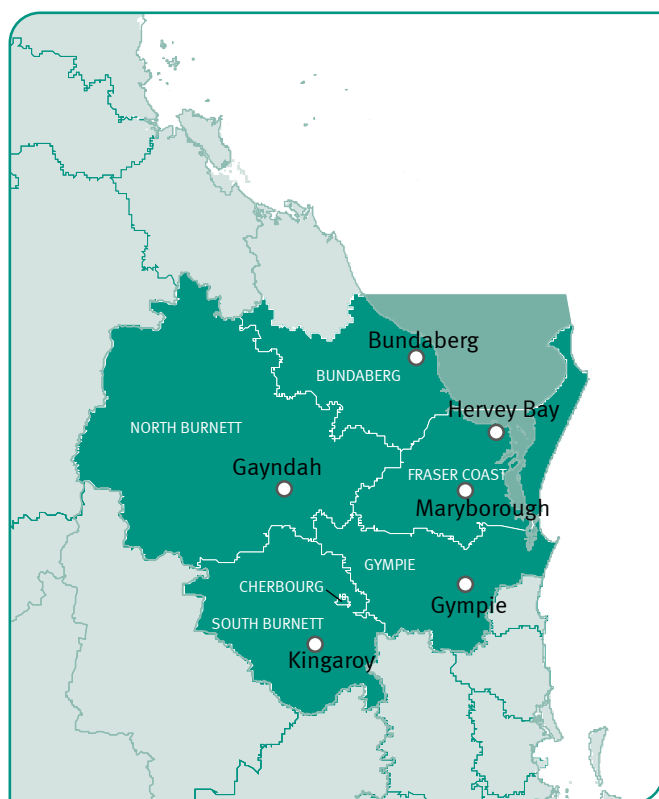


Climate change in the Wide Bay–Burnett region

VERSION 1



UNDERSTAND | ADAPT



Wide Bay–Burnett region snapshot

The Wide Bay–Burnett region extends from the northern edge of the Sunshine Coast to the coastal town of Winfield, and inland to the orchards and grazing areas of the Burnett. The region occupies 3% of the state's total area, and includes around 7% of the state's population.

How will climate change affect the Wide Bay–Burnett region?

In the future, the region can expect:



higher temperatures



more intense downpours



hotter and more frequent hot days



rising sea level



harsher fire weather



more frequent sea-level extremes



fewer frosts



warmer and more acidic seas



reduced rainfall

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, rainfall and the sea. 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 Wide Bay–Burnett region experiences a sub-tropical climate with warm wet summers and mild winters. The average annual temperature is 20°C. The summer average temperature is 25°C, autumn 21°C, winter 15°C and spring 21°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 774mm, with most occurring during the summer months.

The region's annual average potential evaporation is approximately twice the average mean 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 Wide Bay–Burnett region is projected to rise by 2.7°C (1.9 to 3.4°C). In this case, the middle temperature rise determined by all the models is 2.7°C. The range is between 1.9°C and 3.4°C, meaning 95% of model results indicated a rise of at least 1.9°C and 95% of the model results indicated a rise of 3.4°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.

Bundaberg 2030

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

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.



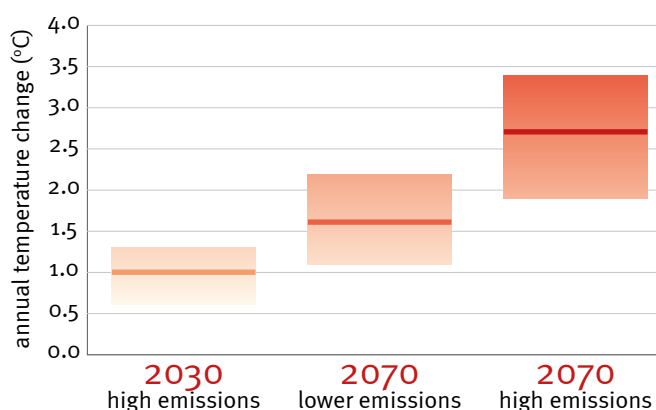
Climate projections for Wide Bay–Burnett



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 0.6 and 1.3°C above the climate of 1986–2005. By 2070, the projected range of warming is 1.1 to 3.4°C, depending on future emissions.

The region's summer average temperature is 25°C. This could rise to over 26°C by 2030 and to over 28°C by 2070.



Projected annual average temperature changes for the Wide Bay–Burnett 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.



Fewer frosts

A substantial decrease in the frequency of frost risk days is projected by the end of the century.



Harsher fire weather

Fire weather is a measure of fuel dryness and hot, dry, windy conditions. Climate change is likely to result in harsher fire-weather in the future.

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.

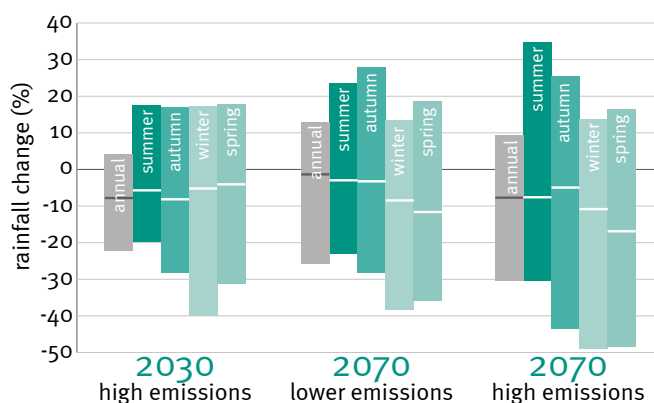


Reduced rainfall

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

Rainfall projections for 2070 show little change or a decrease, particularly in winter and spring; however, the projections show high variability.

The intensity of heavy rainfall events is expected to increase.



Projected annual and seasonal rainfall changes for the Wide Bay–Burnett 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.



Sea level will continue to rise

Sea level is projected to rise by 0.8m above present day levels by 2100.



More frequent sea-level extremes

Higher sea levels will increase the risks of coastal hazards such as storm tide inundation.



Warmer and more acidic ocean

Sea surface temperature has risen significantly across the globe over recent decades and warming is projected to continue.

The ocean will become more acidic due to dissolved carbon dioxide, with acidification proportional to emissions growth.



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"> ↑ sea level ↑ fire weather ↑ heatwaves 	<ul style="list-style-type: none"> Erosion and infrastructure damage along the coastline Increased maintenance costs Increased disruption to services Increased energy and water usage 	<ul style="list-style-type: none"> Consider future climate and sea-level rise when locating and constructing new infrastructure Increase road heights Insure public assets Design buildings to accommodate changing climate
	<ul style="list-style-type: none"> ↑ temperature ↑ sea level ↑ 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 ↑ sea temperature ↓ rainfall ↑ 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 Establish shelter belts to increase shade, e.g. for dairy cattle Consider different crop varieties and sowing times Improve water efficiency
	<ul style="list-style-type: none"> ↑ sea level ↑ fire weather ↑ temperature ↑ ocean acidification ↓ rainfall ↑ 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 Increase green urban infrastructure and urban biodiversity 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 sea level and storm intensity will affect coastal communities and increase inland flooding risk 	<ul style="list-style-type: none"> Improve bushfire safety standards for urban development Increase 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

The region's population is approximately 355,000. More than 80% of the region's population is located in the major centres of Bundaberg, Hervey Bay, Gympie, Maryborough and Kingaroy. The remaining residents live in predominantly rural shires.

On the coast, extreme inundation and erosion events could become more frequent with rising sea levels, resulting in high clean-up and asset maintenance costs.

Flooding, due to more intense storms, could affect water, sewerage, stormwater, transport and communications infrastructure. Flash flooding and wind damage will exacerbate these impacts closer to the coast. The cost of insurance to business and the community may increase as a result.

Inland, harsher fire weather and the impact of hotter days and extreme heat events will affect infrastructure.

Adaptation measures

- Consider how to adapt 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 and sea-level rise.
- Develop a Coastal Hazard Adaptation Plan.



Tourism

Tourism is a significant industry in the region with a number of iconic ecosystems and the key tourism areas of Fraser Island, Hervey Bay and South Burnett.

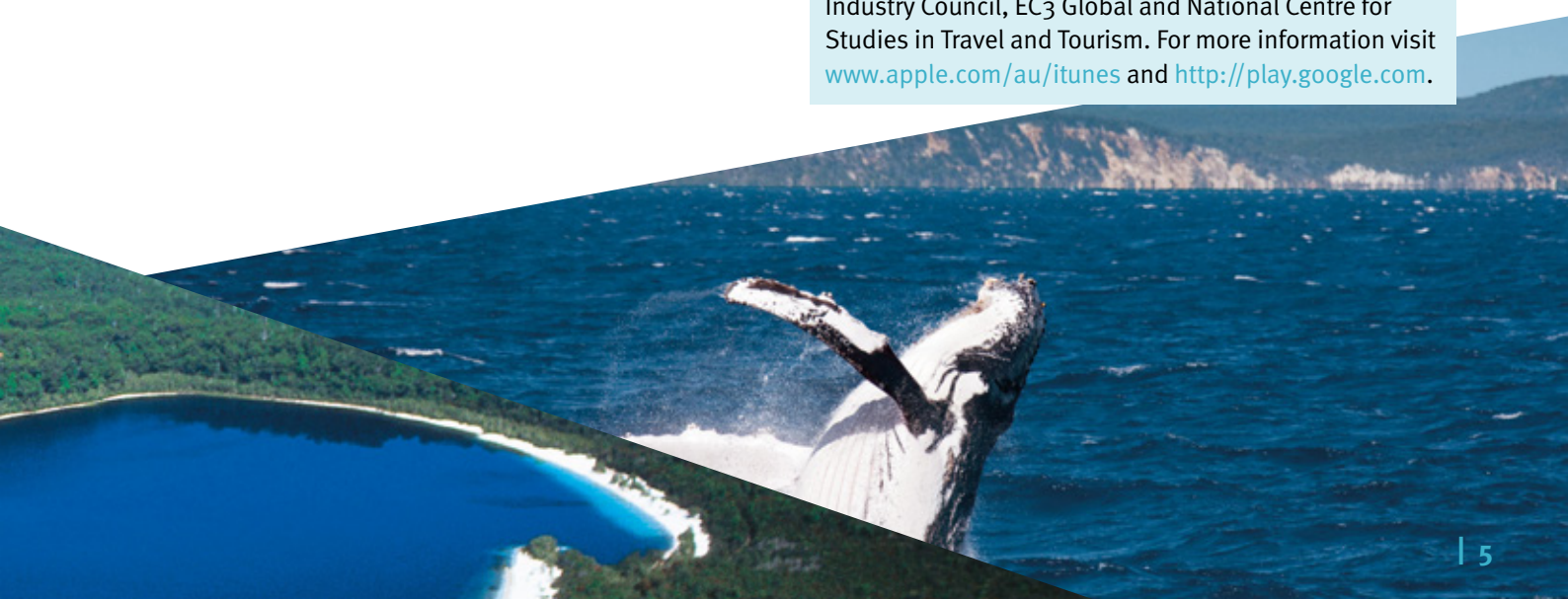
The tourism industry is reliant on healthy reef and rainforest environments. These environments are particularly vulnerable to the impacts of climate change. The degradation of the reef will not only be a loss of great intrinsic value; it will also come at a great cost to the tourism industry.

Increases in temperature could extend the season when the region is attractive to visitors. This will need to be balanced against harsher fire weather and increased flooding risk, which 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.

'Ready Set Go' is a smartphone app designed to assist tourism operators prepare for the impacts of extreme weather events, such as floods and cyclones. The app has been developed by the Queensland Tourism Industry Council, EC3 Global and National Centre for Studies in Travel and Tourism. For more information visit www.apple.com/au/itunes and <http://play.google.com>.





Business and industry

The region supports a range of industries including engineering, manufacturing, timber and sugar processing, tourism, fisheries, and agricultural and horticultural production. Increasing flooding events will damage fish nurseries, and cause increased outflow of fresh water and sediment.

Businesses and industry face increased disruption due to climate change. Increased frequency of flooding and inundation, harsher fire weather 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.

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.

Spinnaker Bar and Restaurant owners from Bundaberg watched as their riverside business was inundated in the floods. However, just over a month later they re-opened their business—but with a few flood-proof improvements. The owners implemented plans they had considered for some time—to keep fine dining upstairs, which was unaffected by flood waters, and to focus on a bar and more casual dining downstairs. The ‘Flood Bar’ has been rebuilt to withstand the impact of future flooding with all essential equipment now in the upstairs restaurant. See <http://qldreconstruction.org.au/u/lib/cms2/rebuilding-resilient-qlld-full.pdf>



Agriculture

The region accounts for approximately 10% of Queensland’s agricultural production, with a diverse agricultural and agribusiness base.

Sugarcane and horticulture are the major irrigated industries in the Wide Bay–Burnett region. The region is a major producer of a wide range of horticultural crops, including macadamias, avocados, mangoes, pineapples, tomatoes, chillies, citrus, herbs and vegetables. Over half of the region is suitable for pastoral purposes. There is significant dairy farming and beef cattle. Timber plantations represent 60% of the state’s plantation estate and over 6% of the total Australian estate. The region is also home to fisheries and aquaculture industries, including otter trawl, pearling, scallop and sea cucumber operations.

Increased temperatures may lead to difficulties in supplying sufficient water to meet agricultural demand, heat damage to horticultural crops and stress on livestock. Conditions may increase plant diseases, weeds and pests, and allow some pest species to move southwards into areas where they are currently excluded. Lower rainfall and increasing evaporation will cause more frequent depletion of soil moisture, reduced ground cover and lower livestock carrying capacity. Harsher fire weather poses a threat to the timber industry and broad-acre farming.

Adaptation measures

- Manage climate variability and change by using forecasts of rainfall (and temperature) in decision-making about crops and planting times.
- Monitor the spread of pests, weeds and disease.
- Provide more cooling mechanisms for livestock.
- Consider climate risks in the selection of crop varieties and production systems.

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 is renowned for its unique coastal communities, including the World Heritage-listed Fraser Island, the Mackay-Capricorn section of the Great Barrier Reef and the Ramsar-listed Great Sandy Straits wetlands.

This region includes the Brigalow Belt and South East Queensland bioregions. The Brigalow Belt is the largest bioregion in Queensland and is rich in species, including large numbers of plants and animals with small ranges. The South East Queensland bioregion is rich in biodiversity with many species vulnerable to climate change, including some that reach their northern limits on mountains and plateaus, and some with small populations.

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

The region will increasingly be subject to flooding events and inundation from sea-level rise. Longer dry seasons will continue to affect biodiversity and freshwater aquatic ecosystems. Warming seas and increased storm tide inundation may harm coastal ecosystems, which have important recreation and biodiversity values.

Adaptation measures

- Protect plant and animal species habitat with restricted distributions.
- Undertake weed management and rehabilitation of native plant species, including community education.
- Place restrictions on weedy plants grown and sold.
- Increase conservation of forests on fertile soil for koalas, sugar gliders and other foliage-feeding fauna.

Project Catalyst is a partnership between more than 70 innovative Queensland cane growers, focused on improving the quality of water that flows from agricultural catchments into the Great Barrier Reef. It promotes practical solutions to increase water use efficiency, prevention of runoff, reduced application of nutrients and pesticides, and better management of soils. See www.reefcatchments.com.au/land/project-catalyst.



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.

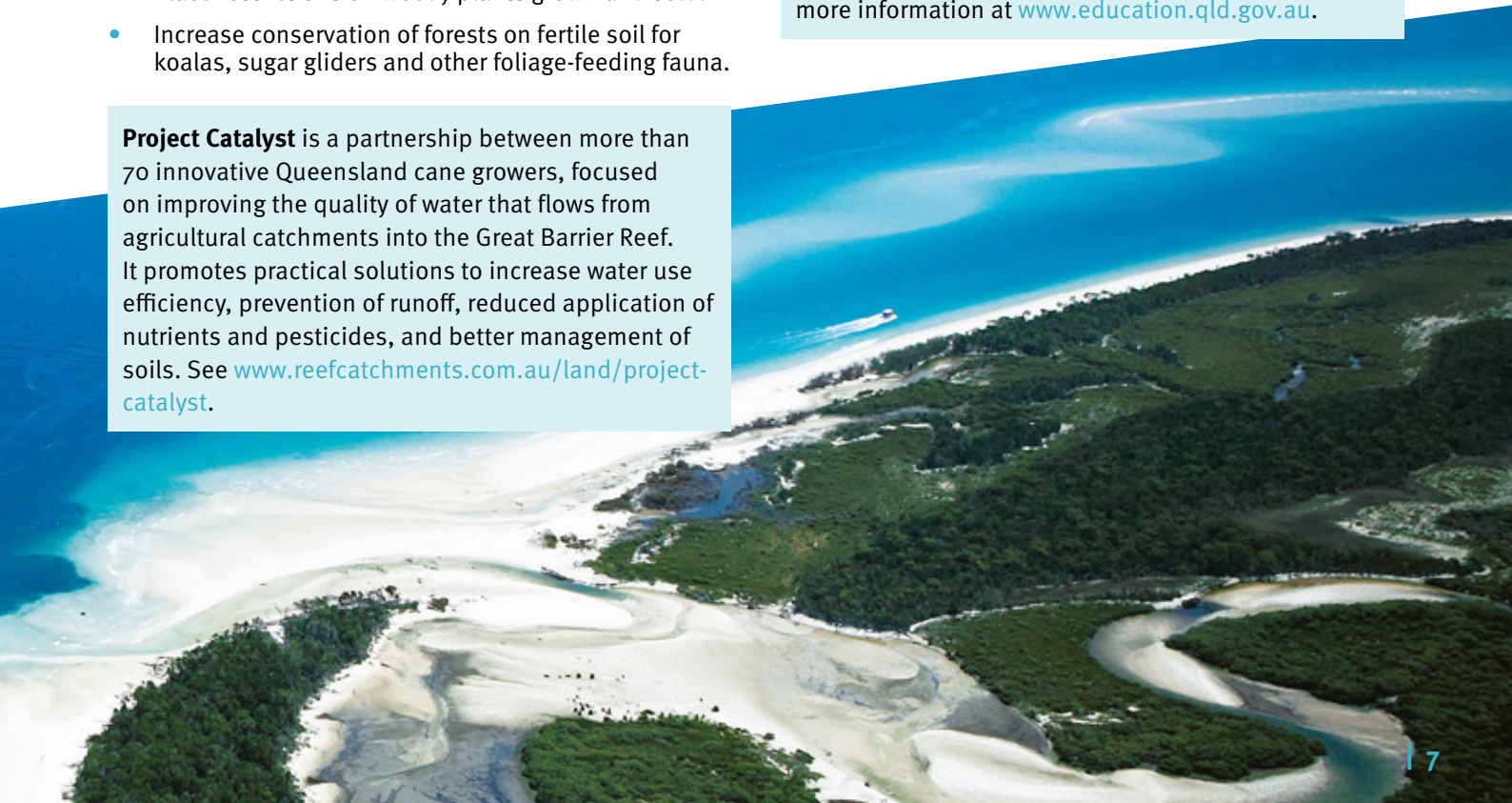
There could be an increased demand for health professionals, ambulance and hospital workers to deal with these impacts; however, many parts of the country already find it hard to recruit dedicated healthcare and social service professionals.

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.

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 Government** addresses the impact of hotter days on school children by providing guidelines on managing excessive heat in schools. There are clear indicators of when children need to be protected from excessive heat, and strategies to ensure their safety, such as limiting physical activity and sporting events during the hottest part of the day. There is more information at www.education.qld.gov.au.





Emergency services

While the region is renowned for its favourable climate, it is no stranger to emergencies. Over the past few decades there have been significant bushfires and flooding events, the most notable being the floods of 2010, 2013 and 2015.

Harsher fire weather represents a threat, particularly for urban fringe communities where natural ecosystems abut houses and businesses.

Increases in storm intensity and sea-level rise will see a higher risk of flooding and inundation throughout the region, particularly for coastal communities.

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.

Local Emergency Alert is a national telephone warning system used by emergency services, such as Queensland Fire and Emergency Services, to alert communities about a likely or actual emergency in your area. Local Emergency Alert sends a voice message to landlines and a text message to mobile phones, to increase community preparedness for extreme weather events and other emergencies.

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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