



Government of **Western Australia**  
Department of **Water and Environmental Regulation**

# Climate Resilient WA

Directions for the state's  
Climate Adaptation Strategy

December 2022



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## Minister's foreword

Western Australia is a place like no other. Spanning a staggering two-and-a-half-million square kilometres and blessed with abundant sun and wind, our state is well placed to embrace the opportunities of the global transition to a clean energy future. We are also vulnerable to the consequences of climate change, which is already impacting how Western Australians live, work, and prosper.

The McGowan Government acknowledges the urgency of taking action in the face of a changing climate and is committed to taking action to reduce emissions and manage the impacts of climate change across our state.

In June 2022, the State Government announced a commitment to reducing whole-of-government emissions by 80 per cent below 2020 levels by 2030 – a vital step towards achieving our existing whole-of-economy target of net zero by 2050.

While the McGowan Government is taking ambitious steps to decarbonise its own operations – we cannot achieve our net zero aspiration alone. Work is now underway on the development of the Sectoral Emissions Reduction Strategies to provide robust and credible emissions reduction pathways for Western Australia, ensuring our state thrives and keeps pace as the world transitions to a net zero future.

Global emissions reduction efforts are now accelerating and will help minimise the projected consequences of climate change. However, we know that Western Australia's communities, Aboriginal people, businesses, and environment are already being impacted. Declining rainfall in the south-west, increasing bushfire risk and more frequent and severe heatwaves are just some of the impacts we are already observing. Despite emissions reduction efforts to date, some of the consequences of climate change are unavoidable, and the latest climate science shows these impacts will worsen.

Adaptation is a key component of the long-term response to climate change, and critical to ensuring communities, livelihoods and ecosystems are protected. The United Nations Framework Convention on Climate Change recognises that adaptation is a global challenge faced by all, with widespread risks across industries, sectors, and governments. Not all sections of our communities or economy can adapt equally, and there will be significant social and economic implications if we fail to act.

The McGowan Government has already taken significant steps to adapt. Substantial investment in desalination, groundwater replenishment, and water efficiency measures means we have a sustainable, climate-resilient water supply. Grant programs to better manage coastal erosion and encourage local government partnerships to address climate change further demonstrate effective initiatives underway at the local and regional scale. We are also investing in new and updated climate science for Western Australia to ensure locally relevant climate projections support ongoing decision-making and investment.

By taking action to enhance our resilience to current and future climate impacts we strengthen our communities, shape new economic opportunities, and ensure that future generations are better equipped. This will require bold action and strong partnerships with communities and key sectors of our economy.

**Climate Resilient WA** builds on commitments in the Western Australian Climate Policy and sets out core directions to enhance coordination and delivery of a statewide climate adaptation response. These directions are the result of considered analysis of action underway internationally, across Australia and locally, and respond to targeted consultation with a range of Aboriginal, community, local government, and industry stakeholders.

This paper lays the foundation for the Climate Adaptation Strategy, to be released in 2023. The Strategy will guide statewide adaptation action for years to come, and shape sector-specific initiatives that improve knowledge, capability, and partnerships to enhance community and economy-wide resilience.

A handwritten signature in black ink, appearing to read 'Reece Whitby', written in a cursive style.

**Hon Reece Whitby MLA**  
**Minister for Environment; Climate Action**



Esperance © Tourism Western Australia

## Introduction

The latest reports by the Intergovernmental Panel on Climate Change (IPCC) have reinforced the threat of climate change and the imperative for urgent action to decarbonise the global economy and adapt to the unavoidable impacts of climate change.

The Government of Western Australia is taking decisive action to support the net zero transition and create a prosperous low-carbon economy. This includes reducing State Government emissions by 80 per cent below 2020 levels by 2030 and investing in new green energy infrastructure.

While reducing greenhouse gas emissions is critical, climate impacts associated with cumulative emissions are locked in, presenting risks to health, livelihoods, and critical infrastructure.

The IPCC Working Group II report, *Climate Change 2022: Impacts, Adaptation and Vulnerability*, released this year, found climate impacts are appearing earlier and are more severe than expected. Action is needed now to protect our communities and environment and to minimise the disproportionate impacts of climate change on vulnerable people and communities, including Aboriginal people, those living with disability and those on low incomes.

The case for an urgent adaptation response is clear. Climate-induced extreme weather events, including drought, fires, and floods, have cost Australian communities an estimated \$120 billion over the past 50 years. This is expected to increase to \$150 billion over the next decade, reaching \$1 trillion by 2050 unless we take effective action. (Deloitte Access Economics 2022).

Western Australia has a history of solving challenges through innovation, resourcefulness and determination. Adapting to climate change is no different. There are clear examples of excellence in

adaptation planning and action across Western Australia that can be supported, replicated and scaled up. There are also many areas of vulnerability that need further attention.

The *Western Australian Climate Policy*, released in November 2020, committed to develop a coordinated, collaborative climate adaptation action plan to support Western Australian industries, cities and regions to identify and manage climate impacts and enhance climate resilience.

**Climate Resilient WA** builds on targeted consultation with government, environment groups, peak industry bodies and Aboriginal groups throughout 2022, and lays out the directions for Western Australia's future statewide Climate Adaptation Strategy.

This document identifies four directions to accelerate immediate action, supporting a more comprehensive long-term approach to climate risk, resilience, and adaptation:

1. Produce and communicate credible climate information
2. Build public sector climate capability and strengthen accountability
3. Enhance sector-wide and community partnerships to unite and coordinate action
4. Empower and support the climate resilience of Aboriginal people.

Further targeted consultation will be conducted in early 2023 to identify actions to support these directions. The Climate Adaptation Strategy will be released in 2023 and will include new initiatives and concrete actions to enhance resilience of industries, cities and regions.

# The case for change

The science is clear. Western Australia's climate has changed and further change is inevitable.

Over the last century, the average global temperature has risen by about 1.1°C and is expected to reach 1.5°C in the 2030s (IPCC 2021a).

This change is already impacting our state. During the same time period, the number of days over 40°C in Perth has doubled and the number of 50°C days in parts of the north-west has also doubled (Breshears et al. 2021). Heatwaves account for more deaths in Australia than all other extreme weather events combined (Coates et al. 2014).

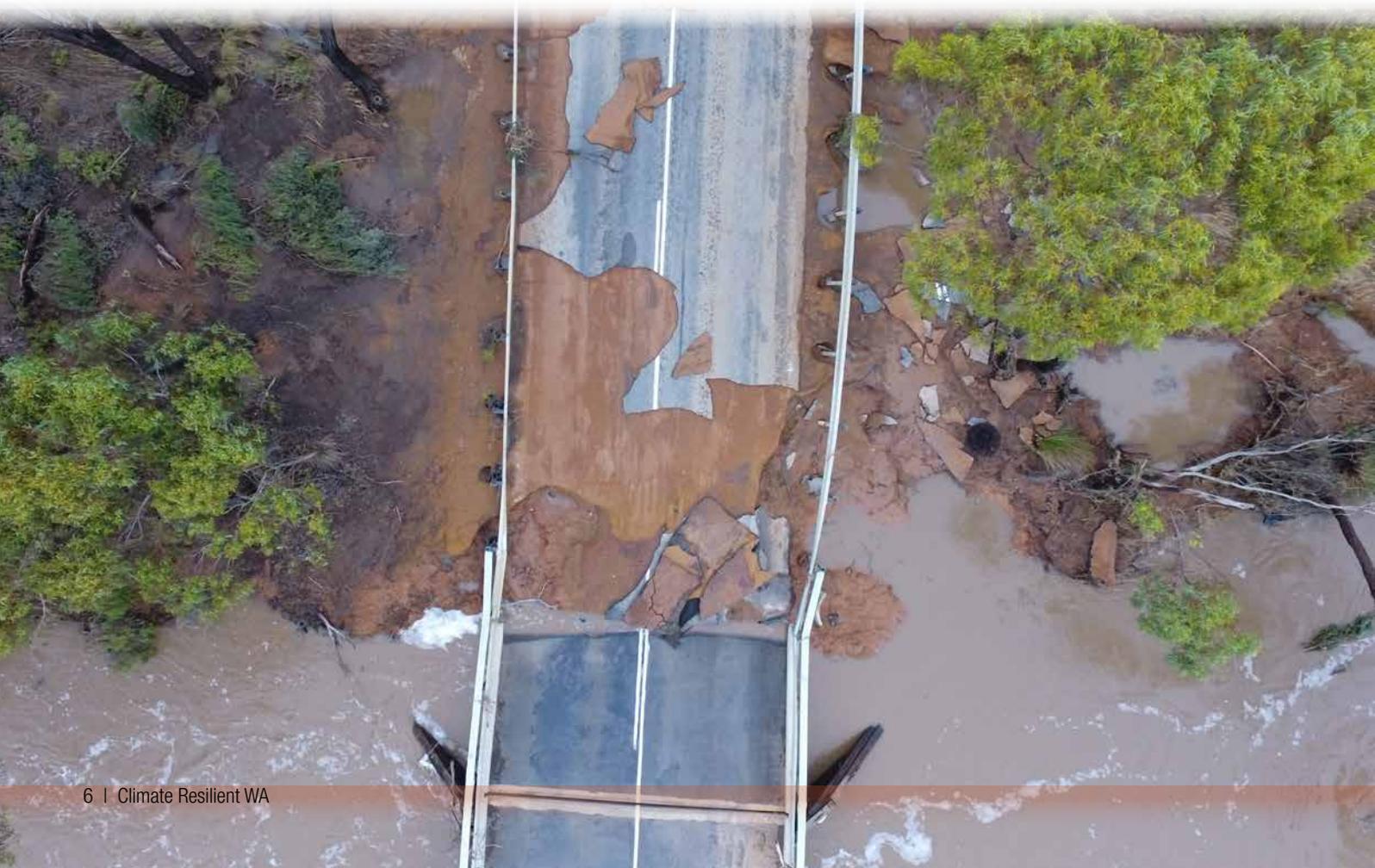
Western Australia's south-west is on the frontline of climate change. This region has experienced climate-induced drying at one of the fastest rates in the world and is projected to continue drying (IPCC 2021b). At the same time, extreme rainfall events are becoming more frequent and intense across the state, leading to localised flooding and infrastructure damage (CSIRO and Bureau of Meteorology 2015). The marine environment is also being impacted with events such as the 2010-11 marine heatwave, which affected 2,000 km of coastline in the Mid West of WA. The lower west coast of Australia has been identified as one of the world's hotspots for water temperature increases.

By mid-century, sea levels are projected to rise by about 24 cm along the Western Australian coast, exacerbating erosion and threatening coastal infrastructure (CSIRO and Bureau of Meteorology 2015).

As the global temperature increases, climate disasters are growing in size, frequency and intensity. Fires are burning more intensely and bushfire seasons are getting longer. Fire seasons in northern and southern Western Australia are increasingly overlapping, putting greater pressure on finite resources such as aerial firefighting fleets.

Increasingly climate impacts are occurring simultaneously or consecutively, causing compounding and cascading impacts. The 2009 heatwave in Victoria, which culminated in the Black Saturday bushfires, occurred at the same time two tropical cyclones made landfall in Western Australia and Queensland. Despite impacting different regions of the country, these events were caused by connected atmospheric processes.

Damaged caused by the South West Floods 2017 © Department of Fire and Emergency Services

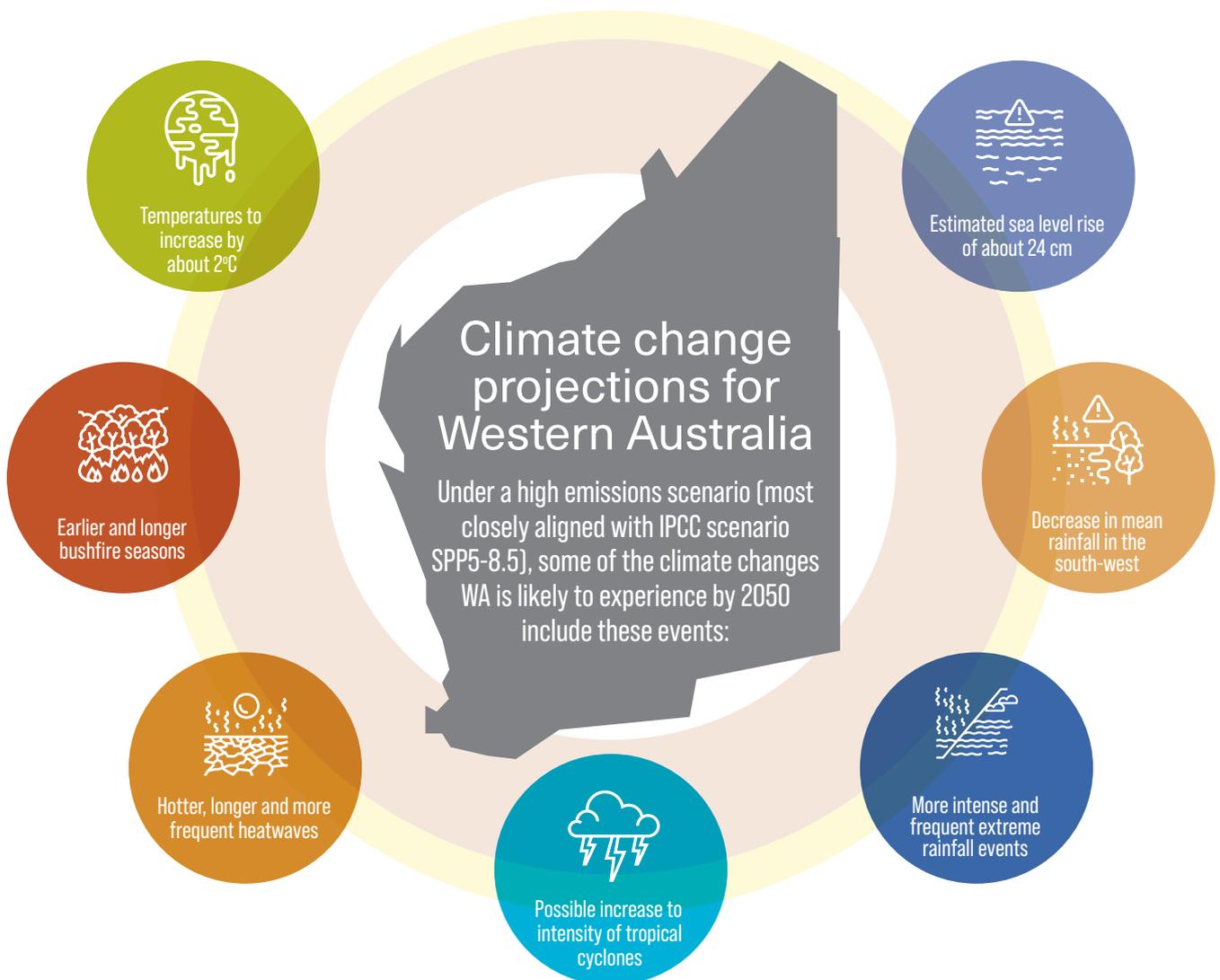


# Adapting now creates stronger communities and economic opportunities.

The costs of not adapting to climate change are significant. A recent study by Deloitte Access Economics found that, without action, Australia's economy could suffer \$174 billion in costs over the next decade (Deloitte Access Economics 2022).

The scale of impacts is expected to stretch the adaptive capacity of communities, governments and sectors. Climate change will also challenge the insurability of assets and present material risks to lenders.

The sooner we act, the more effective our adaptation response will be. Early action will help to avoid loss and suffering, reduce future disaster costs and unlock social and economic benefits. The Global Commission on Adaptation calculated that every dollar spent on adaptation can create up to 10 times the benefits (Global Commission on Adaptation 2020).



# Extreme weather events in WA



## 2021 Tropical Cyclone Seroja

In April 2021, Tropical Cyclone Seroja made landfall as a Category 3 system causing widespread damage in the Mid West. About 70 per cent of buildings in Kalbarri and Northampton were damaged in the cyclone as winds reached up to 170 km/h.

Seroja made landfall unusually far south. Many properties were not constructed to withstand such weather systems and damaged asbestos buildings resulted in extensive contamination. The impact area of the cyclone was estimated at about 133,000 km<sup>2</sup>, with associated insurance claims reported to reach \$372 million.



## 2021 Wooroloo bushfire

A rapidly evolving bushfire in the Perth Hills provided extensive challenges to emergency responders. High temperatures, strong persistent winds, low humidity and extremely low dew points coupled with steep and inaccessible terrain and high fuel loads made suppression very difficult.

The fire caused significant damage to critical infrastructure and services including power, telecommunications and roads. A total of 86 homes were lost and more than 100 other structures were destroyed or damaged.

**2010**

Perth hail storm  
Gascoyne River flooding

**2011**

WA bushfires  
Marine heatwave

**2012**

Carnarvon bushfire complex

**2013**

Cyclone Christine  
Cyclone Peta

**2014**

Perth Hills bushfire

**2015**

Cyclone Olwyn  
Esperance bushfires

**2016**

Yarloop bushfires  
Cyclone Stan

**2017**

Cyclone Hilda  
South-west flooding

**2018**

Cyclone Joyce  
Cyclone Kelvin

**2019**

Cyclone Veronica  
Esperance bushfire

**2020**

Cyclone Damien  
Cyclone Blake  
Cyclone Claudia

**2021**

Carnarvon floods  
Cyclone Seroja  
Wooroloo bushfire

**2022**

Extreme heatwave  
South-west bushfires



## 2010/11 Marine heatwave

Coastal sea temperatures for the Mid West and Gascoyne reached 4-5°C above average. This event led to catastrophic losses of seagrass meadows and fish communities in the Shark Bay World Heritage area. The loss of seagrass released 2 to 9 billion tonnes of CO<sub>2</sub> into the atmosphere over the following three years. Abalone, scallop, and swimmer crab fisheries were forced to close, impacting local businesses.



## 2017 February flooding events

Atmospheric moisture from low pressure systems in the north of WA produced significant cloud bands bringing persistent rainfall to the south-west of the state in late January and early February. This led to many daily and monthly rainfall records being broken.

The February flood event affected much of the Kimberley, Pilbara, Mid West Gascoyne, Metropolitan, Wheatbelt, Goldfields-Esperance and Great Southern regions, causing widespread impacts across a large proportion of the state. Significant damage was caused to road and bridge infrastructure and agriculture was severely affected.



## 2022 extreme heatwave

The summer of 2021-22 was Perth's hottest summer on record. Perth experienced 13 days of 40°C or over, nearly double the previous summer record of seven days. In January, Perth recorded six consecutive days in excess of 40°C. In the Pilbara, Mardie and Roebourne reached 50°C and Onslow equalled the Australian hottest day on record, reaching 50.7°C.



# Western Australia's adaptation progress

Adapting to our harsh climatic conditions and harnessing our natural advantages have always been part of the Western Australian way of life.

Against a backdrop of our drying climate, Western Australia has strong credentials in water resource management and dryland agriculture. From investing in climate-resilient water supplies and management of water entitlements, to drought-tolerant crops and traditional fire management practices, there are many examples of Western Australian leadership and innovation in response to climate change.

## Examples of action on adaptation

### Producing local-scale climate change projections

The State Government is producing the most up-to-date assessment of how our state's climate may change over the next century as part of the [Climate Science Initiative](#).

Stage one of the Climate Science Initiative will produce detailed climate change projections for the state's south-west covering Geraldton, Kalgoorlie and Esperance. The projections will provide information on a wide range of climate variables (e.g. temperature, rainfall, wind) under different scenarios of global emissions to 2100. Projections will also help improve our understanding of trends in extreme climate events.

The Initiative is being delivered in partnership with Murdoch University, the New South Wales (NSW) Government through the NSW and Australian Regional Climate Modelling (NARClIM) Project, and the Pawsey Supercomputing Research Centre. New projections will be made available online with guidance and information to help WA stakeholders plan for climate change and its impacts.

The Department of Water and Environmental Regulation is also collaborating with the Bureau of Meteorology to update guidance for selecting and applying future climate projections to water management decisions. The guidance recommends the Bureau's national hydrological projections - Australian Water Outlook ([bom.gov.au](http://bom.gov.au)) - to assess future risks to water resources from climate change (Wilson et al. 2022).

### Managing climate impacts to State Government assets and operations

The Western Australian Climate Policy commits to developing a Climate Risk Framework to support the State Government to monitor, assess, and report on the implications of climate change on the state's finances, infrastructure, physical, natural and cultural heritage assets and service delivery. An interim *Climate Change Risk Management Guide* has been developed to provide practical guidance for public sector agencies to assess and manage physical climate change risks.

Climate change risk assessment is already informing the rollout of major infrastructure programs in Western Australia. METRONET is Perth's integrated transport and land-use framework that will support growth of the Perth metropolitan region over the next 50 to 100 years. All METRONET projects are subjected to a comprehensive Climate Change Network Vulnerability and Risk Assessment with a contractual requirement to provide adaptations to any high or very high risks identified. For example, on the Morley-Ellenbrook line [project](#), flooding risk at Whiteman Park was mitigated by elevating the rail onto a viaduct.



Gascoyne River

## Supporting climate-ready agriculture

Western Australian farmers have proven resilience in cultivating the driest inhabitable continent on Earth and have rebounded following droughts, floods and fires. Advances in cropping techniques, drought-tolerant crops and technology have allowed farmers to maximise their output despite declining rainfall and warming temperatures.

The State Government is investing \$15 million into an Agriculture Climate Resilience Fund, to further support agricultural projects that build climate resilience. This includes the Gascoyne River Catchment Rehydration and Climate Resilience project, with the fund investing \$500,000 to assist Gascoyne Catchments Group in protecting the productivity and profitability of agribusinesses in the Gascoyne River catchment, which encompasses a wide range of pastoral, horticultural and fishery enterprises.

The project will implement a range of strategies to slow water movement within the catchment to decrease the risk of flooding and subsequent soil erosion. Land managers will work with Traditional Owners to incorporate traditional land management practices into the project and protect important cultural heritage values.

## Developing climate-resilient water supplies

In the 1960s, Perth recorded rainfall runoff (streamflow) into dams of 420 gigalitres (GL) per year. Dams supplied 88 per cent of the city's water needs. Today, Perth has 70 GL of streamflow, so dams provide just over 26 per cent of our drinking water. Groundwater, desalination and some groundwater replenishment have made up the difference.

All water service providers have a role in planning to adapt to the effects of climate change on their sources of water and the demand for the water they supply. Western Australia's Water Corporation was the first in Australia to use groundwater replenishment. The scheme started operating in 2017 at the Beenyup Advanced Water Recycling Plant. Since then, stage one has injected more than 54 GL of recycled water back into the ground. After the success

of the first stage, the Corporation has now expanded its recharge capacity, and can inject up to 28 GL each year back into the ground. The purified recycled water is cleaner than the water already in the aquifers and provides drinking water to more than two million Western Australians.

To secure Perth's future drinking water in the face of climate change, the State Government has invested more than \$2.35 billion in climate-resilient water sources since 2001. In September 2021, the State Government announced \$1.4 billion to help fund Perth's third desalination plant, to be powered by renewable energy. Future investment to meet growing demand will be needed, including additional supply through desalination.

In parallel, the [Kep Katitjin - Gabi Kaadadja Waterwise Perth Action Plan 2022](#) will help tackle impacts of climate change on our water resources in the Perth and Peel regions. The plan will save more than 70 GL of water every year by 2029 and support biodiversity and urban greening and cooling through water-saving initiatives and the creation of climate-resilient, liveable urban spaces.

The Department of Water and Environmental Regulation is also investigating groundwater resources across Western Australia to identify and understand them and manage them in a climate change context, with nearly 3,000 bores, 300 streamflow gauges and 200 rainfall monitoring sites across the state.

Water Treatment (Desalination) Plant © Water Corp





Environs Kimberley Fire and Biodiversity Project in the Dampier Peninsula © Environs Kimberley

## Building a climate-resilient health system

The *Climate Health Inquiry Final Report*, released in December 2020, sets a 10-year blueprint for strengthening the Western Australian health system's capability to adapt to climate change and better protect the health of the community. The final report made 10 recommendations, including to strengthen adaptation in the specific areas of extreme weather events, heatwaves, mosquito control and air pollution.

Acting on these recommendations, the State Government has established a Sustainable Development Unit to coordinate a system-wide response on climate action and sustainability across the WA health system. A Health Sector Adaptation Plan is being prepared to assess and build awareness of climate risks to human health and wellbeing, and enhance the climate resilience of the community, health sector stakeholders, health services and associated assets. The plan will include identification of the increased demand for health services resulting from climate change, and improved public health messaging to increase awareness of risks to human health.

Perth Children's Hospital



## Strengthening contemporary and traditional fire management practices to protect and conserve biodiversity

Fire has been part of the Australian landscape for millenia and contemporary prescribed burning and traditional fire management can play a valuable role in protecting the state's communities and biodiversity from the increasing risk of bushfires because of climate change.

The State Government is supporting Environs Kimberley to deliver the Sandy Deserts Fire and Biodiversity project, which will support four Aboriginal Ranger groups of the Great and Little Sandy Deserts (Ngurrara, Ngurrupa, Nyangumarta and Karajarri) to increase and better inform fire management with scientific, cultural and more accurate weather information. The benefits of this fire management will be measured through broad and targeted biodiversity surveys, including threatened and culturally significant species, allowing Rangers to adapt their fire management to maximise environmental and cultural outcomes.

Additional funding has been allocated to the Department of Biodiversity, Conservation and Attractions to support fire management in Prince Regent National Park and Drysdale River National Park. These fire mitigation activities will increase early dry season burning to minimise intense late dry season fires with an overall reduction in total area burned. Funding will also enable increased engagement and participation with Traditional Owners, who will take part in aerial burning, undertake on-Country trips and carry out cultural mapping. This intersection of contemporary prescribed burning with more traditional fire management practices will assist in enhancing the important biodiversity and cultural values of both these national parks.



Tropical Cyclone Seroja, 2021 © Department of Fire and Emergency Services

## Supporting regional local governments to act on climate change

The State Government is supporting local governments to build resilience, reduce greenhouse gas emissions and enhance capacity and knowledge to support climate action at a regional scale.

The Regional Climate Alliance Program is an initiative under the State Government's *Western Australian Climate Policy* and supports local governments to take action on climate change, energy and sustainability through regional partnerships. The program supports two partnerships, the South Coast Alliance and the Goldfields Voluntary Regional Organisation of Councils, representing 13 local governments from the Great Southern and Goldfields regions.

In 2021 the Western Australian Local Government Association (WALGA), in partnership with the State Government, launched the Climate Change Adaptation Toolkit, a seven-step process to help local governments develop a climate change adaptation strategy. The State Government is also supporting the WALGA Climate Resilient Councils Project, assisting councils to overcome barriers to the implementation of climate change planning and action.

Over 2021 and 2022, the Department of Primary Industries and Regional Development supported 16 local governments in the Mid West, Wheatbelt and Great Southern develop pilot Regional Drought Resilience Plans through the Commonwealth Future Drought Fund. The [Regional Drought Resilience Plans](#) will assist local governments to prepare for and manage future drought risks for their economies and communities.

As part of implementing the Gngangara groundwater allocation plan, the State Government is providing \$4 million in funding to support selected local governments in delivering projects to improve water efficiency and urban cooling. This will support initiatives such as redesigning public open spaces, using water-sensitive urban design, planting tree canopy for shading and undertaking water audits.

## Evolving our emergency sector adaptation response

Climate change will increase the severity and concurrency of hazards in Western Australia with significant implications for emergency services. Large-scale and concurrent events will require the coordination of personnel and assets in each jurisdiction and careful management of the resources provided by the Commonwealth.

An Emergency Management Sector Adaptation Plan is currently being developed by the State Emergency Management Committee to assess the state's climate risks and identify issues and needs, including capability gaps, resourcing needs, barriers to climate change adaptation and future challenges and opportunities.

As a result, the State Government will have an improved understanding of the climate risk exposure of the emergency management sector and clear pathways to address priority risks. Industry and peak bodies, businesses and community organisations will also have greater awareness and understanding of their respective climate risks and be better equipped to enhance the climate resilience of the sector.

Delivery of this sector adaptation plan will also provide a signal to domestic and international investors that Western Australia is systematically addressing climate risks, supported by strong State Government leadership.

EnviroNS Kimberley Fire and Biodiversity Project in the Dampier Peninsula © EnviroNS Kimberley





Coastal erosion at Sunset Beach © City of Greater Geraldton

## Managing coastal erosion hotspots

Rising sea levels and increased frequency and intensity of storms along Western Australia's coast are likely to exacerbate coastal hazards including flooding and coastal erosion.

These vulnerabilities were highlighted in the 2019 *Assessment of Coastal Erosion Hotspots in WA*, which identified 55 locations where coastal erosion is expected to impact on public and private physical assets across WA's more than 20,000 km of coastline within 25 years. In response, the State Government has established a \$33.5 million CoastWA program to build local capacity in managing coastal hazards, with a focus on the identified hotspots.

Through CoastWA, the City of Greater Geraldton was awarded \$750,000 for the construction of four geotextile groynes and sand replenishment at Sunset Beach, an identified hotspot – one of 109 coastal projects to benefit since 2021.

## Protecting our natural environment

Nature supports livelihoods and economies, helps moderate the climate itself, and offers protection from climate-related impacts such as storms, sea level rise and flooding. At the same time, climate change is impacting Western Australia's conservation estate and affecting ecological values of parks and reserves.

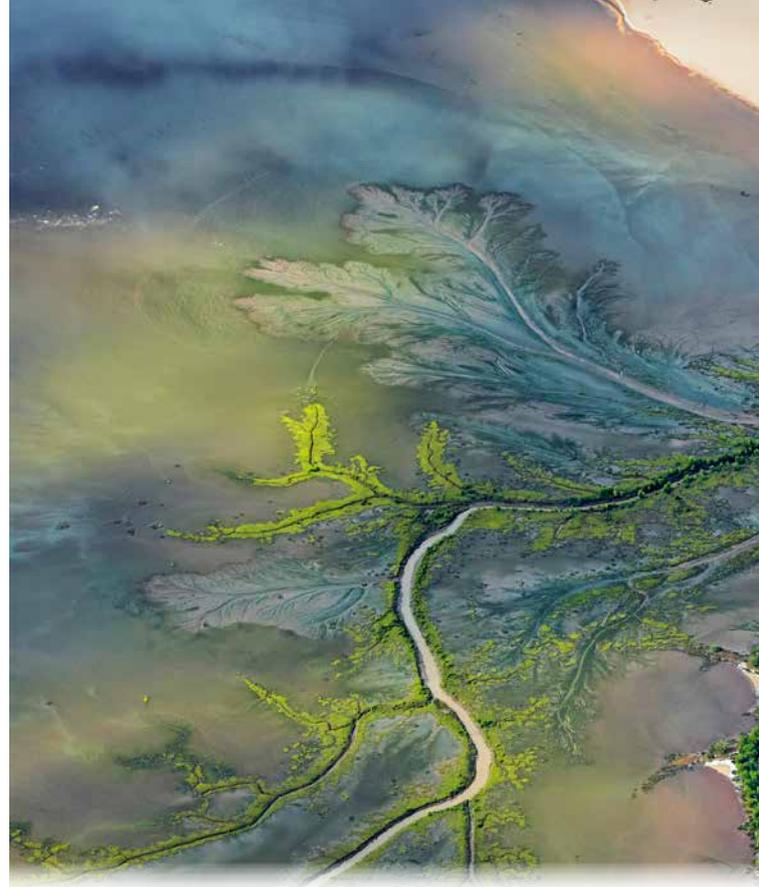
Our expanding conservation reserve system recognises the importance of nature in climate adaptation and mitigating climate-related impacts such as storms, sea level rise and flooding. The State Government's Plan for Our Parks will create five million hectares of new national and marine parks and conservation reserves by February 2024, increasing the state's conservation estate by 20 per cent and expanding existing joint management arrangements with Aboriginal Traditional Owner groups.



# Vision and principles

Western Australia's communities, environment and economy are resilient and can adapt to the unavoidable impacts of climate change in a forward-looking, fair and collaborative manner.

The State Government will adopt the following principles to ensure climate adaptation actions are proactive, fair, collaborative and promote resilience now and for future generations



**Collaborate**

Work together across all levels of government and with people, business, academia and the community to prepare for and adapt to a changing climate.



**Adjust as we go**

Design actions and decisions in a flexible and iterative way so they can be adjusted as circumstances change and new information emerges.



**Make well-informed decisions**

Use the best available evidence, including Aboriginal and local knowledge, to anticipate change and focus on adaptation.



**Mainstream adaptation**

Develop policy, systems and processes that make climate change adaptation part of everyday decision-making and planning.



**Think long-term**

Take an intergenerational perspective that goes beyond political, planning, and financial cycles, to plan for the changing climate.



**Adapt locally**

Enable communities to prepare for the risks and opportunities they face, and tailor intervention to the local situation.



**Promote equity**

Help the people, places and infrastructure most vulnerable to climate impacts, while building adaptive capacity for all. Consider the equity implications for affected stakeholders.



**Maximise co-benefits**

Take action that achieves complementary outcomes including reducing greenhouse gases while avoiding perverse adaptive responses.



King River, East Kimberley © Tourism Western Australia

## We all have a part to play

Everyone has a part to play in creating a climate-resilient Western Australia. Only by working together can we harness our potential and respond to the enormous challenge of climate change. An effective climate response requires energised and empowered communities that can make a real contribution to adaptation. Well-understood roles and responsibilities will help organisations and communities work together:

**State Government** influences climate adaptation through planning laws, provision of public infrastructure and investment in research. Relevant areas of service delivery and infrastructure provision include water, energy, emergency services, environmental protection, agriculture, health, planning and transport. The State Government also invests in regional-scale science and information and leads statewide emergency responses.

**Australian Government** is responsible for national leadership on adaptation, managing Australian Government assets and services including significant investments in public infrastructure, and providing national climate science and information. A strong, flexible economy and well-targeted safety net will ensure that climate change does not disproportionately affect vulnerable groups.

**Local governments** are on the frontline of dealing with the impacts of climate change. They manage climate risks to their assets, including by assessing coastal hazards and coastal erosion, often manage emergency responses at the local level and consider how adaptation costs may be equitably shared. Local governments are best placed to identify the adaptation needs of local communities and will typically be the first to respond to local impacts.

**Business and industry** manage risks to their own assets and investments and often drive innovation and changes that can enhance the climate resilience of products, services and markets. The business sector has a strong incentive to act in response to climate risk, but their capacity to act will differ depending on their understanding, exposure to risk and access to resources.

**Communities and households** are encouraged to identify and manage their own climate risks where possible although not everyone has the same capacity to do so. This may include planning and acting responsibly to reduce the exposure (e.g. cleaning gutters in anticipation of the bushfire season). Individuals and households can also play an important role in shaping local connections and mobilising action to strengthen resilience within their communities.

Nobody is invulnerable to the impacts of climate change; however, the risk is higher for some groups. Individuals experiencing health, social and economic pressures will be the hardest hit by climate change and often have the lowest capacity to adapt. The young and the old, those living in remote and regional areas, and Aboriginal people are often more susceptible to climate hazards because of increased health vulnerabilities and reduced climate resilience of services such as water and electricity supply. This can further exacerbate existing inequalities. Targeted support and empowerment from governments is needed to help these groups become climate resilient.

# Directions

The State Government has identified the following four directions to accelerate immediate action and deliver a more comprehensive, long-term approach to climate risk and resilience.



## 1. Produce and communicate credible climate information:

Decisions are being made now – we need localised data, research tailored to Western Australian conditions and credible analysis translated to a broad audience informing long-term planning and investment decisions.



## 2. Build public sector climate capability and strengthen accountability:

We need to leverage specialist expertise and support improved accountability across government to incorporate climate risk into existing policies and processes.



## 3. Enhance sector-wide and community partnerships to unite and coordinate action:

We need to bring together different levels of government, industry and the community to reduce fragmentation and align collective effort on the highest-impact areas.



## 4. Empower and support the climate resilience of Aboriginal people:

We need to recognise connection to Country, living Aboriginal culture and cultural heritage and the disproportionate impact of climate change on these. We also need to learn from and empower the leadership role of Traditional Owners in caring for Country and support their work to adapt to climate change.



## Direction 1: Produce and communicate credible climate information

Knowledge is power and good decisions rely on the right information. Currently, we lack some of the core data and information needed to make good decisions. This includes up-to-date climate projections on how our climate may change, information on how these changes may impact specific regions and options to respond.

Information that is currently available can be difficult to find and hard to understand. Information often lacks examples, such as case studies, or is at resolutions not suited to local decision-making. There is also limited guidance to help non-climate experts assess climate risks and develop responses.

There is a clear role for the State Government to help the community, including the business community, understand the risks posed by climate change through enhanced communication. With this understanding, communities and businesses will be better placed to respond to climate impacts.

### Understand how our climate may change and how we can respond

Climate change projections provide essential information for adaptation planning. They help us understand how the climate may change over time and across different regions. Producing climate change projections requires significant scientific and technical expertise, high-performance computing resources and very large data storage capacity. The State Government is partnering with other jurisdictions and Australia's world-class research and science institutions to deliver this important work.

The [Climate Science Initiative](#) will provide the most up-to-date assessment of how our state's climate may change over the next century. The State Government is partnering with Murdoch University, the NSW Government through the NARClIM project, and the Pawsey Supercomputing Research Centre to deliver the Initiative.



Pawsey Setonix supercomputer © Pawsey  
The Climate Science Initiative is using high-performance computer and storage resources provided by the Pawsey Supercomputing Research Centre. The newest supercomputer, Setonix, has been recognised as one of the most energy-efficient supercomputers in the world, ranking in the top five on the globally recognised Green500 list

### Translate science and research into useable information

The Climate Science Initiative will produce two to three petabytes of climate data that is only useable by big data users and technical scientists. By comparison, 1.6 petabyte of data is equivalent to the size of the 10 billion photos currently on Facebook.

Climate projections and research findings must be translated into local insights to help non-specialists understand and apply the information.

We need to improve how we translate and communicate complex climate science and research so it can be used more easily in decision-making. This may include providing training, step-by-step guidance on how to use the latest climate science to assess climate risks, and development of case studies. This work needs to be done in consultation with relevant communities, sectors, and vulnerable groups.

The Water Corporation has developed a variety of public campaigns aimed at improving waterwise practices in the face of our drying climate. We need to build on our success in such awareness raising and behaviour change campaigns to help the community and industry understand other climate risks (e.g. extreme heat) and how to respond.

Woorooloo bushfire © Department of Fire and Emergency Services





## Direction 2: Build public sector climate capability and strengthen accountability

While action is needed at different levels, some responses must be coordinated at the statewide level to reduce duplication, minimise costs and build trust with the community.

Climate change will continue to stretch the capacity of essential services including water infrastructure, health care, emergency response, electricity and transport networks. As the provider and coordinator of these critical services, the State Government plays an important role in safeguarding the community from climate disruption.

Climate adaptation cannot be isolated from other outcomes or agendas. It needs to be systemically embedded into government policy, decision-making and planning including budget and procurements practices.



### Set the right policies to enhance decision-making and encourage action

State Government agencies play an important role in managing assets, services and operations to minimise climate change risks and increase resilience. Their role in developing and updating policy, regulation and guidance also provides opportunities to progressively embed consideration of climate risk and resilience.

Climate change risk assessment is already informing the rollout of major infrastructure programs such as METRONET. We need to urgently mainstream this practice across government and improve decision-making in the face of uncertainty.

A public sector Climate Risk Framework currently in development will improve the management of climate risk across the public sector. The Climate Risk Framework will set the expectations for state agencies and government trading enterprises to assess, manage and report on climate impacts to the state's finances, assets and service delivery. This will help integrate consideration of climate change risks, opportunities, and adaptation into decision-making.

The State Government invests significantly in goods and services from private and not-for-profit providers and will continue to do so. Procurement and government purchases are powerful tools in transitioning to a net zero, climate-resilient community. The recent WA State Infrastructure Strategy, Foundations for a Stronger Tomorrow, takes a long-term infrastructure outlook to guide planning and investment decisions to 2042, focusing on a range of current challenges including climate change.

### Drive transformation through State Government leadership

State Government agencies need to lead the building of climate resilience in every part of our work and ensure all public servants and agencies see themselves as part of the climate response. This includes performance measures that reward collaboration and support employees to excel in a dynamic and adaptive environment.

### Develop appropriate metrics to measure progress

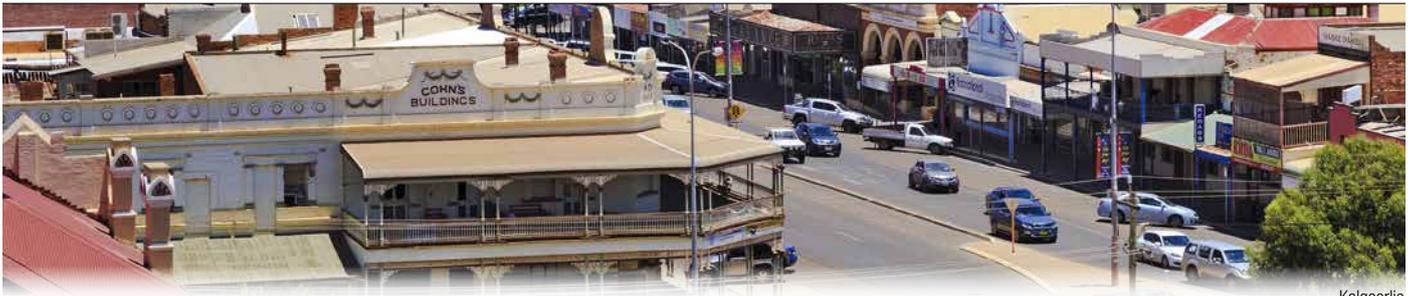
Unlike emissions reduction targets in the mitigation area, there is no single quantitative measurement for effective climate adaptation. We need a set of metrics to measure progress towards climate change resilience. This will help the State Government make good investment decisions and ensure resources are allocated efficiently. Monitoring should also avoid duplication and minimise administrative burden.

Parliament House © Parliament of Western Australia





### Direction 3: Enhance sector-wide and community partnerships to unite and coordinate action



Kalgoorlie

Local governments and communities are already taking steps to respond to climate change, including managing bushfire risk, tackling coastal erosion and implementing water efficiency and drought response measures.

Likewise, businesses, including mining and agriculture, are adjusting their operations to manage extreme temperatures and develop new approaches to agriculture and horticulture that take account of reduced growing seasons and available water.

However, while action is increasing across the state, efforts to build, resource and deploy adaptive capacity are struggling to keep pace with escalating climate impacts.

Few businesses in Western Australia have considered the full suite of climate risks that could impact their business, and more than 30 per cent believe climate change will not impact their business (Chamber of Commerce and Industry of Western Australia 2022). At the local government level some councils are taking proactive steps to address climate change risks and impacts; however, the majority have not completed climate adaptation action planning.

Action remains unevenly distributed and the capacity and capability of organisations vary across the state. Barriers to action highlighted through consultation include a lack of resourcing, expertise and access to fit-for-purpose information and guidance.

## Support local communities to create their own adaptation pathways

Local governments and Aboriginal, regional and remote communities are on the frontline of climate change impacts.

Strengthening collaborations and partnerships between these stakeholders will ensure place-based adaptation solutions are identified and implemented, and that vulnerable segments of our community are empowered to adapt.

State Government can play a role by investing and collaborating on local or regional-scale adaptation projects. Consultation to inform the development of this Directions Paper highlighted strong support for programs like the Regional Climate Alliance program that facilitates locally led and regional-scale solutions to address climate change risks and opportunities. State Government can also provide and communicate climate science, guidance and support tools to local and regional adaptation planning.

## Develop and deliver adaptation action plans together

Sector adaptation plans are being used nationally and internationally as a useful tool for government and the community to build a shared understanding of climate impacts and prioritising responses across key sectors and systems.

The State Government is currently developing adaptation plans for the health sector and the emergency management sector to combat climate change.

In addition to adaptation plans for health and emergency management, there is merit in developing adaptation plans for other key systems such as water, small-to-medium enterprises, natural environment and the built environment.

Consultation undertaken to inform this Directions Paper identified strong support for a more comprehensive sector-based approach to adaptation, which was also a key recommendation of the State Infrastructure Strategy.

Place-based stakeholders, including local government, Aboriginal people and the community, need to be engaged in developing these plans to ensure local knowledge is integrated into statewide adaptation planning. In particular, Aboriginal people have a strong understanding of and connection to Country and how it can adapt to climate variability.

This work should be done in a coordinated way and leverage understanding of common climate risks and adaptation opportunities across sectors to help identify priority adaptation responses and avoid duplication.

Manjimup © Tourism Western Australia





## Direction 4: Empower and support the climate resilience of Aboriginal people



Shark Bay World Heritage Area © Tourism Western Australia

Aboriginal people have generations of knowledge and expertise in managing and caring for Country (Janke et al. 2021). This includes knowledge of previous sea-level rise and climate patterns, and local adaptation responses including fire management, threatened species recovery, water management, and weed management.

Aboriginal people also face disproportionate effects of climate change. Historic and ongoing injustices, difficulties accessing essential services such as water supplies, housing, electricity, and food and medical supplies, and the reliance on bushfoods, particularly in remote communities, place Aboriginal people at further risk.

For people living on Country and Rangers involved with land management, the impacts of climate change are deeply personal. Hotter fire seasons and weather disruptions are impacting Rangers' ability to do their work and care for Country. Ranger groups are also noticing changing behaviours in animals and plants, including camel migrations, because of the reduced availability of food and water.

The recently released Australian State of the Environment Report found extreme events can force Aboriginal people off their Country and damage cultural heritage sites such as birthing sites and scarred trees. Warmer temperatures can also reduce the availability and growth of plants used for food and medicines. When combined, these changes can impact cultural patterns of living and travelling in and across their Country.

## Enhance adaptive capacity of communities and create spaces for discussion and deep listening with Aboriginal people

Aboriginal people have not been sufficiently included in the conversation about climate change to date. We need to create culturally safe opportunities for Aboriginal people to apply their knowledge, manage their Country and exercise their rights of self-determination.

We must improve inclusion of Aboriginal voices and knowledge in how we identify climate risk and develop adaptation solutions to climate change. This could be achieved through culturally respectful two-way dialogues between government and Aboriginal people that create spaces for Aboriginal people to share their knowledge with appropriate intellectual and cultural property protection. This will also help realise opportunities to integrate Western and Traditional Owner science and deliver dual benefits of enhanced adaptation and Aboriginal wellbeing.

## Empower Aboriginal-led climate adaptation action

Aboriginal people have a strong history of stewardship, resilience and adaptation. While cultural knowledge of climate change and adaptation is thousands of years old, it is also contemporary and highly relevant. Responding to climate change presents an opportunity for empowerment of Aboriginal people, allowing communities to lead climate action planning based on their knowledge of Country.

Consultation with Aboriginal people undertaken to inform this Directions Paper identified several immediate priorities to strengthen adaptive capacity. These are largely focused on enhancing basic rights (access to housing, food and water) improving the resilience of existing housing and community infrastructure, building respectful, trusting partnerships to share and weave together Indigenous and Western knowledge systems, and providing sustainable and flexible government funding to support Aboriginal-led climate adaptation action.

Njaki Njaki Aboriginal Cultural Tours, Merredin © Tourism Western Australia



## Next steps

*Climate Resilient WA: Directions for the State's Climate Adaptation Strategy* has been developed with input from key Western Australian stakeholders, including state and local governments, Aboriginal groups, peak industry bodies and environment and health organisations.

Further targeted consultation will be undertaken in 2023 to inform the finalisation of the Climate Adaptation Strategy.

The Climate Adaptation Strategy will be released in 2023 and deliver a broad range of actions to help Western Australian households, communities and businesses adapt to climate change and improve the resilience of our state.



# Glossary

<b>Adaptation</b>	The process of adjustment to the actual or expected effects of climate change to moderate harm or take advantage of beneficial opportunities. It can be proactive, reactive, incremental or transformational (IPCC 2022).
<b>Adaptive capacity</b>	The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities or respond to consequences (IPCC 2018).
<b>Climate hazard</b>	A potential natural or human-induced physical event, trend or disturbance that may cause loss of life, injury or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, ecosystems and environmental resources (IPCC 2022).
<b>Climate impact</b>	The consequences of climate change because of interactions of climate-related hazards (including extreme weather/climate events), exposure, and vulnerability. Impacts can be adverse or beneficial (IPCC 2021a).
<b>Climate change projections</b>	The simulated response of the climate system to a scenario of future emissions or concentrations of greenhouse gases and aerosols and changes in land use, generally derived using climate models (IPCC 2021a).
<b>Climate Risk</b>	The potential for negative consequences because of the exposure and vulnerability of human or ecological systems (IPCC 2021a).
<b>Mitigation</b>	Actions to reduce greenhouse gas emissions or enhance sinks of greenhouse gases to slow the rate of climate change (IPCC 2022b).
<b>Resilience</b>	The capacity of social, economic and ecosystems to cope with a hazardous event, trend or disturbance (IPCC 2022).
<b>Vulnerability</b>	The propensity or predisposition to be adversely affected, including the sensitivity or susceptibility to harm and lack of capacity to cope and adapt (IPCC 2022).

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