hazards with a high level of concern in the current climate. By 2050, the list of high concern hazards is expected to expand to also include bushfire, convective storms and extratropical storms (Table 8).

These hazard concern levels were a key consideration in identifying the nationally significant climate risks for this system.

Table 8 Hazard concern-level for the primary industries and food system

										
	Bushfires, grassfires and air pollution	Coastal and estuarine flooding	Coastal erosion and shoreline change	Convective storms including hail	Drought and changes in aridity	Extratropical storms	Changes in temperatures including extremes	Ocean warming and acidification	Riverine and flash flooding	Tropical cyclones
Current (2020)	Medium concern	Some concern	Some concern	Medium concern	High concern	Medium concern	High concern	Some concern	High concern	Medium concern
2050	High concern	Medium concern	Medium concern	High concern	High concern	High concern	High concern	Medium concern	High concern	Medium concern
2090	High concern	Medium concern	Medium concern	High concern	High concern	High concern	High concern	Medium concern	High concern	Medium concern



Insufficient data / lower concern Some concern Medium concern High concern

Nationally significant climate risks – primary industry and food system





Regional and remote communities

System description

The regional and remote communities system refers to all (natural, social, economic, and built) aspects of communities in Australia that are beyond major urban centres. This system includes regional centres, towns, remote communities, mining settlements, small islands and external territories.

This system has strongest interdependencies with the natural environment and First Nations values and knowledges systems.

Hazards

Scientific analysis identifies riverine and flash flooding as a hazard with high levels of concern in the current climate. All hazards present at least some concern to regional and remote communities at present. By 2050, the list of high concern hazards is expected to expand to also include coastal erosion, convective storms, drought, extreme heat and tropical cyclones (Table 9).

These hazard concern levels were a key consideration in identifying the nationally significant climate risks for this system.

Table 9 Hazard concern-level for the regional and remote communities system

										
	Bushfires, grassfires and air pollution	Coastal and estuarine flooding	Coastal erosion and shoreline change	Convective storms including hail	Drought and changes in aridity	Extratropical storms	Changes in temperatures including extremes	Ocean warming and acidification	Riverine and flash flooding	Tropical cyclones
Current (2020)										
2050										
2090										

Insufficient data / lower concern

Some concern

Medium concern

High concern



Nationally significant climate risks – regional and remote communities system



5 First Nations climate risks

First Nations communities are experiencing multiple impacts from climate change. Caring for Country through applying First Nations values, knowledges and cultural practices is critical to addressing the cumulative impacts of climate change that are being experienced by First Nations communities.

Integrating First Nations perspectives in the context of the Risk Assessment

The [National Agreement on Closing the Gap](#) (2020) aims to strengthen and establish partnerships and shared decision-making between government and First Nations peoples. The Risk Assessment process has involved working closely with First Nations peoples to understand the risks to the First Nations values and knowledges system. The integration of First Nations perspectives is essential in understanding and responding to climate change.

First Nations peoples have a unique and profound connection to their land and waters. This connection is not just physical; it is deeply rooted in cultural, spiritual, and historical ties, offering a range of knowledges and practices that are vital for sustainable environmental management. Recognising this connection is key to understanding the full spectrum of climate risks in Australia and developing effective adaptation strategies.

In the context of this Risk Assessment, the 'First Nations values and knowledges' system refers to a holistic approach that encompasses environmental, social, cultural, and spiritual dimensions. This system is characterised by a deep understanding of the interdependencies within the natural world, honed through generations of observation and interaction with the environment.

However, it's important to note that the term 'system' here is not a standalone concept commonly used by First Nations peoples. Rather, it is an artefact of the Risk Assessment methodology, designed to encapsulate a complex set of values, knowledge, practices, and relationships with the natural world. This framework allows the unique insights of First Nations peoples to be mapped within the broader context of climate risk analysis.

In the Risk Assessment methodology, the 'First Nations values and knowledges system' serves as a framework for analysing impacts, vulnerabilities, and strategies for adaptation. It is through this lens that the depth and breadth of First Nations perspectives on climate change can be reflected. This system-based approach helps in identifying specific climate risks and prioritises them, ensuring that strategies for adaptation are grounded in the understanding and practices of First Nations communities.



First Nations values and knowledges system

Recognising First Nations values, knowledges and cultural practices is essential for understanding and effectively responding to climate change. This system recognises the deep connection of First Nations peoples to their land and waters and the valuable insights this connection provides in terms of sustainable environmental management, observation of changes, and adaptation strategies.

This system has strong interdependencies with the natural environment, health and social support and regional and remote communities systems. This includes concerns around topics such as the environment, water, health, infrastructure, economy and climate-adaptive housing.

Climate change has many direct and indirect impacts through acute, chronic and slow onset changes which drive a variety of risks to this system, ranging from individuals through to entire First Nations communities across multiple generations.

This systemic view is underscored by the need for policies and actions that respect and incorporate First Nations perspectives, values and knowledges systems. Risks to this system will have local, regional, national and international implications.

First Nations risk assessment

The first pass assessment of First Nations climate risks is underway. This assessment requires a longer timeframe, recognising the diversity of climate risk interpretations and experiences among First Nations peoples.

First Nations peoples from around the nation attended 2 workshops in November 2023. The workshops explored First Nations climate risks and potential First Nations-led governance models for assessing First Nations climate risks and adaptation planning.

In 2024, the government will continue to support the First Nations-led process to identify the climate risks for the First Nations values and knowledges system and prioritise and assess the most significant risks to underpin adaptation actions and strategies.

Through the literature review, adaptation stocktake, expert elicitation processes and direct engagement with First Nations stakeholders, the impact of climate change on First Nations peoples and communities was considered in the analysis of the 56 nationally significant climate risks, and the 11 priority risks for the second pass assessment as there is a substantial overlap of concerns and strong interconnections between these risks.

6 Next steps

Second pass risk assessment

The 11 priority risks identified in the first pass will undergo a detailed technical analysis and further stakeholder engagement in the second pass assessment.

This will consider measures of climate impact, including economic impacts, and potential opportunities from climate change over the remainder of the century.

The second pass is now underway and is scheduled for completion at the end of 2024. A detailed National Climate Risk Assessment report will be released following completion of the second pass, along with supporting data and technical materials.

The outcomes of the first and second pass of the Risk Assessment will help all levels of government, industry, businesses, First Nations peoples, and communities to better understand their climate risk and inform their adaptation actions.

National Adaptation Plan

The National Adaptation Plan will respond to the findings of the Risk Assessment.

It will also establish a comprehensive framework for adapting to the nationally significant, physical climate risks faced by Australia.

A National Adaptation Plan Issues Paper has been released for consultation alongside this report. The issues paper summarises adaptation planning work conducted to date and provides a basis for further consultation and development of the Plan in 2024.

Work conducted to date has focused on research and analysis, consideration of results from the first pass of the Risk Assessment, and targeted consultation. To inform this issues paper, the Department of Climate Change, Energy, the Environment and Water held 11 roundtables over October and November 2023 with key stakeholders including peak representative bodies, businesses and non-government organisations.



7 References

DCCEEW 2023, *National Climate Risk Assessment: Methodology*, Department of Climate Change, Energy, the Environment and Water, Canberra, July. [Online] Available at: <https://www.dcceew.gov.au/climate-change/publications/national-climate-risk-assessment> Accessed 01 March 2024

IPCC, 2022a, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, eds. H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama. Cambridge University Press, Cambridge, UK and New York, NY, USA, 3056 pp. DOI: 10.1017/9781009325844.

IPCC 2022b, *Summary for Policymakers*, in H.-O. Pörtner, D.C. Roberts, E.S. Poloczanska, K. Mintenbeck, M. Tignor, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem (eds.), *Climate Change 2022: Impacts, Adaptation, and Vulnerability*. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3-33. DOI: 10.1017/9781009325844.001.

Betts, R.A., Belcher, S.E., Hermanson, L., Klein Tank, A., Lowe, J.A., Jones, C.D., Morice, C.P., Rayner, N.A., Scaife, A.A., & Stott, P.A. 2023, 'Approaching 1.5 °C: how will we know we've reached this crucial warming mark?', *Nature*, Vol. 624, 7 December, pp. 33-35, range. DOI: 10.1038/d41586-023-03775-z.

Trewin, B. 2022, 'Assessing internal variability of global mean surface temperature from observational data and implications for reaching key thresholds', *Journal of Geophysical Research: Atmospheres*, 127, 9pp. DOI: 10.1029/2022JD036747.

United Nations Office for Disaster Risk Reduction, 2020, *Hazard definition and classification review: Technical report*, 28 July, 87pp.

Murray, V., Abrahams, J., Abdallah, C., Ahmed, K., Angeles, L., Benouar, D., ... Wright, N. 2021, *Hazard Information Profiles: Supplement to UNDRR-ISC Hazard Definition & Classification Review: Technical Report*, Geneva, Switzerland: United Nations Office for Disaster Risk Reduction; Paris, France: International Science Council. DOI: 10.24948/2021.05

Australian Governments and the Coalition of Aboriginal and Torres Strait Islander Peak bodies, 2020. *The National Agreement on Closing the Gap*. [Online] Available at: <https://www.closingthegap.gov.au/national-agreement> Accessed 19 January 2024



