



AFAC Climate Change and Disasters

Key Messages and Resources | November 2020



Cover images (starting top left): DFES, DELWP CFA, NASA, NSW RFS, QFES
Image: Neal Herbert, Department of the Interior

Purpose

This document has been prepared by the AFAC Climate Change Group, and provides an authoritative and agreed set of information, and resources related to climate change and disasters. This resource is primarily for AFAC members, to assist member agencies to continue to support their communities to prepare for and adapt to the impacts of climate change. This resource may also assist AFAC members in preparing consistent communications and messaging in response to media queries about climate change.

National Frameworks and AFAC's strategic position

The work of AFAC Groups is directed by the *Strategic Directions for Fire and Emergency Services*, the *National Strategy for Disaster Resilience* (COAG 2011) and the *National Disaster Risk Reduction Framework* (Department of Home Affairs 2018), which was endorsed into national policy in March 2020, identifies climate change as the fundamental driver for building disaster resilience in Australia¹.

Climate change is affecting fire and emergency services significantly due to the increased scale, intensity and frequency of climate-driven emergency events. The exposure and vulnerability of communities and the environment to emergency events caused by climate change needs to be carefully addressed and managed. AFAC and its member agencies play an important role in mitigating this exposure.

In 2018, the AFAC Climate Change Group developed the AFAC Climate Change and Emergency Management Sector Discussion Paper, which identifies the key physical, transitional and legal risks facing fire and emergency services and the priorities to address them. Subsequently the AFAC Council established a national position and endorsed the *AFAC Position 2018: Fire and Emergency Services and Climate Change*².

The AFAC Climate Change Group Strategic Work Plan 2019–2021 was endorsed by AFAC Council in May 2019, and seeks to address several focus areas adapted from the AFAC Council endorsed Priorities for Action listed in the [AFAC Climate Change and Emergency Management Sector Discussion Paper 2018](#).

1 <https://www.homeaffairs.gov.au/emergency/files/national-disaster-risk-reduction-framework.pdf>

2 <https://knowledge.aidr.org.au/resources/emergency-management-and-climate-change/>

Climate change observations and projections

THE MAIN MESSAGES

Observed changes

- Australasia's climate has already warmed, including an increase of 1.4°C in average air temperatures for Australia since national records began in 1910. Oceans around Australasia have warmed by around 1°C since 1910.
- The duration, frequency and intensity of extreme heat events have increased across large parts of Australasia.
- Bushfire weather conditions have increased in severity for many regions of Australia.
- Sea levels are rising around Australasia, increasing the risk of inundation.
- Cool season rainfall has decreased in southwest and southeast regions of Australia in recent decades.
- Extreme rainfall is increasing in intensity, including short duration localised events, that can exacerbate flash flood risk factors.

Source: BoM/CSIRO State of the Climate Report 2020.

Climate change background

Based on the scientific evidence now available, it is clear that human-caused climate change has already influenced various weather and ocean hazards in Australasia. Scientific research has established that human-caused greenhouse gas emissions are the primary cause of climate change including long-term trends such as global warming and rising sea levels. Increasing atmospheric greenhouse gas concentrations into the future will continue amplifying many weather and ocean hazards.

In 2018, the IPCC reported, it is virtually certain that temperatures will continue to increase in coming decades. This means that many extreme hazards are likely to continue increasing in frequency and severity, while for some hazard types there are larger uncertainties in their future occurrence³.

Extreme heat events

Average temperatures across Australasia have increased by more than 1°C since 1910 due to human-caused greenhouse gas emissions. This includes an increase of 1.4°C for Australia, with most of that increase occurring since 1950 and every decade since then being warmer than the ones before. This warming trend has led to an increase in the number of extreme heat events that have occurred. Multi-day heat wave events have increased in frequency and duration across many regions of Australia; it is almost certain climate change will continue to worsen and compound the impacts of extreme heat events, with longer heat waves, more frequent extreme heat days, and temperatures above historical records.

Bushfires

Human-caused climate change has already influenced the frequency and severity of dangerous bushfire conditions in Australasia and other regions of the world. Significant changes have been observed in recent decades towards more dangerous bushfire weather conditions in some regions of Australasia, indicating a longer and more severe fire season, particularly in southern and eastern Australia. Bushfire weather conditions in future years are projected to increase in severity for many regions of Australasia, with high confidence for southern and eastern regions.

Climate Hazard Summaries for Australasia

The following snapshot of climate hazards in Australasia is based on up-to-date research and review, based on publications produced by Bureau of Meteorology (BOM), CSIRO, NIWA, universities, and other research providers. This information can be used by emergency management organisations and spokespeople when preparing for questioning and other forms of public communication on the relationship between climate change and fire, flood, heat, thunderstorm or cyclone activity.

Extreme rainfall

There is evidence climate change has increased the intensity of extreme rainfall events in some regions. Global warming can have a direct influence on extreme rainfall potential, as the moisture capacity of the atmosphere increases with temperature by about 7% per degree of warming. Extreme rainfall events including those produced by thunderstorms, fronts and cyclones, could potentially increase in intensity by about 4-10% per degree of warming for daily rainfall extremes and 5-15% per degree of warming for short-duration (hourly) extremes, while noting a range of plausible values above and below these best estimates⁴.

Flooding

An increase in flash flooding risk is possible due to the potential of increased intensity of short-duration rainfall events, particularly for urban environments where soil moisture has less influence on flood risk. When combined with increasing sea level, projected increases in extreme rainfall intensity suggest flooding will likely increase in frequency and magnitude in the future for many coastal and estuarine regions throughout Australasia. Although an increase in frequency may be more likely than a decrease of floods in general, particularly for the more extreme events, there is low confidence in future changes for some flood types, including in large catchments and larger floods for river and surface water.

³ https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_SPM_FINAL.pdf

⁴ <https://www.cmsi.org.au/reports>

Sea level rise and storm surge

Global warming is causing sea levels to rise due to the combined effects of melting glaciers and thermal expansion of the oceans, with a global average rise of about 20 cm since the mid-19th century, with similar trends in Australasia. Sea level rise has accelerated in recent decades, with a global increase of 3-4 mm/year. Global average sea level rise estimates over this century are of the order of 30-60 cm for low emissions pathway and 60-110 cm for high emissions pathway for greenhouse gas emissions. Due to rising sea levels, the frequency and magnitude of coastal flooding is expected to increase significantly this century, regardless of potential changes in storm events⁵.

Thunderstorms (including hail, lightning and tornadoes)

Trends in extreme wind events, including those caused by thunderstorms, are difficult to determine in Australia due to a lack of a long-term high-quality observations. Future changes in thunderstorm hazards are relatively uncertain for lightning, hail, tornados and extreme wind gusts, with potentially large increases for short-duration rainfall extremes.

Cyclones and low-pressure systems

Climate change is likely to affect cyclone activity in a number of ways, with these changes being variable between different types of cyclones. Observations show a downward trend in the number of tropical cyclones that have occurred in recent decades in Australasia. Fewer east coast lows are likely to occur in the future near Australia, while noting that those which do occur could potentially cause more severe coastal hazards including due to rising sea levels as well as heavier rainfall.

⁵ <https://www.ipcc.ch/srocc/>



Image: Queensland Fire and Emergency Services

Climate and disaster risk

THE MAIN MESSAGES

- Currently, the responsibilities for disaster risk management and climate adaptation are decentralised from national to local levels. It's acknowledged that in order to achieve community resilience, a joint effort by all levels of government, business, communities, organisations, households and individuals is required.
- Plans and strategies must reflect the multidimensional, systemic nature of risk, if people and ecosystems are to be protected and resilient. Assessment is imperative; Empowering and resourcing local authorities is key to successful disaster risk reduction. See the [UNDRR Concept Note for International Day for Disaster Risk Reduction 2020](#).
- For a summary of the key physical, transitional and legal risks and impacts facing fire and emergency services due to climate change, please visit [here](#).

Governance and management of climate and disaster risk

Climate and disaster risk refer to the potential impacts of natural hazards and climate change on exposed or vulnerable people, communities, assets, natural environments and socio-economic activities and services. Climate and disaster risks are systemic risks.

It's acknowledged that in order to achieve community resilience, a joint effort by all levels of government, business, communities, organisations, households and individuals is required. The changes we are seeing and will see more of, will impact upon just about every aspect of our society, from the way we earn a living to how we move around our cities, feed ourselves and enjoy leisure time. Climate change will also have profound impacts on the natural environment. The many ways that climate change is and will continue to impact on society means that governments alone cannot shoulder the full responsibility for taking action on climate change. We all have a role to play in understanding what climate change will mean for us, and the actions we can take now and into the future to ensure our society continues to thrive⁶.

Climate and disaster risk is inherently complex, however there are a range of useful resources and tools available that help to deconstruct disaster risk and provide advice on understanding the far reaching impacts across natural and built environments, which aim to improve our understanding on the determining factors that drive systemic disaster risk and what contributes to exposure and vulnerability.

The Department of Home Affairs, through the National Resilience Taskforce, has developed a set of interconnected guidance documents to support implementation of the National Disaster Risk Reduction Framework and encourage new conversations about climate and disaster risk, and factors that influence exposure and vulnerability⁷. These resources are housed on the [Australian Disaster Resilience Knowledge Hub](#).

What are the risks and impacts of climate change?

Every year, Australian communities face devastating losses and disruption caused by emergencies such as bushfires, floods, severe storms and extreme heat. The consequences of such events have significant impacts on people, communities, the economy, infrastructure and the environment. However, it's not just disasters that need to be considered. We're seeing increased variation in our climate and higher temperatures, lower rainfall, more storms and stronger wind speeds are becoming the new standard for 'normal weather'.

For the emergency management sector and the communities AFAC member agencies support, evidence shows that fire and emergency services staff and volunteers are being stretched with the bushfire seasons getting longer, increasing risk of floods, severe storms, in addition to usual demands such as motor vehicle accidents and search and rescue. The impacts of these hazards not only cause direct loss of life, physical injuries and mental health issues, but large populations are also at risk from the increasing health impacts associated with bushfire smoke, and displacement from their homes and communities.

⁶ <https://www.redcross.org.au/getmedia/b5b004b5-e572-4d9d-a1a1-c8fb5d1be5e3/climate-ready-communities-a-guide-to-getting-started.pdf.aspx>

⁷ <https://knowledge.aidr.org.au/media/7709/02-governance-guidance-strategic-decisions-climate-disaster-risk-2020.pdf>

The impacts of climate change are not be equally spread.

Climate change will see some communities experience more rainfall, while others receive less. Similarly, not every community will see the same increase in the number and duration of heatwaves, and some coastal communities are more susceptible to sea level rise than others.

Climate change is a force multiplier for many of the existing challenges faced by Australians, with those particularly at-risk including people who are:

- socially isolated
- with a disability
- experiencing mental illness
- housebound
- elderly
- recovering from an illness or accident
- have an ongoing illness, such as diabetes or a heart condition
- experiencing financial hardship or homelessness
- living in remote communities
- working primarily outside.







This often means that migrants, elderly people, people with disability and Aboriginal and Torres Strait Islander peoples can be at higher risk⁸. The below is for illustrative purposes only, and determining who is most at risk, to what hazard, in what location requires thorough and detailed assessment.

Black Summer 2019-20

The enormous scale, severity and duration of the 2019–20 bushfire season, demonstrated that we need to continue to plan ahead and prepare to manage the increasing scale, severity and duration of extreme events. For an overview of Black Summer bushfire events, refer to the *AIDR Major Incidents Report 2019–20*.

The bushfire season for 2019–20 in New South Wales and southeast Queensland began earlier than usual, starting in winter and then extended into other states and territories, with unprecedented impacts and losses to communities, industry and wildlife. The losses go far beyond anything that has occurred in previous years in these areas, with over 17 million ha of total area burnt, over 3000 homes destroyed and 33 lives lost.

While factors such as fuel management and human ignitions are important to consider, the climate variability and trends were a significant factor in attributing to the conditions that led to the Black Summer fires of 2019–20. As outlined in the Bureau of Meteorology’s annual climate statement, 2019–20 was Australia’s hottest and driest year since records began. Dry conditions persisted through the whole year and across the majority of southern and eastern Australia. Similarly, the record heat resulted in the national annual average temperature being 1.52°C above the 1961–1990 average. Notably, the heat was persistent in space and time. December daytime maximum temperature was an extraordinary 4.15°C above the 1961– 1990 average¹⁰.

 Extreme Heat Events Built up areas, rural areas, outdoor workers, the elderly, people isolated, children.	 Bushfires Rural areas, fire prone communities, peri-urban areas, people with disability, migrants.
 Extreme rainfall and flooding Flood prone areas, rural areas, built up areas, people with disability, elderly.	 Thunderstorms (hail, lightning and tornadoes) Rural areas, built up areas.
 Sea level rise and storm surge Low lying coastal communities.	 Cyclones and low pressure systems Flood prone areas, built up areas.

Adapted from Red Cross: Climate Ready Communities: A guide to getting started⁹.

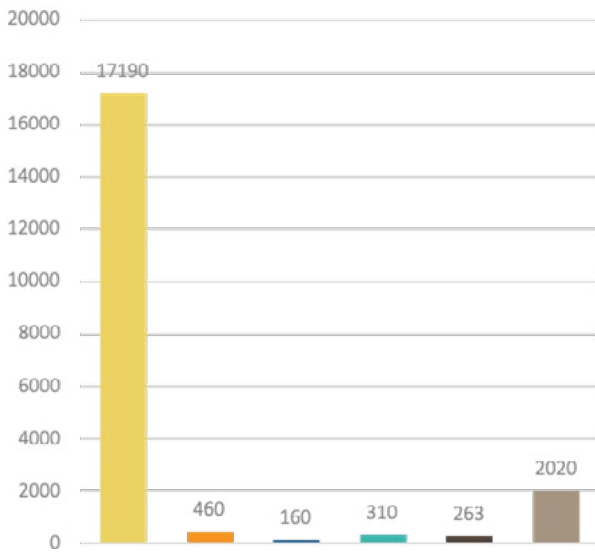
⁸ <https://www.redcross.org.au/news-and-media/news/climate-change-is-a-humanitarian-issue>

⁹ <https://www.redcross.org.au/getmedia/b5b004b5-e572-4d9d-a1a1-c8fb5d1be5e3/climate-ready-communities-a-guide-to-getting-started.pdf.aspx>

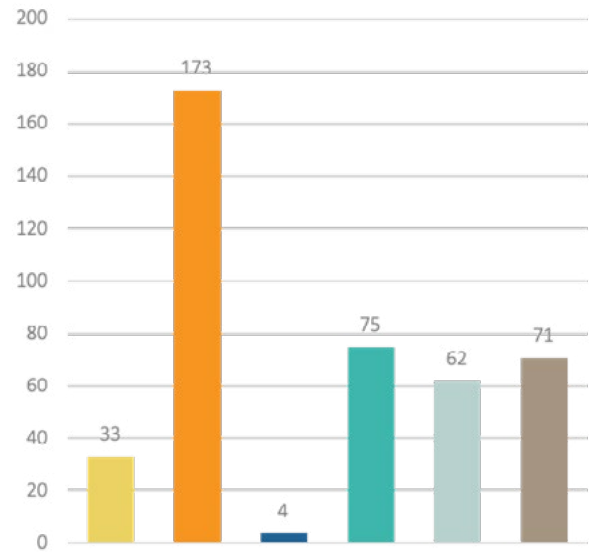
¹⁰ <https://ecos.csiro.au/bushfires-and-climate-change-qa/>

Historical comparison of fire impacts* 1939 - 2020

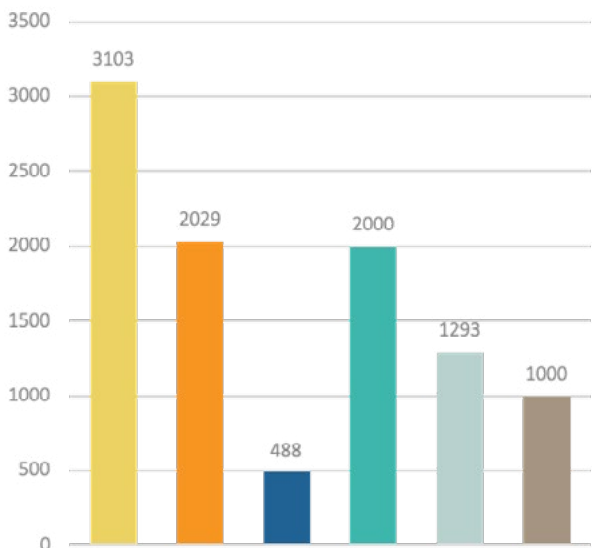
Size (thousand ha.)



Lives lost



Homes lost



Key

- Black Summer 19-20
- Ash Wednesday 1983
- Black Saturday 2009
- Hobart 1967
- Canberra 2003
- Black Friday 1939

*2019-2020 data is drawn from ACT, New South Wales, Victoria, Queensland, Western Australia and South Australia

How can AFAC members continue to plan and prepare?

THE MAIN MESSAGES

- **Harmonisation of approaches** – Harmonisation requires recognising and accommodating fit-for-purpose regional and location-based responses within a nationally facilitated framework based on common platforms and approaches.
- **Focus on prevention and building resilience** – Fire and emergency services have begun and need to continue to look to new and diverse partnerships to successfully meet future climate change risks and challenges. This involves shifting towards a more whole-of-community focus underpinned by better communication and connection with communities.
- **Plan for greater frequency and intensity of extreme events** – In anticipation of climate change impacts, jurisdictions have begun and need to continue to develop and improve operational response by planning for greater frequency of events and potentially larger events, improving activities that protect staff and volunteers and supporting interstate and overseas calls for assistance.
- **Improving risk mitigation** – Greater understanding of the risks and impacts of climate change will enable us to focus on existing and future risk and allow us to plan ahead to protect our communities now and into the future.
- For the Royal Commission into National Natural Disaster Arrangements Report, please visit [here](#).

AFAC has collaborated with AIDR to establish the AFAC Climate Change Group to provide leadership and assist AFAC members in addressing the challenges of climate change. The AFAC Climate Change Group has established a Strategic Work Plan 2019–2021. AFAC member agencies can continue to work towards preparing and adapting to climate change in the following ways:

Preparedness, strategic planning and resourcing

In anticipation of climate change impacts, jurisdictions have begun and need to continue to develop and improve operational response by:

- planning for greater frequency of events and potentially larger events
- improving activities that protect staff and volunteers;
- supporting interstate and overseas calls for assistance.

Harmonisation of approaches

Harmonisation of approach can lead to greater effectiveness. There is support for a more harmonised approach to climate and disaster resilience across a wide range of government, industry and community stakeholders, yet it remains difficult to progress this goal in practical terms. Harmonisation requires recognising and accommodating fit-for-purpose regional and location-based responses, within a nationally facilitated framework based on common platforms and approaches¹¹.

Focus on prevention, and building resilience

Fire and emergency services have begun and need to continue to look to new and diverse partnerships to successfully meet future climate change risks and challenges. This involves shifting towards a more whole-of-community focus – underpinned by better communication and connection with communities – as well as understanding (and reducing) what drives vulnerabilities and the adverse consequences of emergencies. Building resilience requires communities, government, agencies, community service organisations, business and industry to work in partnership, and to recognise that every person and organisation has a part to play. It also requires understanding that capacities to act are not the same for everyone and that there is a need to develop adaptive

capacity. This should be an integrated approach that puts diverse groups at the centre of decision making and supports the EM sector to connect with community values, priorities and strengths¹².

Improving risk mitigation

Greater understanding of the risks and impacts of climate change will enable us to focus on existing and future risk and allow us to plan for and consider what we would rebuild/build, with this in mind. We wish to protect our communities and environment now and into the future. We need to continue to improve and invest in:

- bushfire detection and suppression capability
- mitigation strategies – risk mitigation and exploring opportunities for climate change mitigation
- understanding most appropriate land use planning to reduce risk
- building community resilience and encouraging shared responsibility
- improving infrastructure to withstand natural hazards into the future
- better forecasting of natural hazards and their impacts
- Increased vegetation management practices that reduce bushfire risk
- communicating and engaging with people in a way that helps them make better decisions
- capability development – Workforce 2030
- investing in research that can be implemented by agencies to reduce risk
- creating climate change datasets at a spatial and temporal scale that are useful for agencies
- investing in technology that enhance agencies staff and volunteer capability
- protecting areas of significant biodiversity and cultural value
- shoring up supply chains that may be impacted by climate change events, with alternative resourcing options being considered.

¹¹ <https://www.csiro.au/en/Research/Environment/Extreme-Events/Bushfire/frontline-support/report-climate-disaste-resilience>

¹² <https://www.afac.com.au/docs/default-source/doctrine/AFAC-Climate-Change-Emergency-Management-Sector.pdf?sfvrsn=6>

We need to prepare now for future risks and possible climate scenarios

Past practices need to be augmented and are no longer an indicator of future experience and scenarios.

AFAC and the BNHCRC in 2020 are commencing a tactical research project that seeks to better understand the future possible climate scenarios facing fire and emergency services, to inform improved operational planning.

No matter what we think we control, we will also need to be ready for the unexpected, and to do that we need to find a way to accept uncertainty and plan for the inevitable. How we actually do that is an area in critical need of further research into weather prediction, land planning, infrastructure development, population trends, and community awareness.

Enable adaptation pathways

Global drivers including climate change, are creating unprecedented challenges for decision-makers in communities, governments and industry who are responsible for planning for an uncertain future. Adaptation Pathways is a powerful metaphor and analytical approach that can help decision makers identify, explore and sequence possible adaptation decisions and actions over time.

Examples of planning and preparation:

- Emergency service agencies and AFAC are investing in research to better understand the impacts and implications on emergency services.
- Many local governments and councils across Australia are taking innovative steps to address climate and disaster risk. See [Government Association of South Australia's Climate Adaptation Report](#)
- Queensland state and local government planning provisions include local flexibility and support innovative planning that establishes resilient settlements, safeguards wellbeing and protects property, the environment and infrastructure.
- See [Tasmania's Climate Action Plan 2021](#)
- See [Queensland Emergency Management Sector Adaptation Plan for climate change](#)
- See [Victoria's Climate Change Framework](#)

With the appropriate resourcing, examples of adaptive measures that can be applied within fire and emergency services include:

- Improve PPE and health and safety standards to protect personnel against increased health risks such as fatigue, heat stroke and smoke exposure.
- Increase in workforce and resources to ensure agencies can maintain capacity during a sustained operational activity in anticipation of more frequent extreme and compounding events (fire and storm/flood).
- Plan for less capacity to share resources nationally and internationally as fire seasons lengthen and overlap and other hazards become more frequent.
- Shift and adapt firefighting strategies to ensure firefighters are not exposed to the more frequent extreme fire behaviour.
- Consider the implications of climate risk on OH&S and the necessary training updates that may be required;
- Innovate and develop technologies to adapt to more extreme weather conditions.
- Greater inclusion of cultural burning practices and adapt planned burning practices to reduce risk and adjust to the shifting feasible planned burn windows.
- Areas of major biodiversity and cultural significance included as important assets for protection in fire planning and control operations.

Continue to share information, collaborate, evolve and adapt

COVID-19 has seen the emergency management sector of Australia, New Zealand and more broadly at a global scale, require implementation of agile and rapid adaptation measures, with a collaborative approach to enable efficient and effective response for community safety.

Further reading

National Frameworks and AFAC's strategic position:

[AFAC Position 2018: Fire and Emergency Services and Climate Change](#)

[AFAC Climate Change and Fire and Emergency Services Discussion Paper 2018](#)

[National Disaster Risk Reduction Framework 2018](#)

[Strategic Directions for Fire and Emergency Services in AUS and NZ 2017–2021](#)

[UNDRR Sendai Framework for Disaster Risk Reduction 2015–2030](#)

Climate change observations and projections:

[BoM/CSIRO State of the Climate 2020](#)

[BoM/CSIRO summaries of climate change influence on some hazards](#)

[CSIRO/BoM - Climate Change in Australia](#)

[NIWA, the National Institute of Water and Atmospheric Research](#)

Climate and disaster risk:

[AIDR Knowledge Hub - Guidance for strategic decisions on climate and disaster risk](#)

[AIDR Knowledge Hub - Climate and Disaster risk, Guidance on Governance](#)

[AIDR Knowledge Hub – Disaster Mapper](#)

[AIDR Major Incidents Report 2019–20](#)

Continue to plan and prepare:

[AIDR Knowledge Hub – AJEM – Climate change challenges for Queensland's emergency management sector](#)

[AIDR Land Use Planning for Disaster Resilient Communities Handbook](#)

[CSIRO Report on Climate and Disaster Resilience](#)

[Government Association of South Australia's Climate Adaptation Report](#)

[IPCC – Climate Resilient Pathways: Adaptation, mitigation and sustainable development](#)

[National Environmental Science Program - Earth Systems and Climate Change Hub](#)

[Queensland Emergency Management Sector Adaptation Plan for climate change](#)

[Red Cross: Climate Ready Communities: A guide to getting started](#)

[Tasmania's Climate Action Plan 2021](#)

[UNDRR Concept Note for International Day for Disaster Risk Reduction 2020](#)

[Victoria's Climate Change Framework](#)

