

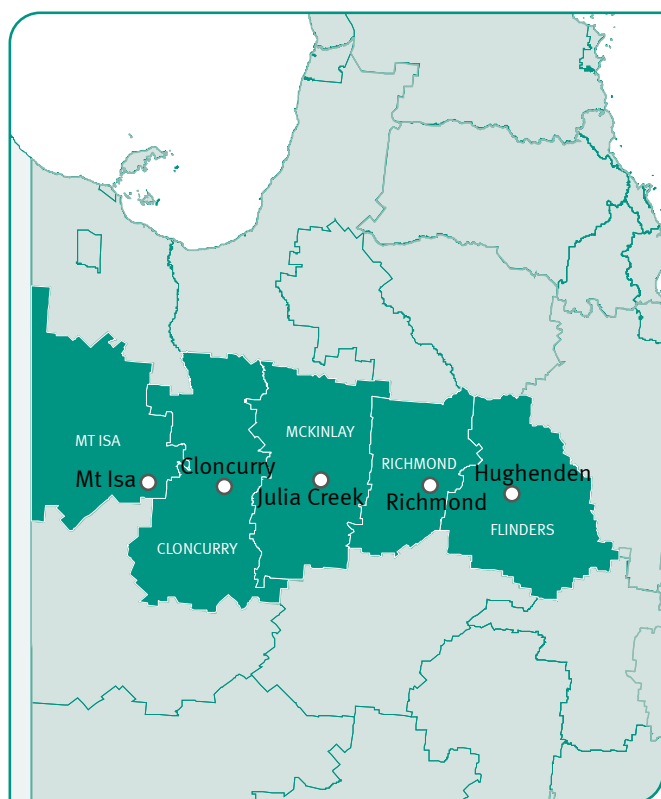
Climate change

in the North West Queensland region

VERSION 1



UNDERSTAND | ADAPT







North West Queensland region snapshot

North West Queensland stretches from the Northern Territory border in the west to the Great Dividing Range in the east, including the towns of Mount Isa, Cloncurry, Julia Creek, Richmond and Hughenden. The region occupies around 12% of the state's total area but is home to less than 1% of the state's population.

How will climate change affect the North 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 North West Queensland region has a semi-arid climate with hot humid summers and dry warm winters.

The average annual temperature is 25°C. The summer average temperature is 30°C, and the winter average temperature is 19°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 453mm, with most rain falling during the summer wet season (October–March) either as thunderstorms or rain depressions.

The region's annual average potential evaporation is approximately 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.

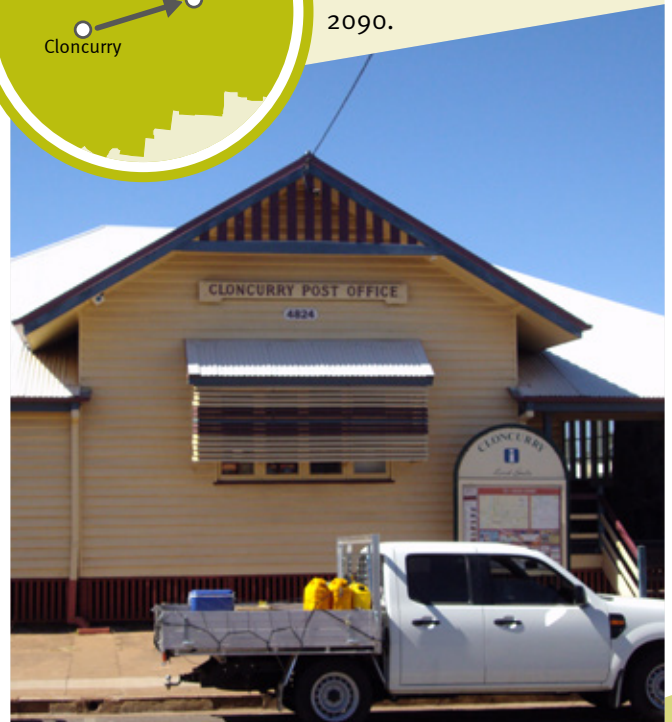
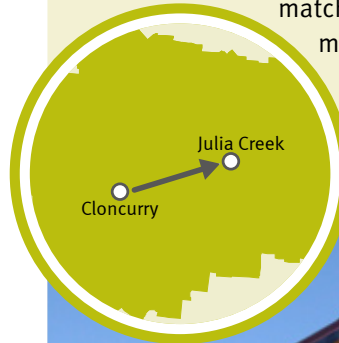
For example, in 2070 under a high emissions scenario, temperature in the North West Queensland region is projected to rise by 3.0°C (1.7 to 4.1°C). In this case, the middle temperature rise determined by all the models is 3.0°C. The range is between 1.7°C and 4.1°C, meaning 95% of model results indicated a rise of at least 1.7°C and 95% of the model results indicated a rise of 4.1°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.

Cloncurry 2030

In 2030, under a high emissions scenario, Cloncurry will experience temperatures more like those currently experienced in Julia Creek.

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.



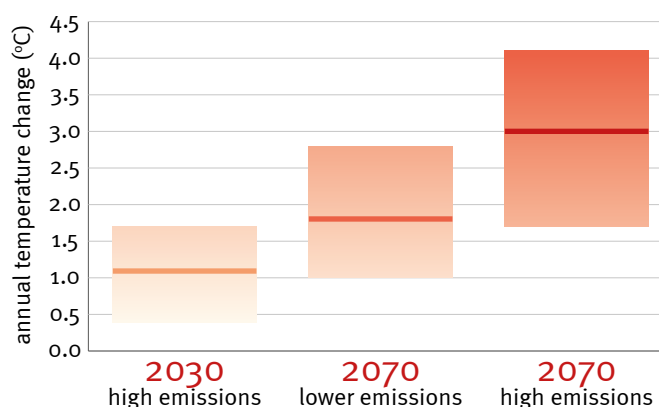
Climate projections for North West Queensland



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 0.4 and 1.7°C above the climate of 1986–2005. By 2070, the projected range of warming is 1.0 to 4.1°C, depending on future emissions.

The region's summer average temperature is 30°C. This could rise to over 31°C by 2030 and to over 34°C by 2070.



Projected annual average temperature changes for the North 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.

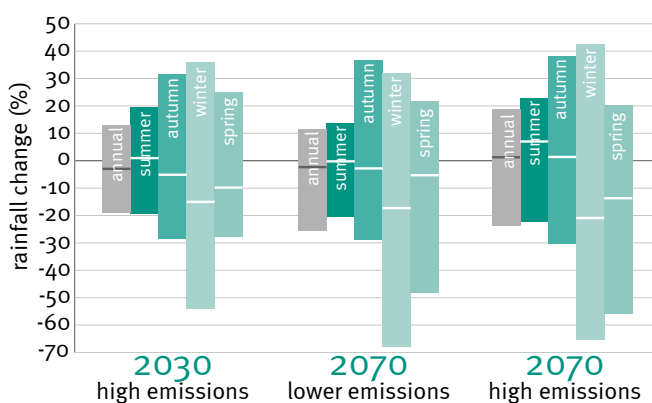


More intense downpours

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

In 2070, rainfall changes continue to show a large amount of variability, with the possibility of a drier or wetter climate. Winter and spring rainfall declines are possible towards the end of the century.

The intensity of heavy rainfall events is likely to increase.



Projected annual and seasonal rainfall changes for the North 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.

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.



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 developments and infrastructure Increase road heights Insure public assets
	<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 	<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 Consider different crop varieties and sowing times Improve water efficiency
	<ul style="list-style-type: none"> ↑ fire weather ↑ temperature 	<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 rural communities Increased storm intensity will increase flooding risk 	<ul style="list-style-type: none"> Improve bushfire safety standards for 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

Around three-quarters of the region's population of around 30,000 is in Mount Isa, the main regional centre. While the other regional centres predominantly service the grazing industry, Mount Isa is focused on mining and support industries. The region is serviced by one major highway, sealed and unsealed roads and a rail network. The major domestic airport is at Mount Isa, with smaller airports at Burketown, Normanton, Doomadgee, Cloncurry, Julia Creek, Richmond and Hughenden.

Communities in the region are exposed to climate extremes on a regular basis, and therefore may be better able to adapt to conditions under a changing climate than other communities. However, if climate 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.

Increased bushfire risk will threaten infrastructure, homes and agricultural industries.

Adaptation measures

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



Tourism

Mount Isa is an iconic tourist destination for travellers into remote Australia. Its unique landscapes and distance from other centres are attractive for four-wheel drivers and adventure travellers.

Increases in temperature could reduce the tourist season, as extended heatwaves will make the region less attractive to visitors. Increased bushfire and 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

The region is well known for its globally significant mineral resources, including lead and zinc, silver, copper and phosphate.

Increased frequency of flooding and inundation, bushfires 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, reduced water availability for minerals processing and mine operations may 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 North West Queensland region has a long history of pastoral beef, sheep and wool production. The vast majority of land tenure in the region is pastoral leasehold.

Drought and rural debt are contributing to significant profitability problems in the pastoral sector, and this would be exacerbated by any increased drought frequency. Drier conditions could decrease forage production, surface cover, livestock carrying capacity and animal production, and cause major changes in plant and animal species composition.

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

Adaptation measures

- Improve management of pests and disease by introducing more species of dung fauna (control of buffalo fly larvae), greater use of traps and baits (buffalo and sheep blowflies) and vaccines (cattle ticks and worms).
- Increase or maintain cattle breeds which provide cattle tick and buffalo fly resistance.
- Manage climate variability and change by using forecasts of rainfall (and temperature) in decision-making about crops and planting times.
- Use supplementary feeding, early weaning and culling animals at risk to reduce mortalities in dry conditions.

The Managing Climate Variability program has developed **CliMate**, designed for producers who seek to understand recent weather and probabilities of future weather events. The tool uses weather data, statistics and forecasts with farming system information, such as soil water and heat sum. It is available at www.australianclimate.net.au.



Biodiversity and iconic ecosystems

The region includes the Northwest Highlands, Gulf Plains and Mitchell Grass Downs bioregions. The Northwest Highlands bioregion has low levels of endemism and plants that do not live close to their climatic limits. The Gulf Plains bioregion is dominated by vast plains that are vulnerable to increased flooding over large areas. It is an important bioregion for waterbirds. The Mitchell Grass Downs bioregion has large, treeless areas in which plant and animal diversity is low. Most of the species in this bioregion are well adapted to high summer temperatures, low rainfall and frequent droughts; however, a hotter, drier climate may be too great for certain species to cope and may lead to biodiversity decline.

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

Severe drought events in central Australia could drive the feral camel population into the region, which may have serious consequences for woody vegetation. Mitchell grasses are very well adapted to a hot climate and severe drought; however, widespread die-offs can occur with serious implications for wildlife.

The purple-necked rock-wallaby, largely endemic to the region, may be threatened if temperatures increase several degrees, forcing populations to contract back to rugged areas near permanent water and where substantial caves and overhangs provide shelter.

Long dry spells followed by heavier rainfall events could lead to increased flood duration on the Gulf Plains. This may result in cattle and wildlife loss, widespread pasture death and weed invasion.

Adaptation measures

- Manage fire, invasive pasture grasses (buffel grass, guinea grass), and feral animals to reduce losses and protect rare plants.
- Destock cattle in drought events and after major floods to facilitate survival and recovery of pastures.
- Prevent vegetation thickening in conservation areas.

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.des.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.

The **Queensland Mental Health Commission** has funded a drought support officer to work across the drought declared shires of Flinders, McKinlay and Richmond in the North West Queensland region. The drought support officer provides support for graziers, their families and rural communities by promoting personal and mental wellbeing and resilience, through a series of training, seminars, workshops and linkages to businesses and individuals. See www.qmhc.qld.gov.au/drought-worker-supports-community-resilience.



Emergency services

The region is influenced by monsoonal rainfall followed by periods of extended drought. Emergency situations swing from extreme flooding and isolated communities through to extended drought and heat events.

Higher temperatures and harsher fire weather will be a problem, particularly for farming communities where natural ecosystems abut houses and businesses.

Increases in storm intensity will see a higher risk of flooding and inundation throughout the region, particularly in the Channel Country.

Adaptation measures

- Improve bushfire safety standards for 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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Acknowledgements

The Queensland Government acknowledges the use of data from the CSIRO and Bureau of Meteorology Climate Change in Australia website (www.climatechangeinaustralia.gov.au). It also acknowledges the World Climate Research Programme's Working Group on Coupled Modelling, which is responsible for Coupled Model Intercomparison Project (CMIP), and thanks the climate modelling groups for producing and making available their model output. For CMIP the U.S. Department of Energy's Program for Climate Model Diagnosis and Intercomparison provides coordinating support and led development of software infrastructure in partnership with the Global Organization for Earth System Science Portals.

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