

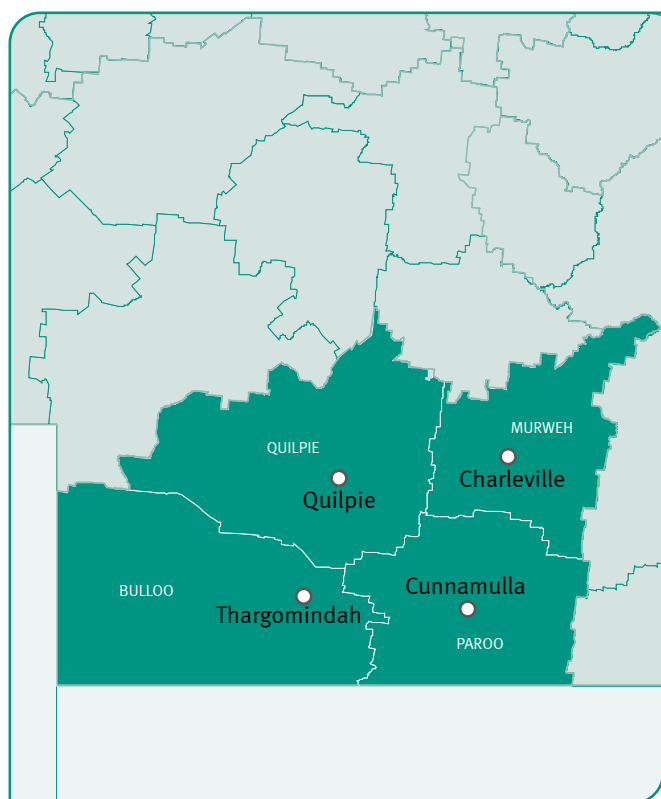
Climate change

in the South West Queensland region

VERSION 1



UNDERSTAND | ADAPT



South West Queensland region snapshot

South West Queensland is one of the most remote areas in the state, encompassing the Bulloo, Warrego and Paroo River catchments and the Nebine–Mungallala Creek catchment. The region occupies 13% of the area of the state, but represents only around 0.2% of the population.

How will climate change affect the South West Queensland region?

In the future, the region can expect:



higher temperatures



hotter and more frequent hot days



harsher fire weather



more intense downpours

How can we deal with these changes?

Queensland often experiences climate extremes such as floods, droughts, heatwaves and bushfires. Climate change is likely to exacerbate the frequency and severity of these events. We will increasingly be affected by changes in temperature, rainfall, sea level and extreme weather conditions.

It makes sense to take appropriate action to better manage our climate risks. Well-considered and effective adaptation measures can limit the adverse impacts of climate change on communities, the economy and natural systems. We can achieve more if we act together to plan for and manage current and future climate impacts across different sectors and regions.

The Queensland Government is working with a range of stakeholders, using the best available science to address the risks climate change presents to our economy, environment, infrastructure and communities. This publication presents details of the expected changes to temperature and rainfall. It highlights the likely impacts on people, businesses and the environment and presents ways to respond. For more information on climate change in Queensland, visit www.qld.gov.au/environment/climate/climate-change/resources/science.



Looking to the future

Our current climate

The South West Queensland region has a semi-arid to arid climate, with very hot summers and generally warm and dry winters.

The average annual temperature is 22°C. The summer average temperature is 29°C, autumn is 22°C, winter is 14°C and spring is 23°C.

Annual and seasonal average rainfall are variable, affected by local factors such as topography and vegetation, and broader scale weather patterns, such as the El Niño–Southern Oscillation.

Annual average rainfall is 339mm, with most rain falling during October to March either as heavy thunderstorms or rain depressions.

The region's annual average potential evaporation is over four times the annual average rainfall, which contributes to the depletion of soil moisture.

However, the climate is changing across Queensland.

Average temperatures across the state are currently 1°C higher than they were 100 years ago. Recent decades have shown a clear warming trend. Our climate is already highly variable but climate change is leading to shifts beyond this natural variability.

Our future climate

Our climate is changing primarily because increasing amounts of greenhouse gases in the atmosphere are trapping heat, warming the air and oceans.

To determine what our future climate might be, scientists use global climate models to simulate the Earth's climate system. The models use a set of mathematical formulae that describe the physical processes of the atmosphere, ocean, land and ice.

Population, the economy, policy decisions and technology will all affect future emissions of greenhouse gases. We don't know exactly what these effects will be, so to cover a range of possibilities, scientists use emissions scenarios called representative concentration pathways (RCPs) to develop climate projections. These projections describe a lower emissions future, where greenhouse gas emissions are substantially reduced (using a scenario termed RCP4.5), and a high emissions future, where high levels of greenhouse gas emissions are set to continue (using a scenario termed RCP8.5).

The projections in this summary are given for 20-year periods centred on 2030 and 2070. The 2030 high and low emissions scenarios are so similar that only the high

emissions scenario has been used in this publication. Projections are represented as a change relative to the average for the period 1986–2005.

For example, in 2070 under a high emissions scenario, temperature in the South West Queensland region is projected to rise by 3.4°C (1.8 to 4.2°C). In this case, the middle temperature rise determined by all the models is 3.4°C. The range is between 1.8°C and 4.2°C, meaning 95% of model results indicated a rise of at least 1.8°C and 95% of the model results indicated a rise of 4.2°C or less.

The Queensland Climate Transition Strategy outlines how we will transition to a zero net emissions future that supports jobs, industries, communities and the environment. Find the strategy at www.qld.gov.au/environment/climate/climate-change/response.

Cunnamulla 2030

In 2030, under a high emissions scenario, the climate of Cunnamulla will be more like the current climate of Quilpie.

To find out what the future climate will be like where you live, use the climate analogues tool on the Climate Change in Australia website at

www.climatechangeinaustralia.gov.au. The tool matches projected rainfall and maximum temperature with the current climate experienced in another location for the years 2030, 2050 and 2090.



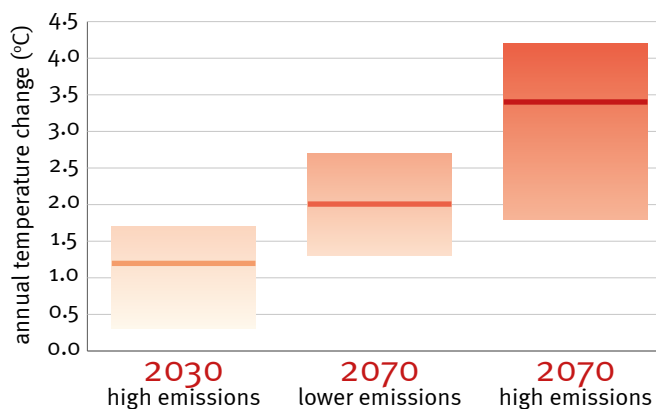
Climate projections for South West Queensland



Higher temperatures

Maximum, minimum and average temperatures are projected to continue to rise. For the near future (2030), the annually averaged warming is projected to be between 0.3 and 1.7°C above the climate of 1986–2005. By 2070, the projected range of warming is 1.3 to 4.2°C, depending on future emissions.

The region's summer average temperature is 29°C. This could rise to over 30°C by 2030 and to over 33°C by 2070.



Projected annual average temperature changes for the South West Queensland region. The horizontal line on each bar is the middle (median) projected temperature change. The extent of each bar indicates the range of projected changes.



Hotter and more frequent hot days

There is likely to be a substantial increase in the temperature reached on the hottest days, and an increase in the frequency of hot days and the duration of warm spells.



Harsher fire weather

Fire weather is a measure of fuel dryness and hot, dry, windy conditions. When bushfires occur, more extreme fire behaviour can be expected.

Climate change projections are based on Climate Change in Australia data from CSIRO and the Bureau of Meteorology. More detailed information on these and other climate variables is available at www.qld.gov.au/environment/climate/climate-change/resources/science.

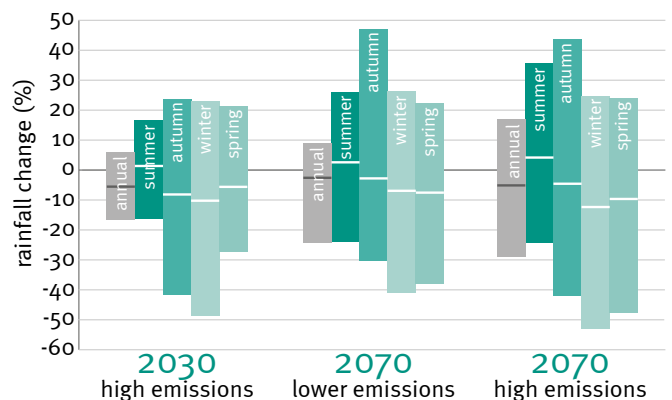


More intense downpours

High climate variability is likely to remain the major factor influencing rainfall changes in the next few decades.

In 2070, rainfall changes show a large amount of variability, with possibilities of a drier or wetter climate.

The intensity of heavy rainfall events is likely to increase.



Projected annual and seasonal rainfall changes for the South West Queensland region. The horizontal line on each bar is the middle (median) projected rainfall change. The extent of the bar indicates the range of projected changes.




Changes to drought are less clear

Projecting changes in the frequency and duration of drought is difficult. However, by late this century, under a high emissions scenario, it is likely that the region will experience more time in drought.



Climate risks, impacts and responses

The range of likely changes to Queensland's climate in the coming years and decades presents opportunities and risks. Extensive work is being done to identify the likely impacts, sector by sector, and how best to respond to them.

Sector	Climate risks ↑ = increase, ↓ = decrease	Impacts	Potential responses
	<ul style="list-style-type: none"> ↑ storm intensity ↑ fire weather ↑ heatwaves 	<ul style="list-style-type: none"> Increased maintenance costs Increased disruption to services Increased energy and water usage 	<ul style="list-style-type: none"> Consider future climate, bushfire and flood risk when locating and constructing new infrastructure Insure public assets Design buildings to accommodate changing climate
	<ul style="list-style-type: none"> ↑ temperature ↑ storm events ↑ fire weather 	<ul style="list-style-type: none"> Increased threats to tourism infrastructure Damage to popular environmental sites Risks to tourists unfamiliar with conditions 	<ul style="list-style-type: none"> Consider climate risks in emergency planning for tourist sites Adopt appropriate cancellation policies for extreme weather Prepare for changing seasonal demand
	<ul style="list-style-type: none"> ↑ inundation and flooding ↑ fire weather ↑ heatwaves 	<ul style="list-style-type: none"> Disruption to supply chains Disruption to workplaces and infrastructure Loss of customers during emergency recovery 	<ul style="list-style-type: none"> Business continuity planning Shift critical infrastructure out of hazard zones Enable flexible working arrangements Diversify customer base and products
	<ul style="list-style-type: none"> ↑ temperature ↑ hot days ↑ fire weather ↑ drought risk 	<ul style="list-style-type: none"> Changed distribution of pests and diseases Heat stress on livestock and crops Farms affected by bushfire Reduced water security 	<ul style="list-style-type: none"> Consider diversifying outputs or business Improve water efficiency
	<ul style="list-style-type: none"> ↑ fire weather ↑ temperature ↑ drought risk 	<ul style="list-style-type: none"> Existing threats to flora and fauna are exacerbated Changes to habitat Altered disturbance regimes Changing dynamics of invasive species 	<ul style="list-style-type: none"> Develop strategies to respond to new and emerging diseases and pests Link habitats to allow species to move Consider moving selected populations to new areas
	<ul style="list-style-type: none"> ↑ heatwaves ↑ fire weather 	<ul style="list-style-type: none"> More stress on health and emergency services More heat-related deaths, particularly among the elderly and disadvantaged Mental health effects Changes in disease occurrence 	<ul style="list-style-type: none"> Use existing social networks to support vulnerable community members Implement rural mental health care programs Consider climate risks when developing emergency planning for schools, hospitals, services Increase green spaces and cool zones for heat stress
	<ul style="list-style-type: none"> ↑ inundation and flooding ↑ fire weather ↑ heatwaves ↑ rainfall intensity 	<ul style="list-style-type: none"> Increased fire season duration and fire intensity will affect urban fringe communities Increased storm intensity will increase flooding risk 	<ul style="list-style-type: none"> Improve bushfire safety standards for urban development Increased focus on community preparedness and prevention Update risk management standards to account for increased risk from climate change

Adapting to climate change

Queensland's environment, economy and communities are already experiencing the impacts from a changing climate. The development of a Queensland Climate Adaptation Strategy will assist government, businesses and communities to manage and respond to our changing climate.



Human settlements and infrastructure

Charleville is the major business and services hub of this sparsely populated region. The regional population of around 8,000 is supplemented by people employed as fly-in/fly-out workers in the Cooper and Eromanga basins.

Communities in South West Queensland are often exposed to climate extremes, and therefore may be better able to adapt to these conditions than other communities. However, if these extremes become more frequent and of longer duration, there will be greater challenges and energy demands for creating a comfortable living environment.

Flooding, due to more intense extreme storms, could affect water, sewerage, stormwater, transport and communications infrastructure. Flash flooding and wind damage may exacerbate these impacts. This may increase the cost of insurance to business and the community.

Adaptation measures

- Consider how to adapt existing homes and communities to deal with projected inundation.
- Plan for new developments and infrastructure to take into account climate impacts and extreme events such as flooding, storms and extreme heat.

The **Queensland State Planning Policy** recognises climate change as a key consideration for State and local governments to incorporate through their planning and development frameworks. The policy ensures the impacts of climate change, such as storm tide inundation and coastal erosion, are accounted for when making or amending local government planning schemes or regional plans, and during development assessment. For more information visit www.dilgp.qld.gov.au.



Tourism

Located at the junction of four states and territories, the region is attractive for four-wheel drive adventure tourists. Tourism and the retail trade are also major contributors to employment in the rural centres.

Increases in temperature could reduce the tourist season, as extended heatwaves will make the region less attractive to visitors. Increased flooding risk may threaten tourism infrastructure and damage popular environmental sites. The increased risks to tourists unfamiliar with these conditions will need to be managed.

Adaptation measures

- Consider climate risks in emergency planning for tourist sites.
- Adopt appropriate cancellation policies for extreme weather.
- Prepare for changing seasonal demand.





Business and industry

Major economic activities include oil, gas and gemstone (opal) extraction.

Increased frequency of flooding and inundation and heatwaves may disrupt supply chains, make it difficult for staff to get to work, and prevent customers from accessing services and products. Extreme events may also damage workplaces, equipment and facilities, especially if the businesses are unprepared. This may increase the cost of insurance.

Flooding can affect contaminated water storage, requiring additional security and protection measures. Conversely, droughts can reduce the available water for minerals processing and mine operations, and create competition for water resources with other users, such as communities and farmers.

Businesses that are prepared will be able to ensure continuity of supply to their clients during/following a disruptive event. Investment in infrastructure, insurance and risk planning will increase as businesses prepare for the impacts.

Adaptation measures

- Undertake business continuity planning accounting for likely increases in extreme weather and events.
- Shift critical infrastructure out of hazard zones.
- Enable flexible working arrangements.
- Diversify customer base and products.



Agriculture

The western part of the region is desert, receiving less than 150mm of annual rainfall. It is used for beef cattle and sheep grazing. The eastern part of the region is predominantly used for sheep grazing. Produce goes to the export market and transport is a major issue, especially in summer when roads may be flooded.

Climatic changes could alter the distribution and incidence of pests and diseases.

Adaptation measures

- Improve management of pests and disease.
- Manage climate variability and change by using forecasts of rainfall (and temperature) in decision-making.
- Employ supplementary feeding, early weaning and culling animals at risk to reduce mortalities in dry conditions.

The Queensland Government's **LongPaddock** website provides climate information, seasonal forecasts and a range of decision support tools to assist producers to improve their climate risk management.

Visit www.longpaddock.qld.gov.au.





Biodiversity and iconic ecosystems

This region includes the Mulga Lands and Channel Country bioregions. Dominant plants, including mulga on the Mulga Lands bioregion, should survive considerable climate change. The Channel Country is the hottest and driest bioregion in Queensland. Most of the species in this region are well adapted to high summer temperatures, low rainfall and frequent drought; however, a hotter, drier climate may push some species beyond their limits.

Within the region, heatwaves coupled with severe drought are likely to seriously impact the populations of many bird, mammal, reptile and amphibian species. Koalas and yellow-footed rock wallabies seem most likely to decline because they are at the edges of their ranges within the Mulga Lands.

Additional threats to birds within the Mulga Lands include the expected decline in size, frequency of filling and productivity of ephemeral wetlands. Lower rainfall in the Channel Country would reduce breeding success of waterbirds. This would have national implications due to the high significance of breeding events.

For further information on Queensland's bioregions see www.qld.gov.au/environment/plants-animals/plants/ecosystems/framework/.

Adaptation measures

- Retain shade structures and paddock trees to provide heat refuges and landscape connectivity.
- Protect all permanent waterholes.
- Manage fire, invasive pasture grasses (buffel grass), feral animals (goats, horses) and invasive natives (such as noisy miners) to reduce losses and protect rare plants.
- Prevent vegetation thickening in conservation areas.
- Undertake weed management and rehabilitation of native plant species, including community education.

NatureAssist targets properties that have significant conservation values, connectivity and predicted resilience to a changing climate for protection. Landholders are able to work with the Department of Environment and Heritage Protection to voluntarily secure their properties under a Nature Refuge Agreement, and employ targeted conservation actions to enhance the properties' resilience. Further information is available at www.ehp.qld.gov.au.



Human health

Higher temperatures and more hot days could result in heat exhaustion and increased mortality among vulnerable people, including the very young and old. People in locations that have not regularly experienced such high temperatures may struggle to adapt to these conditions.

Increases in extreme events can lead to increased pressure on health services, including an increased demand for health professionals, ambulance and hospital workers. Many parts of the country already find it hard to recruit dedicated health care and social service professionals.

Rural, regional and remote communities are particularly exposed in a deteriorating climate. Climate change compounds the chronic difficulties and inequities that already face many communities.

The emotional and psychological toll of disasters can linger for months, even years, affecting whole families, the capacity for people to work and the wellbeing of the community.

Adaptation measures

- Develop agreements with workers on how to manage extreme hot days.
- Clearly identify public cool zones or shaded areas for the community.
- Develop social support networks.

Queensland Health is aware of the impact that drought and disasters has on people and communities. The Tackling Adversity in Regional Drought and Disaster communities through integrating Health Services (TARDDiHS) grants program provides assistance to build community networks that foster social connectedness, improve help-seeking behaviour, build capacity for learning to live with change and uncertainty, and promote positive adaptability in response to adversity. More information is available at www.health.qld.gov.au/clinical-practice/guidelines-procedures/clinical-staff/mental-health/grants/rural-remote-community.



Emergency services

The region is prone to extended periods of drought followed by occasional flooding. Bushfires can threaten farms and communities.

Higher temperatures and longer dry seasons could increase bushfire risk, particularly for towns and agricultural enterprises.

Increases in storm intensity will increase the risk of flash flooding.

Adaptation measures

- Improve bushfire safety standards for urban development.
- Increase focus on community preparedness.
- Update risk management standards to account for increased risk from climate change.

MetEYE, a map of weather observations and official forecasts produced by the Bureau of Meteorology, can increase community preparedness by providing forewarning of extreme weather events such as heatwaves, cyclones and flooding rain. This service provides seven-day forecasting of many climate variables including temperature, wind, rain, humidity, frost and snow. See www.bom.gov.au/australia/meteye/.

What's happening in your region?

The Queensland Government is interested to know what innovative climate adaptation initiatives are happening in your region. You can share this information by emailing adaptation@des.qld.gov.au.

Queensland climate change resources

To find out more about the Queensland Government's policy response to climate change, including commitments to reduce emissions and adapt to our changing climate, visit www.qld.gov.au/environment/climate/about-climate-change.

The Bureau of Meteorology website provides access to weather forecasts, severe weather warnings, observations, flood information, marine and high seas forecasts and climate information at www.bom.gov.au.

Climate outlooks are available from the LongPaddock website at www.longpaddock.qld.gov.au.

Information about the projected future climate and its impacts is available from the Queensland Future Climate Dashboard at www.qld.gov.au/FutureClimateDashboard.

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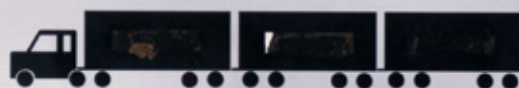
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CAUTION

ROAD TRAINS



53 METRES LONG

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