Burdekin and Charters Towers Regional Drought Resilience Plan

2022–2030

Australian Government
Department of Agriculture, Fisheries and Forestry

Future Drought Fund

Queensland Government

Rural Economies
Centre of Excellence

The Burdekin and Charters Towers Regional Drought Resilience Plan has been developed as a partnership between the Rural Economies Centre of Excellence and the following organisations who will lead implementation of any actions: Burdekin Shire Council and Charters Towers Regional Council.

The Regional Drought Resilience Planning program is jointly funded through the Australian Government's Future Drought Fund and the Queensland Government. Development of the plan has been supported by the Australian Government (Department of Agriculture, Fisheries and Forestry) and the Queensland Government (Department of Agriculture and Fisheries).

Acknowledgement

We pay our respects to the Aboriginal and Torres Strait Islander ancestors of this land, their spirits and their legacy. The foundations laid by these ancestors – our first Australians – give strength, inspiration and courage to current and future generations, both Indigenous and non-Indigenous, towards creating a better Queensland.

We recognise it is our collective efforts and responsibility as individuals, communities and governments to ensure equality, recognition and advancement of Aboriginal and Torres Strait Islander Queenslanders across all aspects of society and everyday life.

On behalf of the Queensland Government, we offer a genuine commitment to fearlessly represent, advocate for, and promote, the needs of Aboriginal and Torres Strait Islander Queenslanders with unwavering determination, passion and persistence.

As we reflect on the past and give hope for the future, we walk together on our shared journey to reconciliation where all Queenslanders are equal.

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Interpreter statement

The Queensland Government is committed to providing accessible services to Queenslanders from all culturally and linguistically diverse backgrounds. If you have difficulty in understanding the regional drought resilience plan, you can contact us for assistance and we will arrange an interpreter to effectively communicate the plan to you.

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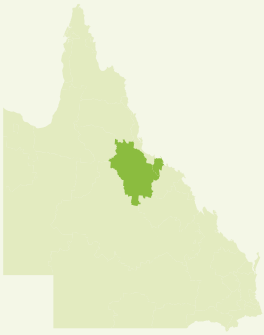
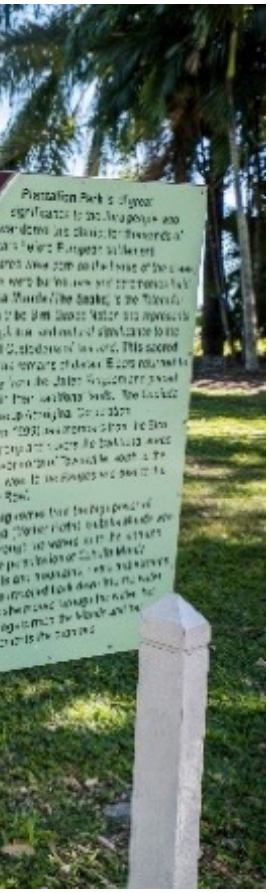
Regional foreword and acknowledgements



The Burdekin Shire Council and the Charters Towers Regional Council proudly acknowledge Australian Aboriginal and Torres Strait Islander peoples' unique cultural and spiritual relationships to the land, waters and seas, and their rich contribution to our society. We acknowledge the Gudjala, Gugu Badhun, Birriah, Jangga, Bindal and the Juru peoples.



Mayor's foreword

The Burdekin and Charters Towers region is a unique and diverse area in the heart of north Queensland. It extends over 73,000 square kilometres from the untouched coastlines and fertile fields of the Burdekin through to the sandstone ranges and dry and sandy plains to the west. While traditionally known for sugar cane production, cattle grazing and mining the region is building on its assets, encouraging innovation, and developing economic strength, productivity, and diversity. A reliable and consistent supply of water is critical to our future.

Our local governments are connected by history, commerce, and the Burdekin River whose catchment begins in the north of the Charters Towers region and finally enters the ocean through the rich Burdekin delta. Working together to build regional resilience through stakeholder engagement as we did with this plan further illustrates our shared values and partnership. We thank the numerous people who have invested their time and knowledge and contributed to the development of this plan – their support of our region and its resilience is greatly appreciated.

Our community is no stranger to natural disasters and hardship – cyclones, floods, droughts and economic downturns are regular events in our history and have created a resilient and adaptable culture. We work together in our community and with our neighbours to prepare and overcome adversity. We acknowledge the changes in our climate and the potential for longer, hotter, and drier seasons and the need to proactively nurture resilience to drought economically, socially, and environmentally.

The potential of our region is enormous and inspiring, and we share a vision for the future where our region is proud of its vibrant economy and enabling infrastructure, its strong and resilient community, and its stunning natural landscapes. We are committed to working collaboratively with the other tiers of government, our industry and community partners in the development and implementation of this Regional Drought Resilience Plan.

Together we will build local capacity and resilience and we will continue to grow and thrive.

Lyn McLaughlin
Mayor
Burdekin Shire Council

Frank Beveridge
Mayor
Charters Towers Regional Council

Executive summary

The Burdekin and Charters Towers Drought Resilience Plan (RDRP) 2022–2030 has been developed in accordance with the guidelines distributed by the Australian Government's Future Drought Fund (FDF) program. It also has been shaped by the inputs from key stakeholders along with the voices and experiences of the region's people and authoritative research. The plan is owned by the key stakeholders involved in its development and is expected to be of interest to a diverse audience including all levels of government, regional and industry development organisations, disaster management agencies, the environmental sector and community groups – in general all those impacted by drought.

It provides a profile of the region describing its weather and climate along with socioeconomic data and a summary of the past and potential impacts of drought across social, economic, infrastructure and environmental domains. It is strongly noted that these perspectives cannot be taken in isolation and that drought impacts a region holistically and an effect in one domain has knock on effects in another.

The region shares a water catchment, the Burdekin River, Australia's largest river by discharge volume. It begins in the very north of the Charters Towers local government area and reaches the sea after crossing the Burdekin Dam, on the Queensland east coast through the Burdekin delta.

Data provided illustrates trends for increased temperature and decreased rainfall which will impact the demand for water, especially in seasons where the summer rainfall under performs. This supply/demand disparity is further exacerbated by plans for economic diversification and expansion reliant on the supply of water in the Burdekin catchment.

A framework for a drought resilience strategy is provided outlining a series of six key pathways and the associated actions, derived from the syntheses of community engagement insights balanced with knowledge and experience in community resilience and disaster management. The identified pathways are:

- Progressing and implementing a whole of catchment approach to achieving water security for the Burdekin and Charters Towers region.
- Business and sector development for economic diversification and resilience.
- Boosting innovation and agricultural technology for drought resilience.
- Address drought related workforce disruption, skills, labour and housing shortages.
- Building community and personal resilience.
- Improving the Regional Governance Capacity within the Region to Plan, Deliver and Monitor Progress Towards Regional Drought Resilience.

Each of these pathways is expanded with actions and clarified by the articulation of lead institutions, key partners, and investment targets. A quadruple bottom line impact is demonstrated by identifying the outcomes that will be delivered. The actions are also mapped to the three pillars to prepare for and deal with drought.

The plan also outlines a partnership approach to the realisation of the articulated resilience strategy, noting that no one organisation has the resources and the capacity to be individually responsible for the delivery of the plan, and nor should they. Best practice in disaster management dictates that community led initiatives are more likely to be successful and that resilience is built across contexts. The plan recognises that drought is not considered a disaster but the very characteristics that keep it from being classified as such, its regularity and duration, dictate that resilience is the key to ongoing survivability and thrivability.

The plan concludes with a detailed monitoring and evaluation strategy to ensure that not only do the partners accept responsibility for implementing the plan there is a defined process to monitor and assess the progress of its implementation and the impact it is having on its host communities.

Introduction

Regional Drought Resilience Planning

Australia, and particularly the State of Queensland, is no stranger to drought. First Nations traditional stories of drought go back thousands of years and European settlers have officially recorded drought in Australia since the late 1700s. Droughts have been officially 'declared' in Queensland since 1897.[1]

The economic, social and environmental costs of drought in Queensland are immeasurable. The toll taken on regions and their communities is high and the impacts often linger for decades. So, in recent years there has been a growing emphasis on the importance of drought resilience planning. This means planning now for the next drought and considering how to do things better or differently to make our communities more resilient.

Alignment with the Queensland Strategy for Disaster Resilience and Regional Resilience Strategies

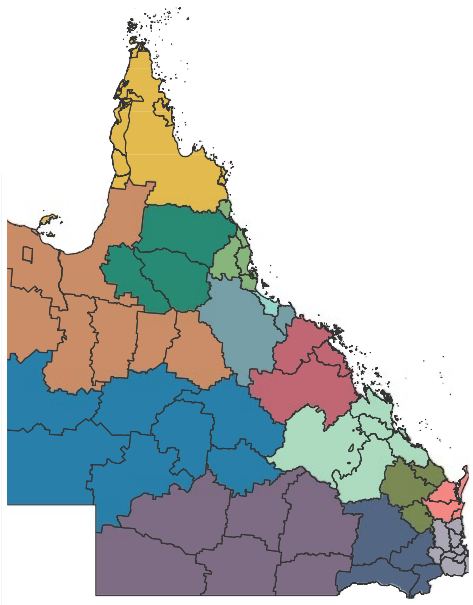
Queensland is the most disaster impacted state in Australia, and Queenslanders are susceptible to a variety of hazards. We are facing unprecedented change in both our current and future operating environment with a dynamic political, social, economic and policy landscape surrounding disaster risk reduction and resilience. This is being amplified by natural hazards becoming more frequent and intense due to a changing climate.

The *Queensland Strategy for Disaster Resilience 2022–2027* (QSDR) promotes a systems approach to resilience that connects with a range of agencies and sectors to deliver improved outcomes for Queensland.

Queensland's suite of Regional Resilience Strategies ensures every region across Queensland is now part of a locally-led, regionally-coordinated and state-facilitated blueprint to strengthen disaster resilience.

It is often agreed that resilience planning for disasters and resilience planning for drought should be aligned. The Queensland RDRP program builds on the work completed under the QSDR, led by the Queensland Reconstruction Authority (QRA). The RDRP program provides the opportunity to have a clear focus on drought risk in the context of regional resilience, addressing the unique challenges it poses and the need for setting out drought-specific priorities and actions at a regional and local level.

Figure 1: Queensland's Regional Resilience Strategies (Regions and Local Government Areas), *Queensland Strategy for Disaster Resilience 2022–2027. Source: Queensland Reconstruction Authority.*



Legend

- Local Government Areas

Resilience Strategy Regions

- Burdekin and Charters Towers Region
- Burnett Region
- Cape York and Torres Strait Region
- Central West Region
- Darling Downs Region
- Far North Hinterland to Gulf Region
- Fitzroy and Capricornia Region
- Mackay, Isaac and Whitsunday Region
- Mary Region
- North West Region
- South East Region
- South West Region
- Townsville and Palm Island Region
- Wet Tropics Region

Regional planning and approach

This plan was developed and produced through a collaborative partnership between DAF, RECoE, QRA, NQROC and its member LGAs, the local facilitator and key regional stakeholders. The engagement model was developed from earlier work undertaken by RECoE, Red Cross Queensland[2], the Queensland Reconstruction Authority (QRA)[3], CSIRO[4] and was informed by international best practice from the World Bank and the UNDRR.[5] The plan has been reviewed by an independent assessor appointed by the Australian Government, and their feedback has been incorporated in the final plan.

The plan was co-designed with local stakeholders, using an approach that emphasised trust-building, building on existing networks, local co-design and commitment, risk-informed processes, place-based and regional strategies, locally led and coordinated solutions and integrated multi-objective responses.

Regional engagement process

The RDRP engagement process was reiterative and involved a systems approach that highlighted local voices and ownership and combined both subjective and objective perspectives with a respect for local, including First Nations peoples as well as 'scientific' knowledge.

The engagement process sought to build upon significant engagement already in progress across the region that deals with broad issues of resilience and disaster response. Engagement was undertaken at both the local government and whole of region levels. Significant engagement had recently been undertaken in Charters Towers through the Communities in Transition project and this was acknowledged and built upon.

Stakeholders from across the economic, social, and environmental domains were consulted via interviews and group discussions; their input and feedback has informed this plan.

These stakeholders included a diverse range of local and regional not-for-profit organisations along with government departments and regional development bodies. The stakeholders who contributed to the diversity of perspectives and the depth of the engagement included locally based community support agencies, Natural Resource Management and local Landcare groups, farming, grazing and associated supply chain players, Water agencies, Chambers of Commerce, local government representatives, local Indigenous leaders, elected local government representatives and other community members.

"The ultimate challenge is climate change – we need to tackle the source of the problem – not just the symptom".

Burdekin Landcare

Key principles and concepts: drought and resilience

Whilst there is no universally accepted definition of drought, in Australia, the Bureau of Meteorology (BOM) states, "drought, in general, means acute water shortage".[6]

In Queensland, drought is 'declared' for a local drought area and/or individual properties. Local drought areas are drought declared "when the rainfall recorded during the previous 12 months (minimum) is in the lowest (or driest) decile or below the 10th percentile when compared to the long-term historical rainfall".[7] This is the technical definition of drought utilised in this plan.

'Resilience' is harder to define. The World Bank has defined resilience as the ability *"…to anticipate, absorb, accommodate or recover from the effects of a hazardous event in a timely and efficient manner"*.[8]

Australia's CSIRO perhaps more specifically states:

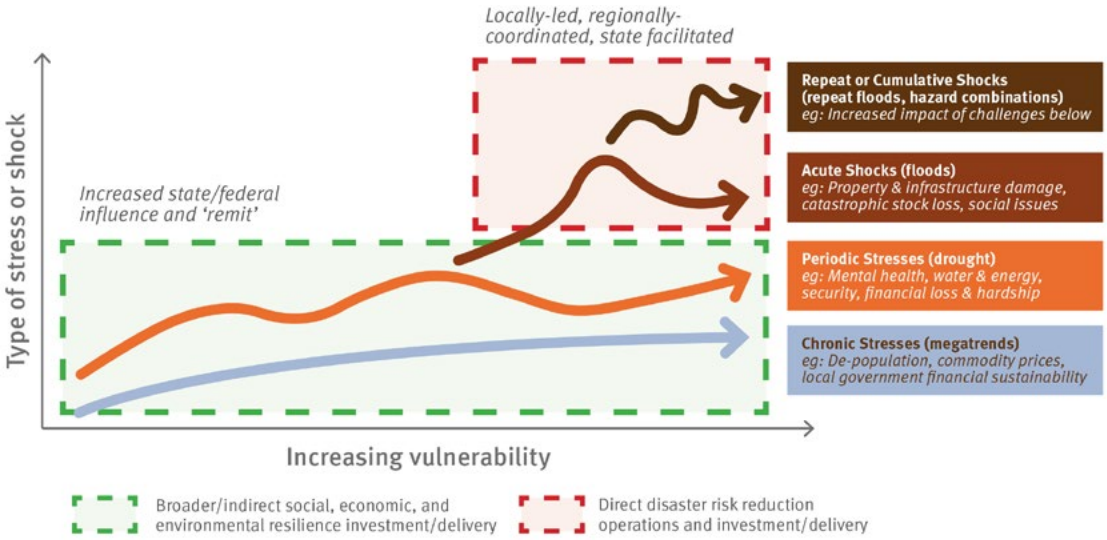
"drought resilience will result in a regional Australia that can endure deeper, longer droughts, and recover from them sooner. This will allow our food and agribusinesses to boost national farm income, increase food security, and protect the regional jobs that rely on agriculture. It will increase the resilience of rural and regional communities that depend on agriculture and improve environmental outcomes".[9]

This plan utilises drought resilience objectives that broadly align with the four key objectives underpinning the *Queensland Strategy for Disaster Resilience*.

Figure 2: Four key objectives of the *Queensland Strategy for Disaster Resilience 2022–2027. Source: Queensland Reconstruction Authority.*

Experience from earlier works on resilience has highlighted the crucial importance of community and regional resilience, sometimes referred to as 'societal' resilience. For instance, work by QRA has revealed that community stakeholders report that their 'societal resilience' is significantly affected by chronic and enduring stresses (long-term megatrends such as ageing populations, fluctuating commodity prices), periodic stresses (such as drought) that are often cyclical, acute shocks (such as rapid-onset disasters), cumulative shocks (often a rapid succession of shocks or the increased impacts of the combined stresses and shocks).

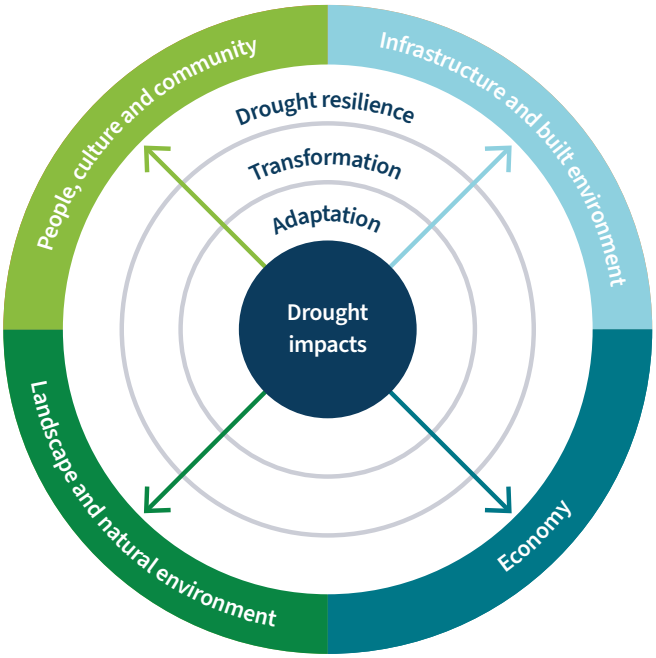
Figure 3: How resilience is affected by stresses and shocks. *Source: Queensland Reconstruction Authority.*



Whilst drought has been often referred to as "an enduring feature of the Australian landscape", when viewed in this context of community resilience, drought is also understood as a periodic stress that comes and goes. However, it is now evident that the warming caused by climate change has added to the variability in Queensland's weather and "increased the severity of drought conditions during periods of below-average rainfall".[10]

Importantly, our approach and engagement processes encouraged community and regional stakeholders to express their own observations of 'drought' and 'resilience'. We have combined the 'local' with 'outside' definitions to produce the regional understanding that underpins this plan and identifies drought impacts, risks and pathways to resilience.

Figure 4: Queensland RDRP elements of drought resilience. *Source: Queensland Regional Drought Resilience Planning.*



How to use this plan

The purpose of the plan

The Burdekin and Charters Towers Regional Drought Resilience Plan (RDRP) has been developed in accordance with the guidelines distributed by the Australian Government's Future Drought Fund (FDF) program. It also has been shaped by the inputs from key stakeholders along with the voices and experiences of the region's people.

Accordingly, the purpose of this RDRP is to:

- express the outcomes of the Burdekin and Charters Towers RDRP process and the aspirations and commitments of the region's people
- inform decisions regarding the prioritisation and funding of drought resilience initiatives and support the leveraging of investment opportunities
- identify and establish critical networks and partnerships to inform and support drought resilience planning and actions
- combine the best of local and traditional knowledge with best practice data and information to make informed decisions
- clearly identify and plan for the ongoing and future impacts of drought across the region
- highlight pathways that the region can use to adapt to changes and build drought resilience
- specify key actions (regional and local) that can be implemented to build drought resilience in the region.

The RDRP process is intended to be practical, implementable and ongoing. As the region undertakes the specified actions, this plan will assist with monitoring progress and future learning.

Key inputs

This plan draws from and builds upon many important works. Some key plans, projects and studies which have been drawn upon to inform this Strategy include:

- Queensland Strategy for Disaster Resilience
- Resilient Queensland
- Burdekin and Charters Towers Resilience Strategy
- North Queensland Regional Plan
- Outlook 2025 Burdekin Economic Development Strategy
- Charters Towers Destination Management Plan
- Charters Towers Economic Development and Innovation Strategy
- Burdekin and Haughton Flood Resilience Strategy
- Business Case: Dynamic Business and Sector Development of the Charters Towers Region
- Business Case for Making Water Work in the Charters Towers Region
- Charters Towers: A Living Transitions Roadmap
- Charters Towers Regional Water Supply Security Assessment.

Other important linkages

It is the intention of this Plan that it is considered and factored into a range of other strategies and plans – including (but not limited to):

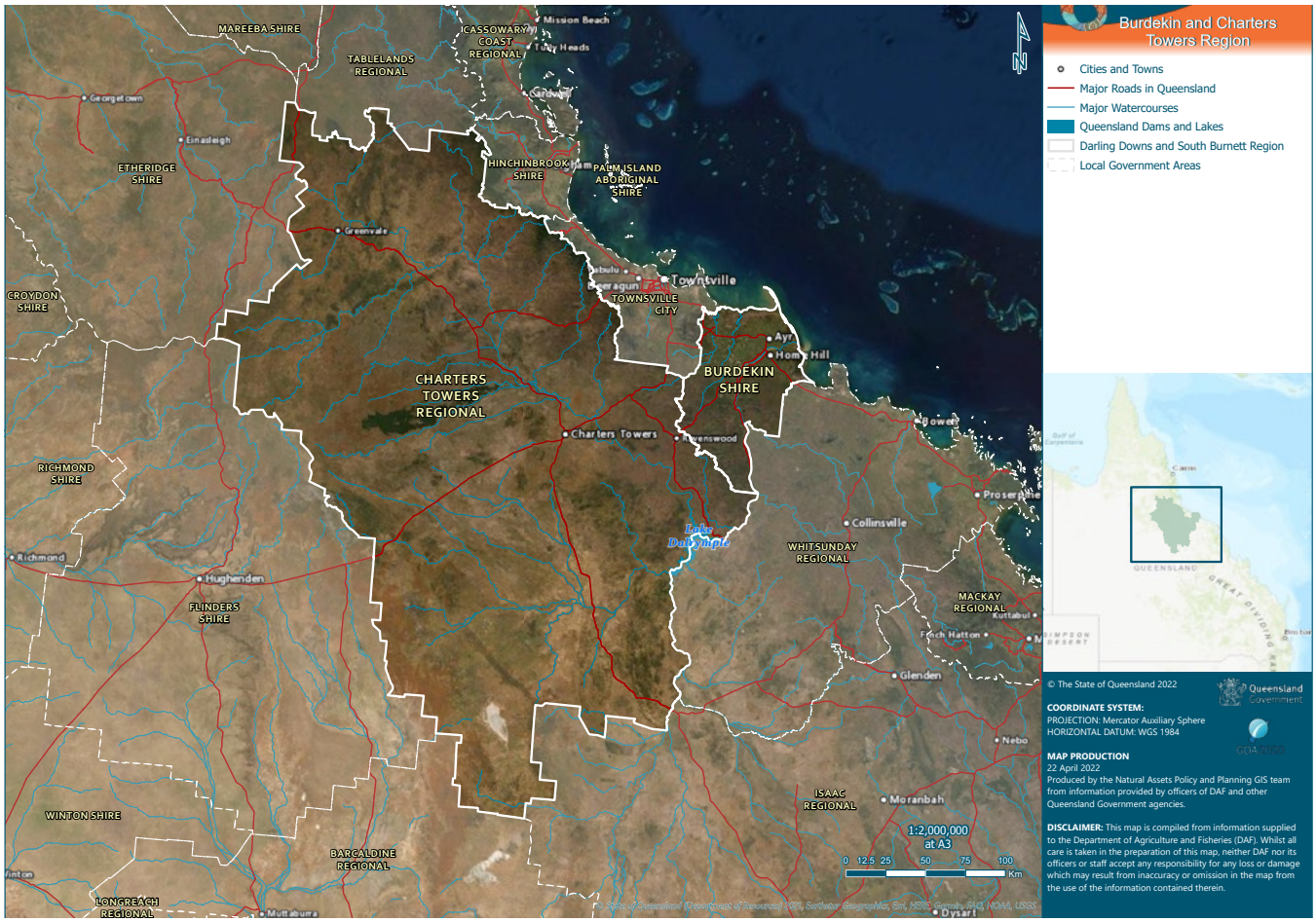
- regional plans
- regional economic development strategies
- regional transport and infrastructure plans
- natural resource management plans
- water resource plans
- local and district disaster management plans
- local asset management and capital works plans
- local corporate and community development plans
- land use planning schemes
- local and regional health strategies.

We also hope it will be closely considered by charities; non-government organisations; not-for-profits; businesses; and government agencies with an interest in the region.

Image: Sunset over the Burdekin Bridge. *Source: Burdekin Shire Council.*

Regional profile

Figure 5: Burdekin and Charters Towers regional map. *Source: Department of Agriculture and Fisheries, Queensland Government.*



Burdekin and Charters Towers region

The region that encompasses the local government areas of Burdekin Shire Council and Charters Towers Regional Council has a total land area of 73,426.1km^2 featuring coastal beaches, a fertile river delta, dry and sandy plains, sandstone ranges, basalt walls, dunes, and conservation areas. The average daily temperature ranges between 16.70°C to 29.40°C and the average annual rainfall is 657mm. It is home to just under 30,000 people who, statistically, are older and more socially disadvantaged than the Queensland average, but value their regional and remote lifestyle and the communities in which they live.

Refer to Figure 11 for data from Qld Government Statisticians Office illustrating the socioeconomic profile.

Water supply and climate

While they share a common local government boundary and rely on the same water catchment area, the Burdekin Shire is largely coastal with a ready supply of water from the Burdekin Dam feeding the irrigated sugar cane paddocks and supporting other crops and an emerging aquaculture industry. The Burdekin also draws water from an aquifer that relies on annual river flows to sustain its level and prevent salination of surrounding land. The aquifer feeds the urban water supply scheme and farming properties in the lower Burdekin area.

Charters Towers region's economy relies heavily on grazing, agriculture, mining, and its regional centre facilities such as education and public administration. The primary water supply for the town of Charters Towers is Charters Towers Weir, located in the Burdekin River approximately 14km northeast of the city and 150km upstream and NW from the Burdekin Falls Dam. The township also has a recycled water scheme used for parks, golf courses and other open spaces that helps reduce the demand on the Weir supply. Graziers rely on artesian bores and property dams – and occasional rain. As one local put it "there are three sources of water – the Dam or River, under the ground or the sprinkler in the sky."

The Burdekin / Charters Towers region has a distinct and predictable climatic seasonality. Almost all the region's rainfall occurs between December and April therefore the demands on water supplies are strongly seasonal, as indicated in the below graph. When it is not raining the demands are on the water from the river/dam or under the ground.

Recent rainfall records show a trend in reduced rainfall as illustrated below, and long-term climate forecasts, predict a reduction in rainfall in the coming years therefore future dry seasons which may be longer, and drier will put pressure on the supply in dams, weirs and aquifers amplified by planned economic growth.

Figure 6: Charters Towers Airport Monthly Rainfall. *Source: Bureau of Meteorology Climate Data Online Station 34084.*

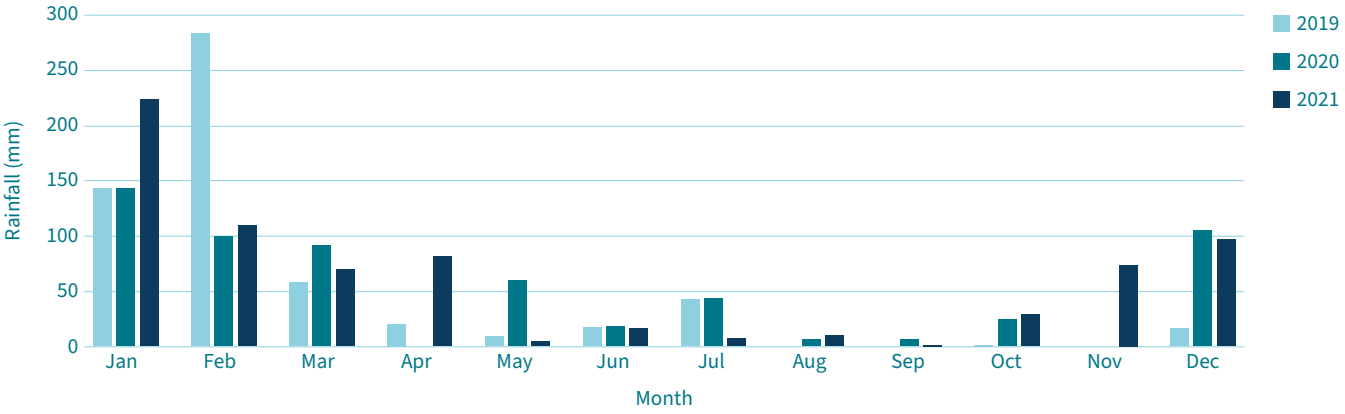


Figure 7: Ayr DPI Rainfall 1970–2020. *Source: Bureau of Meteorology Climate Data Online Station 33002.*

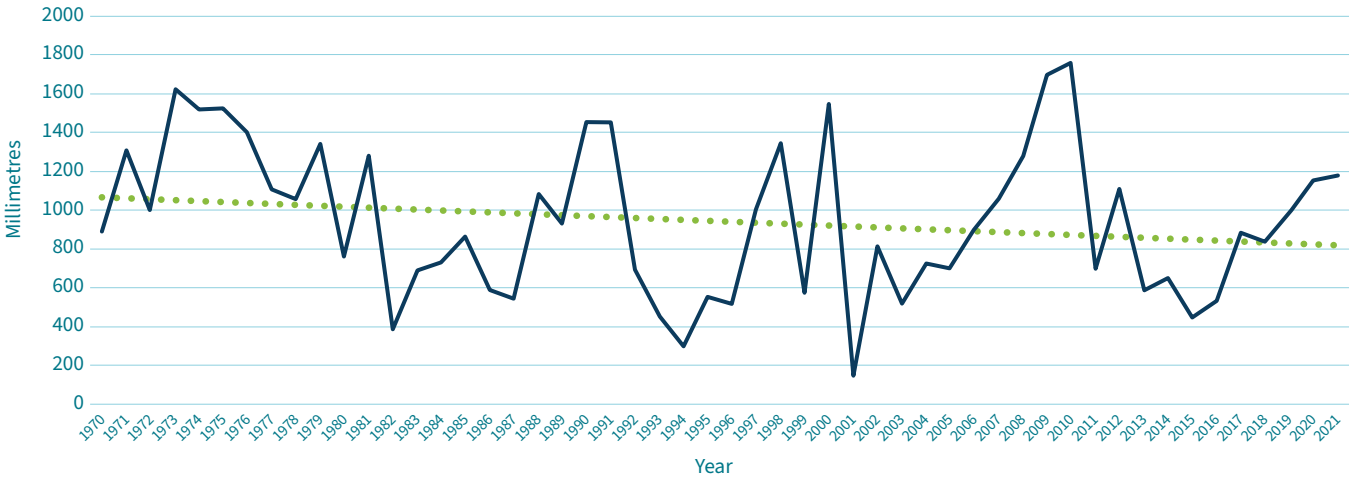
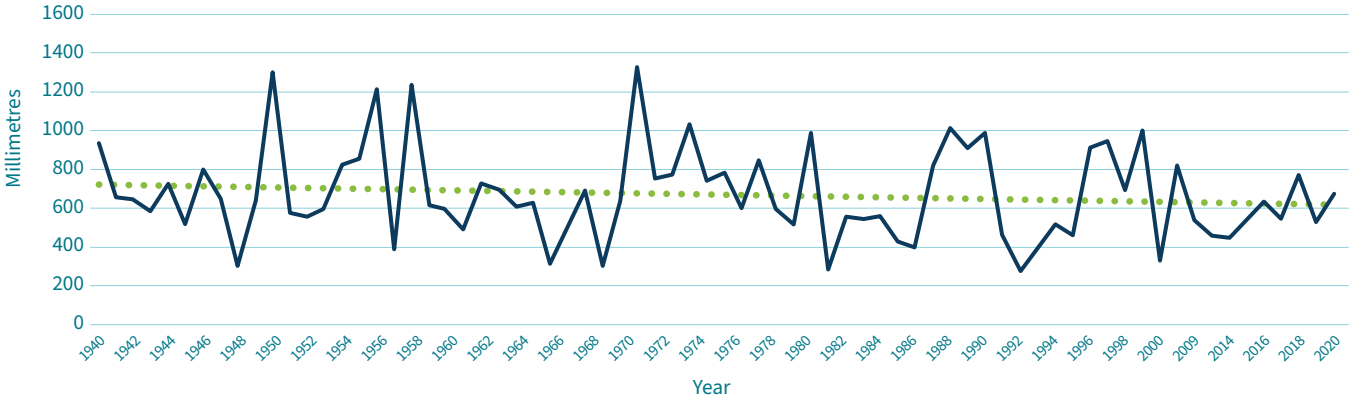


Figure 8: Ravenswood PO Annual Rainfall 1940–2020. *Source: Bureau of Meteorology Climate Data Online Station 33062.*



The previous two rainfall graphs demonstrate the long-term downward trend in rainfall across the region while the following graph illustrates the trend towards an increase in mean maximum temperature.

Figure 9: Mean Annual Temperature Charters Towers Airport 1993–2021. *Source: Bureau of Meteorology Climate Data Online Station 034084.*

The North Queensland area, including and beyond the Burdekin and Charters Towers LGAs, are seeking opportunities for future development and economic growth and looking to the Burdekin basin to provide the water that they need to drive these new industries and business opportunities. Maintaining the sustainability of existing industries plus catering for the increased demand of economic development in an environment of reduced supply due to drought is clearly a problematic combination.

Both Burdekin and Charters Towers local Councils have plans to diversify and grow their economic base and water is a critical ingredient for both. The business case recently completed for the Big Rocks Weir outlines the potential for increased economic activity in the Charters Towers Region if the supply of water could be improved via the construction of the Weir.

The Burdekin River is Australia's largest river by (peak) discharge volume and drains a catchment area of 130,000 square kilometres (nearly 7% of Queensland).

The Burdekin Falls Dam completed in 1987 is the largest dam in Queensland and at full capacity the dam holds 1,860,000 ML, four times the capacity of Sydney Harbour. It has only failed to overflow one year since it was built in 2020–21 it delivered 538,612 ML of water to its 421 customers from the available 1,157,130 ML. By far the bulk of the distributed water usage was for irrigation (approx. 502,000 ML) and the dam maintained very high levels. *Sunwater Annual Report 2020–2021.*

Figure 10: Burdekin Basin Water Plan location map. *Source: Queensland Department of Regional Development, Manufacturing and Water.*

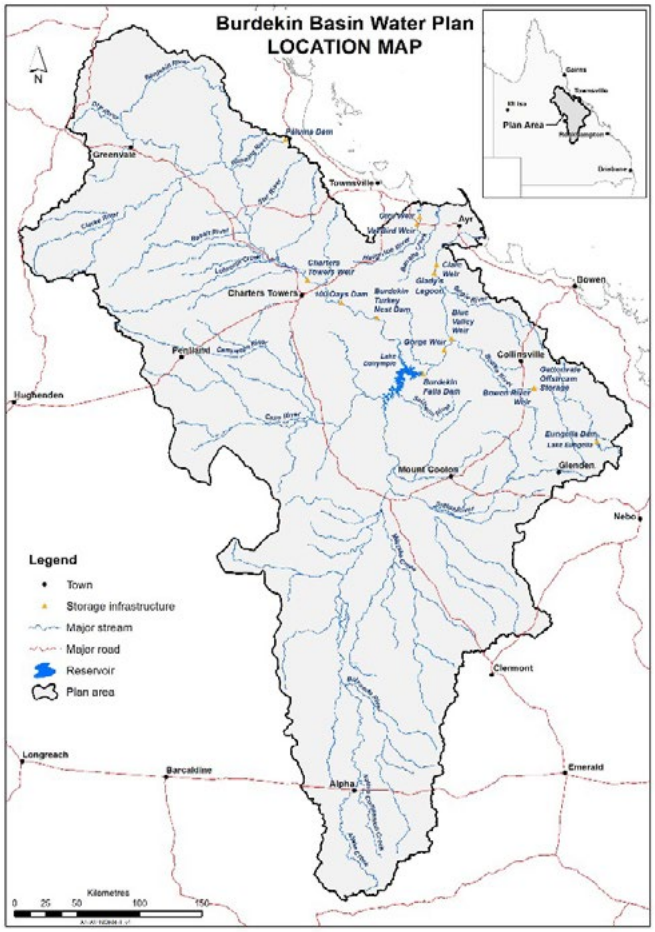


Image: Burdekin Falls Dam. *Source: Charters Towers Regional Council*

Figure 11: Regional socioeconomic profile.

	Burdekin LGA	Charters Towers LGA	Burdekin & Charters Towers region	Queensland
Population as at June 2021 (people)	16,844	11,676	28,520	5,221,233
Projected population as at 30/06/2041	17,310	12,403	29,713	7,161,661
Median age of residents as at 30/06/2020	45.8 yrs	41.1 yrs	43.9 yrs	37.8 yrs
% Aboriginal or Torres Strait Islander Peoples (2016)	5.7%	8.7%	6.9%	4.0%
% people who speak a language other than English at home (2021)	6.5%	2.8%	5%	13.5%
Median total personal income $/year (2021)	$37,596	$34,788	$36,527	$40,924
Australian Digital Inclusion Index: 2021	4.6%	5.4%	4.9%	6.1%
Unemployment rate March quarter 2022	3.0%	3.7%	3.3%	4.9%
SEIFA 2016 Socio Economic Index of Social Disadvantage	934.2	914.2	N/A	996
Registered businesses as at 30/06/2021	2,111	1,147	3,258	460,807
Persons with a profound disability needing assistance (2021)	1,097 (6.6%)	749 (6.4%)	1,846 (6.5%)	543,267 (5.2%)
Protected area – parks, forests, reserves area 2020	216.3 km²	1,787.1 km²	2,003.4 km²	130,321.7 km²

Source: Queensland Regional Profiles Burdekin and Charters Towers LGA compared with Queensland. Queensland Government Statisticians Office 2022

History of drought in this region

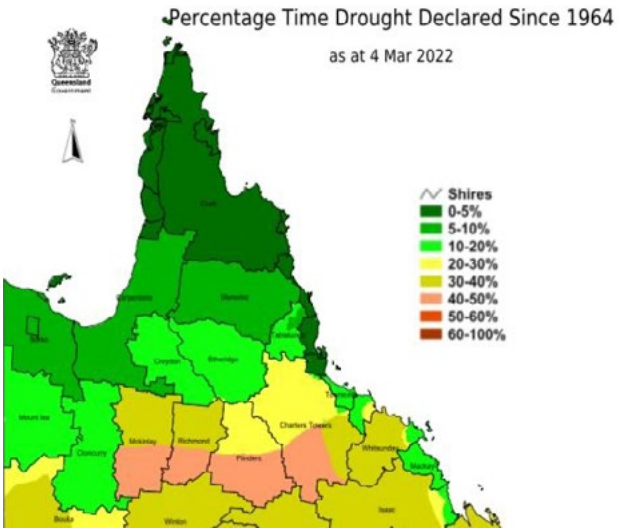
Drought events, associated with below average rainfall of varying intensity, have a long history in the western part of the Burdekin/ Charters Towers region. These stress events have led to great innovations and successes in adaptation however, droughts can seem unending and can, and have, affected personal and community resilience.

Notable drought events in the region include:

- Federation Drought 1895–1902
- September 1951 – March 1953
- April 1982 – February 1983
- April 2002 – January 2003
- January 2017 – December 2019.

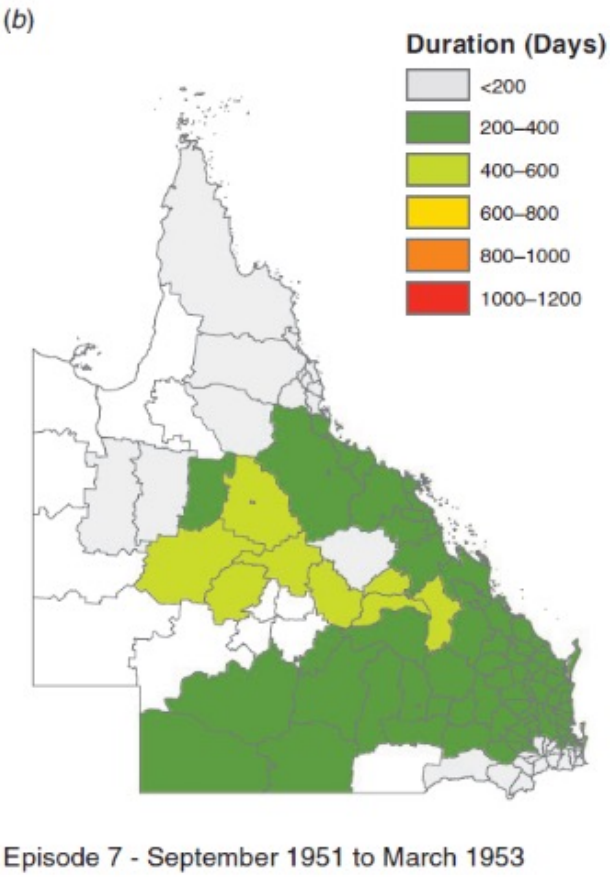
The Queensland Drought Duration Report suggests that since 1964 (Figure 12) most of the Burdekin Shire has only been declared drought declared 10–20% of the time and not at all in the last 3–4 years while the remainder and most of the Charters Towers Region between 20–30% of the time. Prior to 1964, drought declarations were based on railway lines rather than specific areas or local government boundaries.

Figure 12: Percentage time Drought declared since 1964.
Source: Queensland Government – Long Paddock.



Irvine (2021) mapped the estimated location and duration of drought across Queensland for the period 1936–1964 and provided illustrations of the longest drought declarations during that period. Episode 7 Sept 1951 to March 1953 impacted the area we now know as Burdekin/Charters Towers and as Figure 13 below shows the region experienced between 200 and 400 days of drought in that episode.

Figure 13: Days of Drought Sept 1951 to March 1953. *Source: Irvine 2021.*



Community engagement demonstrated that there is variation in the perception of drought across the Burdekin. In the lower Burdekin there was a perception that the Burdekin Dam is totally reliable, and that water will always be available for irrigated agriculture and to replenish the aquifer. This feature is promoted as a regional competitive advantage supporting economic development and liveability. The corollary to this asset is that drought or even dry seasons are not a regular topic of conversation.

However, Burdekin growers do, have serious concerns about the cost of water and the energy required to pump it and those who cannot access the irrigation system are very sensitive to seasonal variation. Over the years increasing salinity of soils due to rising ground water levels, in some parts of the Shire, have been identified impacting agricultural productivity (DNRM, 2017). This complacency is being challenged by some who have valid concerns about climate change and the increasing demand on the Burdekin Dam and the potential for upstream infrastructure to reduce the supply.

The upper Burdekin communities articulate water availability and security as a major issue. These were explored in scenario-based planning work undertaken under Communities in Transition project (CSIRO etal 2019) For example the reliance of Charters Towers Weir for a number of towns and the Pajingo Mine indicates that the weir relies on seasonal filling cycles and continual inflows from the Burdekin River, which are generally sufficient for around six or seven months, but then the water level is slowly reduced through a combination of water use, evaporation and natural seepage loss. Late wet season and low yielding wet seasons pose a risk to supply security and the water levels in the weir have taken to fall to very low levels at times.

Past impacts of drought in this region

The region's reliance on agriculture and the limited annual summer wet season means that dry seasons, whether they meet the criteria for drought declaration or not, have had consequences and impacts across the social, economic, and environmental domains. These domains are inextricably linked and should always be considered in terms of the holistic impact on the region. Building industry resilience will support personal resilience; building resilient farm businesses will benefit resilient town centres; resilient landscapes will improve liveability and encourage community resilience.

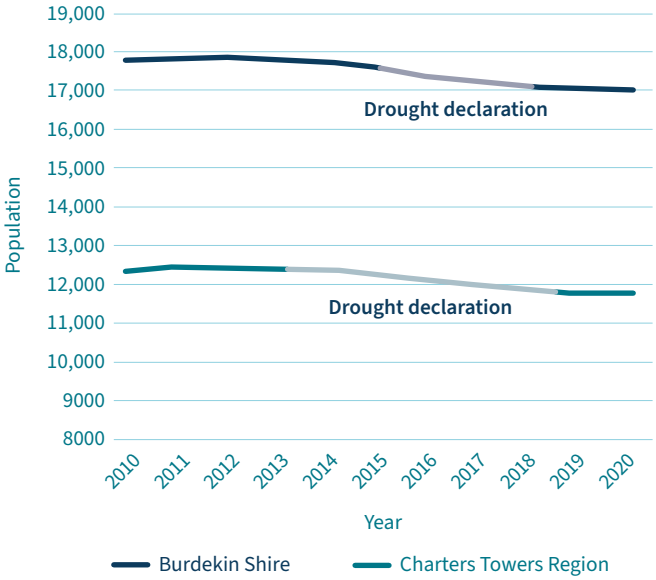
People and community

The people of the Burdekin and Charters Towers region are not strangers to long dry seasons, failed wet seasons and drought declarations and have built a degree of inherent resilience which should be recognised and built upon.

Disasters and crises are known to alter the liveability of a region and the lifestyle of residents – jobs are lost, amenity decreases, social and commercial opportunities diminish. In rural and remote areas this often leads to an exodus of population chasing better opportunities, often in the city. The following graph illustrates the impact of drought by identifying drought periods on the population of the Burdekin and Charters Towers LGAs over the ten years 2010–2020.

Whilst there may have been other pressures impacting population downturn during the drought period it is difficult to argue the relationship especially when strongly supported by anecdotal evidence of why people have relocated.

Figure 14: LGA Population 2010–2020 noting periods of Drought Declaration. *Source: Adapted from informed decisions – id.com.au*



On a more individual level the effects of drought on mental health are well recognised in the literature and public health experts increasingly recognise that adverse weather and climate conditions can have negative impacts on people's mental health as well as physical health (Cartier 2020). The Australian Rural Mental Health Study (ARMHS) repeatedly surveyed more than 1,800 households in remote and rural communities in New South Wales. Over a 6-year period, participants self-reported psychological symptoms of poor mental health like distress, worry, depression, anxiety, and suicidal thoughts. Whilst this study did not include Charters Towers/Burdekin residents the feedback gained through the engagement process clearly identified this as one of the key issues, particularly the risk to mental health as a major impact of local drought. The financial stresses, loss of employment security/income, family separation, loss of animals including pets, and social disconnection caused by drought conditions are identified as some of the mental health determinants.

Family disruption is cited as another social drought impact with one parent needing to find off-farm income moving to the city or taking on Fly-in Fly-out employment. This fracturing of the family unit exacerbates personal stress for all family members. Community feedback noted that the financial impacts of crop or cattle loss/reduction due to drought reduces disposal income which then impacts residents' ability to purchase personal goods, undertake social activities and spend on non-essentials like holidays. This then impacts life satisfaction and social connectivity.

Knowledge, willingness, and capacity to learn and change

Periods of drought and unpredictable weather patterns have forced agricultural producers to adapt and innovate leading to changed farming practices and even changed crops. In some cases, small individually owned farms have been incorporated into larger enterprises run by corporates or large family farms that can capitalise on the critical mass created and increase productivity and resilience to shocks. Town based businesses have diversified and improved efficiencies and taken on new technology to remain viable in times when commerce is tight.

Conversations with the community suggest that younger generations have demonstrated a greater propensity for change and have adapted to climatic pressures and emerging technologies and practices more easily than their parents' generations.

> The big issue for rural people with drought or any kind of natural disaster is stigma – weakness of not being able to cope with the situation and the risk of being the one that lost the family farm.
>
> **Sean Winning, TRACC**

Case studies

Case study: Lower Burdekin Water – a local solution to a local problem

Commercial production of sugar cane commenced in the Burdekin area in 1879 with irrigation from lagoons beginning in 1885 and the use of groundwater introduced in 1887. The large-scale expansion of sugar production with its high-water consumption and a series of dry years in the early 1960s resulted in significant diminishment of the Burdekin delta underground water supplies. This risk to irrigation capacity along with the threat of saltwater intrusion demanded a response. Had these circumstances continued the impact on the local sugar industry and the regional economy and community would have been seriously detrimental.

A locally led initiative to establish artificial replenishment of the underground water supplies was investigated and successfully implemented. In 1964 the Irrigation Water Commission proposed the establishment of a water area covering the entire Burdekin delta and Board comprising representatives from mills suppliers', mills, local government, and the commission to finance, establish operate and maintain the works. Ultimately two water boards were established, the North and South Burdekin Water Boards and pumping for artificial recharge commenced on 19th July 1965. At the time the program and the self-funding and local management model were considered unique.

Lower Burdekin Water ("LBW") was established in 2015 following the amalgamation and dissolution of the former Water Boards and continues to manage the aquifer recharge and water distribution assets and services within its authority area. LBW is charged with utilising part of the flow in the Burdekin River to replenish the subterranean water supply in that part of the Burdekin Delta north of the Burdekin River and to thereby increase the quantity and improve the quality of the supply available from this source for irrigation, domestic, stock and industrial and urban purposes.

While the Burdekin Delta's profile may not be that of the Burdekin Falls Dam or the Burdekin River itself, the aquifer continues to be a critical element in the supply of water to the Burdekin community, local and regional economies and the natural environment and is a critical element in drought resilience planning.

Case study: Making Water Work – economic growth for Charters Towers

The Charters Towers Region is central for road, rail, and air transport across North Queensland, and is thus well positioned as a goods and services centre underpinned by an enduring supply chain with reliable human services, transport and processing industries. The city of Charters Towers sits at the intersection of major roads going north-south, and east-west. Transport by trucks is critical for the ongoing viability of several industries, and the location of the city and its airport is also important for disaster management.

A recent related supply chain analysis for Townsville suggests significant unmet demand for typical agricultural products across key markets including those in South-East Asia, China, and the Middle East (KPMG 2019). The Making Water Work pathway will focus effort on improving supply chain analysis, planning and improvement while monitoring growth and resource efficiency benefits, particularly in the context of creating new opportunities to expand agricultural production and food processing.

The pathway also aims to promote and galvanise Charters Towers as the centre of a viable and more efficient cattle industry which would also have the ability to support grain and fodder handling in the North. Importantly, this could pave the way for investment opportunities, policy and legislation that nurtures sustainable development in the agricultural sector.

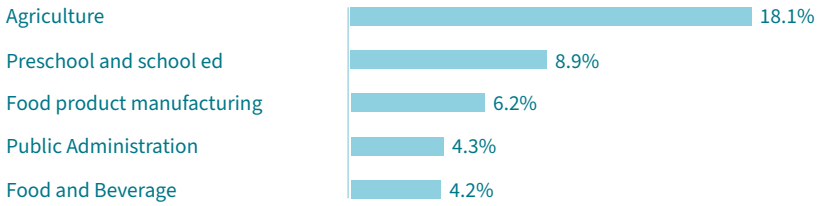
Investigations and advocacy for water security solutions including infrastructure are continuing.

Projects that secure water supply will have a direct and enduring positive impact on the economy and community of Charters Towers and North Queensland.

Economy

The importance of agriculture to the economy and social fabric of the Burdekin and Charters Towers communities cannot be underestimated with 18.1% of employed persons working in agriculture, forestry and fishing industry and many more employed in other parts of the agriculture supply chain (ABS, 2016).

Figure 15: Top Employment Industries Burdekin and Charters Towers Region.
Source: informed decisions – id.com.au



Because agriculture is so susceptible to climate impacts such as drought and other natural disasters the Burdekin and Charters Towers regional economy is particularly sensitive to change in the profitability of its key agricultural enterprises. Sugar cane is highly water intensive in the growing season – if the sugar content and tonnage is low the return to the farmer and miller may not cover costs. In the grazing sector destocking due to drought often occurs in a market that is already oversupplied and therefore the price paid is low.

When the crop or the cattle do not provide a good return – the farmers and graziers spend less, and the town businesses lose income. The townships of Charters Towers and Ayr in the Burdekin are regional business hubs that service a large region which increases the impact of economic downturn caused by drought.

If the situation is significant or long-term; jobs are lost on farms and in mills or processors, suppliers lose customers and viability, property values plummet and the cycle of economic decline gathers momentum. Empty shops, vacant houses, downsized public facilities and services follow closely behind and are clear in the memory of many of those who participated in this plan development.

Any hit to agricultural employment, as occurs in the lead up to and during a drought, will have a significant impact on the economy. The converse of this negative cycle is the positive impact that water security, as an enabler of agricultural growth and economic prosperity can have on this region.

The following graphs illustrate how drought has impacted employment in the agricultural sector in the Burdekin and Charters Towers local government areas from 2005–2021.

Figure 16: Employment for Burdekin Shire – Agriculture. *Source: Adapted from informed decisions – id.com.au*

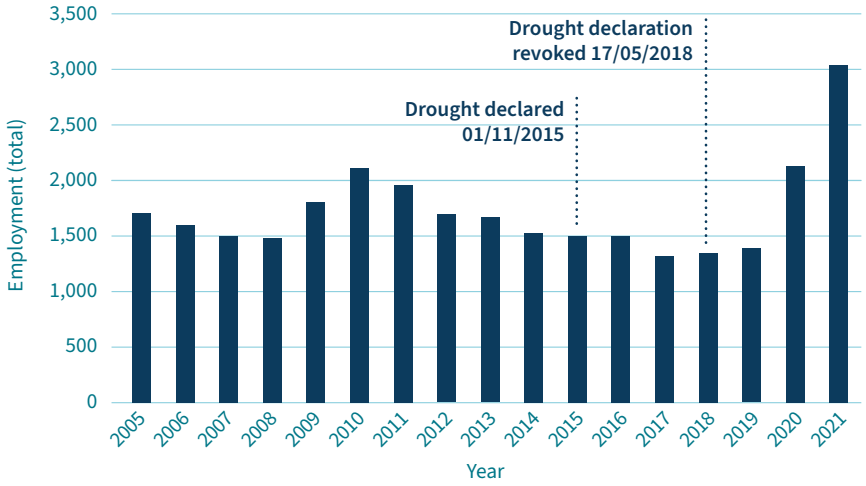
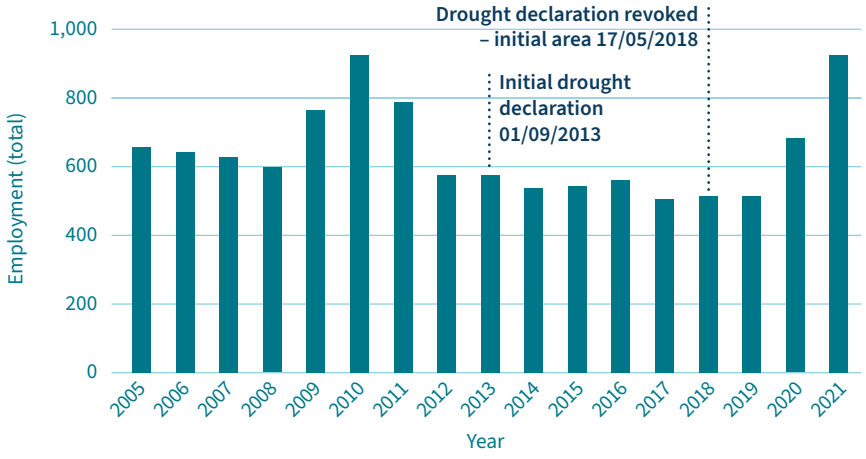


Figure 17: Employment for Charters Towers Regional Council – Agriculture. *Source: Adapted from informed decisions – id.com.au*



The story told by this data is one of job loss in the lead up to, and during a drought and job creation post drought. The difference between the amount of agricultural employment two years before the drought compared to the lowest point during the drought demonstrates a drop of 356 jobs or 21% for the Burdekin and 280 jobs or 35% for Charters Towers. The impact of the post drought agricultural employment rally is even more profound.

Given the importance of the agricultural industry as an employer across the region the consequences of up to over 20% of agricultural employees losing their jobs, plus the associated supply chain positions, the potential economic impact could only be described as catastrophic.

Landscape and natural environment

The Burdekin and Charters Towers region is characterised by a tropical sub-humid climate with relatively high temperatures all year round and heavier rainfall and associated higher humidity in the summer months. Rainfall gets progressively lower towards the west and is more variable compared to the coastal areas.

It is home to a range of different bioregions extending from the basalt plateaus of the Great Dividing Range to the onshore Pacific Ocean and the Great Barrier Reef. Bowling Green Bay, located on the northern coastal strip of the Burdekin local government area, is home to a diverse array of coastal wetlands. The diversity and extent of wetlands, including the wildlife it supports, has led to large parts of the bay being listed as a wetland of international importance—under the Ramsar Convention.

Drought impacts all these natural environments and the plants, animals and people that inhabit them. Conversations with locals suggest that prolonged dry periods have led to a reduction in ground cover which can be further damaged by over grazing and often leads to an increase in weeds and soil erosion. Dry vegetation provides fuel for bushfires further damaging flora and fauna, and dust storms have played havoc with transmission lines. Feral animals can also contribute to land degradation and create issues for native flora and fauna.

Vegetation management planning and encouragement of best practice land management strategies are therefore an important part of drought resilience.

In the short term, land in the Burdekin catchment after rain returns to being productive relatively quickly. In the long term, seed banks are affected, reduced ground cover results in a loss of topsoil resulting in severer gully erosion post drought.

Mitigating erosion whether caused by flooding or drought is currently a focus in protecting the Great Barrier Reef from runoff and contaminants. Ensuring the health of the GBR requires the neighbouring land environments to be resilient and healthy.

Indigenous leaders talk about drought causing unhealthy waters and increased salination because of the absence of an annual flush out. This impacts breeding cycles for fish prawns and crabs and the health of the mangroves, resulting in ecosystem damage.

> “With our variable climate every drop of water counts in making our soils productive for all plants and animals. We will work together to face pest and weed issues and share our knowledge about how healthy country can support a resilient and productive community.”
>
> **NQ Dry Tropics NRM**

Image: Cattle grazing. *Source: NQ Dry Tropics NRM.*

Rainfall and temperature

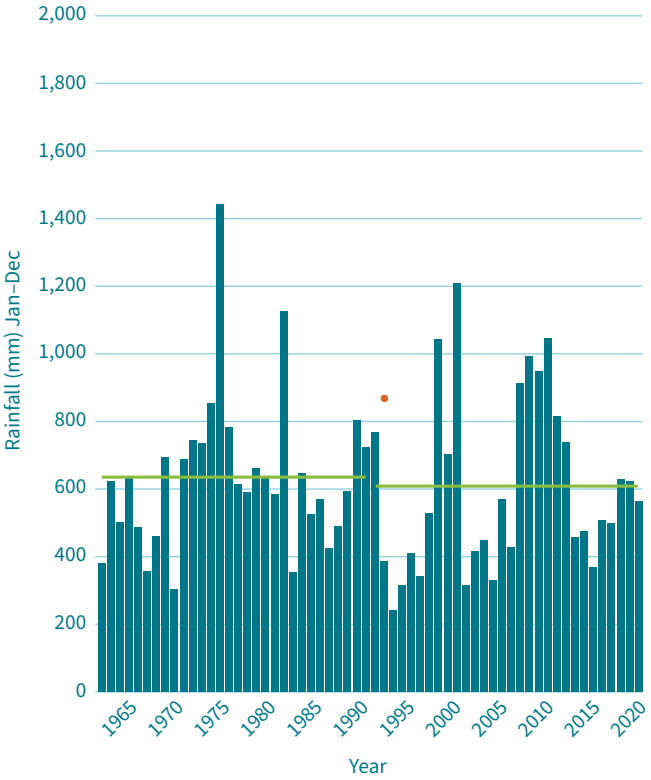
Rainfall and temperature trends provide a reflection of the past and an insight to future environmental pressures.

As illustrated below both local government areas covered in this plan have experienced an increase in temperature and a decrease in rainfall in the period 1961–2022 with all indicators suggesting that this trend will continue and possibly worsen making the need for drought resilience strategies even more pressing.

Charters Towers

- Rainfall decrease from 654mm to 611mm (1961–2022)
- Temperature change: 1.6°C rise by 2050

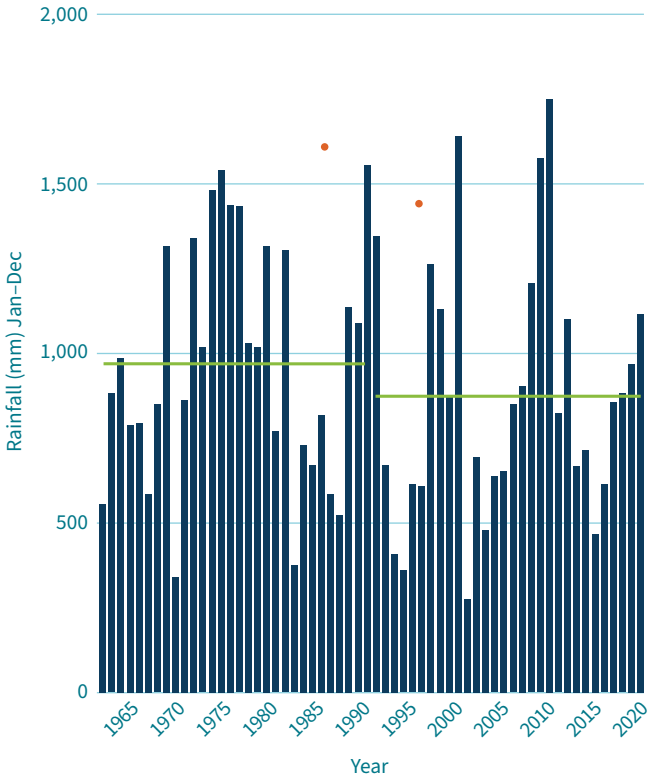
Figure 18: Charters Towers past annual rainfall 1961–2020. *Source: Adapted from The Bureau of Meteorology's Australian Gridded Climate Data (AGCD) dataset.*



Burdekin

- Rainfall decrease from 971mm to 872mm (1961–2022)
- Temperature change: 1.4°C rise by 2050

Figure 19: Burdekin past annual rainfall 1961–2020. *Source: Adapted from The Bureau of Meteorology's Australian Gridded Climate Data (AGCD) dataset.*



Infrastructure and built environment

The extremes of heat, humidity and dehydration experienced in a drought are testing on infrastructure such as roads, rail lines and buildings. Roads can soften, train tracks do expand and distort, and structural defects can appear in buildings and bridges. Communications and power lines and towers are also compromised by dust storms exacerbated by lengthy periods of drought. Severe bush fires which often occur in a drought that follows a period of flood and healthy vegetation growth have destroyed the built infrastructure in their path.

The integrated nature of drought impacts sees the economic and social impacts leading to infrastructure impacts including houses and properties being left unattended, schools reduced or closed and fences, gates, sheds, and equipment severely undermaintained.

Communities that have experienced any natural or man-made event that has caused economic hardship will find it difficult to advocate for improved social infrastructure due to diminished rate base and population. Sadly, this can be the start of downward social spiral. Governments can't afford or justify infrastructure spending so the community's services and liveability features decline leading to further population loss and social hardship – and on it goes.

An alternative perspective considers the infrastructure that communities have developed to help them cope with droughts and harvest the rain. Dams, weirs, bores, water channels, recycle pits, rainwater tanks and pumping stations are all examples of how the people of the Burdekin and Charters Towers region have used infrastructure to build drought resilience.

Energy suppliers through the extension of their networks and the availability of solar power technology have enabled remote stations to access electricity to power water distribution on their properties. Town and country residents utilise electricity to power air-conditioning and other lifestyle tools to increase their personal resilience in the dry and hot days of a drought.

Increased digital connectivity has enabled farmers to use automation and remotely controlled irrigation systems to support their crops and pasture. Through the engagement process the benefits of this equipment to farm productivity and farmer efficiency was a common message. There was also talk of the value of technology and connectivity in terms of crop and animal monitoring, the provision of weather information, communication with education and medical services and maintaining personal networks. The challenges of digital technologies including digital infrastructure gaps and skills gaps were also identified as contributing to ongoing impacts.

> "Greater connectivity has additional economic and social benefits including liveability, worker attraction, connectivity to health, education, and financial services".
>
> **Casie Scott NBN**

Image: Macrossan Rail Bridge over Burdekin River. *Source: Charters Towers Regional Council.*

Likely future impacts (risks) of drought in this region

People and community

The climate of Burdekin and Charters Towers is changing. Based on the IPCC's relative concentration pathways (RCPs) the high emissions pathways will increase projected temperature by an average of 2.6°C (1.8–3.6°C) (Department of Environment and Science, 2019 – see Figure 20).

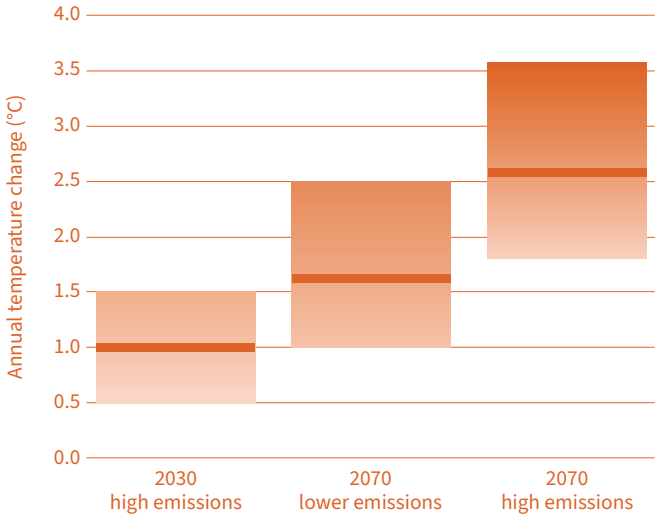
Not only will projected temperatures increase but the frequency and duration of hotter days will increase, which when combined with the reduction in rainfall, may increase the impact of drought.

Droughts have complex community impacts that can vary within the community but also over time, with impacts being both felt in the short and long term. In terms of the people and community of Burdekin and Charters Towers, the risks associated with future droughts will be felt as both tangible and intangible costs (Deloitte Access Economics, 2016).

Although the relationship between future droughts and impacts are complex, future impacts can be broadly partitioned into the following significant impacts areas:

- Health and wellbeing.
- Social cohesion and connectiveness.
- Amenities and quality of life.
- Population growth.

Figure 20: Annual predicted temperature change. *Source: Adapted from Department of Environment and Science, 2019.*



A significant risk from future drought is the deterioration of health and wellbeing (Edwards et al., 2015, 2018). Initially, the existence of droughts will increase levels of depression and anxiety within the community. This will occur due to the direct impact of the drought over business and family life and the emotional connection to the landscape. The symptoms may also persist even after the immediate impact of the drought has dissipated. Indeed, 1 in 10 people who experience natural disasters will report psychological distress and some for their entirety of their life (Deloitte Access Economics, 2016).

This issue was pertinent within community engagement as it was echoed that future droughts, by impacting business and work environments (such as destocking) will have detrimental impacts on family life, self-worth, social stigma, and increased conflict over scarce commodities. (It will likely be acutely problematic for men over the age of 35 that often are either unwilling or struggle to find adequate support services).

Overall, it is expected that demand for health and well-being services will increase over time as well as decreases in both business productivity (due to decreases in labour productivity) and students' academic achievement, which will create severe impacts on the local economy (see the 'Economy' in next section).

An interconnected impact is the deterioration of social cohesion and connectedness within the local community, which adds to a deterioration in wellbeing. In future droughts it would be expected that socialisation and community activity would reduce. As in previous droughts, it would be expected that there is an increase in social isolation with a reduction in community activity and business sponsored philanthropist activities that may be used to provide community cohesion.

In any future drought we will also likely observe a reduction in amenities and quality of life associated with these amenities. This overarching aspect includes lifestyle expectations not being met by the dry landscape and may have a detrimental impact on local sports and recreational activities, gardens, and parks. This has both direct impact on the community but also indirect effects on social cohesion and individual well-being.

The strength of a community is with a sustained population. Future droughts will, by impacting local business, reduce the employment and job retention, and have a determinantal impact on population growth. These impacts will vary from both short-term fluctuations to a potential long term decline due to persistent drought conditions. This, then, has wider short- and long-term implications on resource funding for local clinics and hospitals, schools, and council infrastructure for amenities.

Economy

The impact of drought within the Burdekin and Charters Towers region will create substantial challenges for both individual businesses and the local economy. As previously mentioned, the largest industry within this region is agriculture, which is sensitive to both climate impacts and commodity prices.

A clear immediate concern is the reduction of profit from the agricultural sector (ABARES, 2019). In the presence of drought, a combination of lower yields, increasing costs, and distorted production choices will significantly impact agribusinesses both in terms of profitability and operational capacity within the short and long term.

Within the Burdekin and Charters Towers region, three important industries that will be affected are sugar cane, cattle, and cropping.

In the sugar cane industry, drought will not only reduce cane tonnage, but also reduce sugar content, resulting in less viable operations within the region. This will have an impact throughout the supply chain from grower to mill, and post-processing distribution. Cost of production will also increase due to the expense of irrigation including infrastructure acquisition, electricity usage and maintenance

In terms of cattle farming, drought will likely result in destocking, impacting short-term profit while also impacting the medium-term supply of cattle. Further challenges arise in terms of increasing costs due to increasing dependence on cattle feed, agistments, and cattle transport because of loss of ground cover for cattle feed.

In terms of all cropping, droughts will have direct impacts in terms of crop failures, but also increase the production costs associated with irrigation pumping, fertilizer use, and the costs (productivity losses) of salt intrusion on the land.

Image: Cattle Saleyards. *Source: Charters Towers Regional Council.*

Although substantial impacts will occur at the farm level, knock-on effects will occur throughout the region. Importantly, a negative spill over effect will occur on service industries and secondary industries used to support agriculture within this region, which will lower the economic growth of the regions and result in significant job losses throughout the region.

Even in supporting industries, not specifically susceptible to drought, the impact on agriculture and the spill over effects will reduce business confidence throughout the region, which will lead to less investment in human capital and lower levels of capital and infrastructure investment to support a growing economy.

Indeed, within the engagement process, water security (and water allocation), rather than explicit drought, was a leading cause of business confidence loss, even in the Burdekin regions where water reliability is less of a problem than in Charters Towers. With future drought the conflicts over water allocations will continue to grow in this region.

Further concern exists with the potential for industrial diversification into advanced manufacturing, hydrogen production and the demand on limited water allocation.

Overall, drought will likely increase debts levels, reduce cash flow and, over the long-term, a clear danger of under-investment in both physical and human capital capacity. This would result in lower levels of innovation potential, lower human capital and substantially weaken the economy in the long term (Wittwer and Waschik, 2021).

Landscape and natural environment

Any future drought will have an immediate and direct effect on the landscape and natural environment. In the event of a future drought, it is expected to observe:

- increased bushfire risk
- reduced ground cover
- biodiversity impacts (loss of habitat)
- increased aquifer salinity
- degradation of existing waterways.

An immediate risk is the increased risk of bushfires. With low soil moisture, bushfires have the potential to not only damage the ecosystem but also impact the agricultural sector and the supporting industries within the Burdekin and Charters Towers region.

With drought, ground cover is significantly reduced. In such cases a significant risk is the loss of topsoil and gully erosion that has impacts on biodiversity and the loss of habitats. In such cases with reduced ground cover, overgrazing of land may be a risk, reducing agricultural yields and further degradation of the land.

With future droughts, a real risk is salt intrusion to the region's aquifers. In such cases, increased aquifer salinity will result in increasing costs for both domestic and agricultural use as well as a degradation of waterways and potential loss of productive land.

With increased aquifer salinity, there will be wide reaching impacts on the waterways, resulting in negative impacts on the breeding cycles of fish and crustations, and mangroves.

Image: Burdekin Delta. *Source: Burdekin Shire Council.*

Infrastructure and built environment

Although the risks from drought have immediate consequences on business activity, the community, and the environment, another important area is the impact on infrastructure and the built environment.

How future droughts affect infrastructure, and the built environment will have major implications for the region's growth potential, attractiveness to new investors and development as well as the ability of the region to retain a skilled and educated workforce.

The risks can be separated to immediate and longer-term risk to infrastructure. In terms of immediate risks, drought pose problems of associated heat damage to infrastructure, such as rail lines and roads, as well as increased risks of dust storms that interfere with high voltage power distribution.

With a heavy reliance on the agricultural sector – and many supporting industries – the region is susceptible to substantial changes in population and economic growth. This will have negative impacts on the resourcing of rural services, such as healthcare, transport, and education.

With respect to longer term risks, the implication of future droughts results in lower incentives for investors and developers to relocate to the Burdekin and Charters Towers regions. With uncertain water supply – that may increase in uncertainty over time – costly and long-term capital decisions, with increasing depreciation rates, will be difficult to make.

Additionally, drought – and the heterogeneity of water allocation within the region – will impact and distort the land value, with which longer term capital decisions are made.

Image: Sugar Mill. *Source: Burdekin Shire Council.*

Building drought resilience in our region

Lessons learnt from the past

In rich discussions with Burdekin and Charters Towers residents, businesses, service providers, and community leaders who spoke on the behalf of large cohorts, the message of previous learnings were clear and strong and included:

- Drought is understood in complex ways and shows variability across the region.
- Many resilience skills are transferrable. Lived experience and planned resilience building strategies for disasters such as floods/cyclones etc. help to build resilience for drought or economic downturn. The community is generally resilient and this needs to be recognised.
- There is a need for an integrated approach to drought resilience from the micro enterprise level to regional and macro level strategies.
- Alignment needed across complex planning strategies of different agencies relating to resilience, disaster management, and economic and social development.
- Encouraging mental wellness and supporting mental health is very important, far too many people have died and been damaged. Mental health resilience activities need to be proactive and not just reactive. They also need to be attractive to community members, this includes the use of personal advocates/local champions, farming services to be inviting not threatening, taking a positive approach while valuing privacy and confidentiality.
- Community connectedness on all levels is critical from neighbours to service provider – client, to integrated planning across agencies.
- Knowledge is power – having current, comprehensive information and good communication channels helps to prepare and cope with any natural disaster.
- The recent increased use of technology and the internet of things has contributed to increased productivity and profitability however the take up is slow and needs to be encouraged and the necessary infrastructure and capacity needs to be available.
- Community led initiatives are more successful – empower the local leaders – we don't want to be done to.
- Build the capacity of local business owners/managers (including agri-businesses) in areas such as financial skill development, debt management, cash flow planning, succession planning and business collaboration facilitation.
- Expectation management is important, if we can educate the community about what to expect they will be more confident in coping. The strategy of learn to live like grandma was suggested and would involve changes to household operations.
- Practice regenerative agriculture and regenerative natural resource management.
- Assess and adapt farming practices/ crops.
- Businesses that are more diverse in product/service portfolio, customer base are more resilient – spread your eggs.

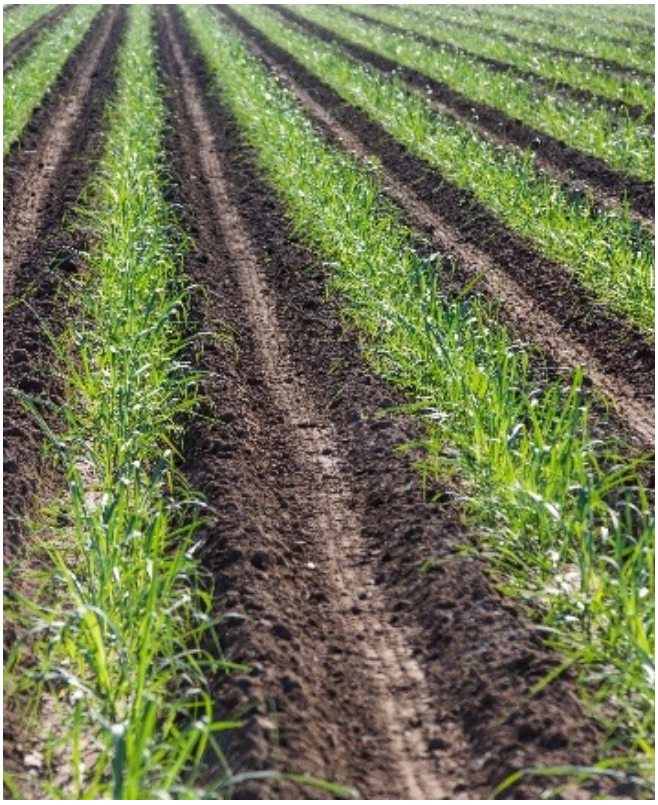


Image: Plant sugar cane. *Source: Burdekin Shire Council.*

The Regional Strategy

This Regional Drought Resilience Plan is a locally led and regionally coordinated plan and actions will be driven from a regional level. It is acknowledged that some actions require involvement of additional stakeholders such as state or federal agencies, regional governance, local stakeholder groups, charities, NRM bodies and community groups. Where this is the case, actions will be driven through local leadership and while stakeholders may work together to deliver the actions, this plan does not commit these additional stakeholders to any responsibility, resourcing or funding.

Regional actions and initiatives

By integrating significant research and analysis, as summarised in the first part of this document, with the priorities identified through deep engagement, six key regional drought resilience pathways were identified within the Burdekin-Charters Towers region. The pathways and the associated actions are central to the drought resilience strategy for the region for the period 2022–2030.

To ensure a balanced quadruple bottom line approach, each pathway and the actions therein are notated to reflect its influence on economic, environmental, social, and cultural and governance priorities. The strategy also notes how each pathway reflects the Drought Resilience, Adaptation and Management Policy (DRAMP). Framework outlined by Crossman (2018) which summarises practical actions to prepare for and deal with drought through three pillars (Tsegai et al. 2015): The Burdekin and Charters Towers Drought Resilience Strategy has been developed to both reflect the globally recognised DRAMP Framework and to address economic, ecological, social, and cultural, and governance benefits through a series of community defined pathways.

The following matrix identifies and maps the pathways and actions to the key pillars to prepare for and deal with drought. Outcomes for each pathway are articulated for the quadruple bottom line in the following pages.

	Pathway 1	Pathway 2	Pathway 3	Pathway 4	Pathway 5	Pathway 6
	Progressing and implementing a whole of catchment approach to achieving water security for the Burdekin-Charter Towers region.	Business and sector development for economic diversification and resilience.	Boosting innovation and agricultural technology for drought resilience.	Address drought related workforce disruption, skills, labour and housing shortages.	Building community and personal resilience.	Improving the Regional Governance Capacity within the Region to Plan, Deliver and Monitor Progress Towards Regional Drought Resilience.
Key Pillar 1 Implement drought monitoring and early warning systems.	**1.1** **1.3**	**2.1** **2.2** **2.3**	**3.1**	**4.1** **4.2**	**5.1**	**6.3** **6.5**
Key Pillar 2 Assess drought vulnerability and risk.	**1.1** **1.2** **1.4** **1.6**	**2.1** **2.2** **2.3** **2.4** **2.5**	**3.1** **3.2** **3.3** **3.4**	**4.2** **4.3** **4.4** **4.5**	**5.1** **5.2** **5.3** **5.4** **5.5**	**6.1** **6.2** **6.3** **6.4** **6.5**
Key Pillar 3 Implement measures to limit impacts of drought and better respond to drought.	**1.1** **1.3** **1.5** **1.7**	**2.3** **2.4**	**3.2** **3.4**	**4.3** **4.5**	**5.2** **5.3** **5.4** **5.5**	**6.2** **6.3** **6.4**

Pathway 1: Progressing and implementing a whole of catchment approach to achieving water security for the Burdekin and Charters Towers region.

The Burdekin catchment is a place of significant opportunities and risks for water development, and as such, water security into the future emerges as a key drought vulnerability for the Burdekin-Charters Towers region. The declining patterns of rainfall, seasonal variability, challenges with capture, storage and competing development proposals exacerbates the concerns relating to water security. The availability, and quality of water are identified as impacting town and drinking water supplies as well as water availability for industry, particularly agriculture. The Burdekin and Charters Towers Councils are committed to understand the risks, assess vulnerability, and develop cohesive measures to ensure water security for the region in the long term across the wider catchment. We aim that Federal and State Governments, the Councils and industry all work together to progress strategic water infrastructure (hard and soft) initiatives that deliver and maintain long term water security for our communities, industry and the protection of cultural and environmental values.

Key regional actions

1.1

Through review of the Burdekin Water Plan, assess the potential impacts and costs of reduction in productive water on local industries and communities (**KP1** and **KP2**).

1.2

Work together across both Council areas to achieve a cohesive program of works to deliver infrastructure that can achieve whole of catchment water security and new water development opportunities for the region (**KP2** and **KP3**).

1.3

Encourage a partnership-based approach to review of the Burdekin Water Plan, with suitable modelling to inform an understanding of the current and future water security needs, water allocation and pricing and to achieve drought resilience for the basin (**KP1**).

1.4

Explore new infrastructure technologies and water trading platforms that might deliver innovative water security solutions (**KP2**).

1.5

Support the capacity of Indigenous communities to negotiate and secure their interests in water (**KP3**).

1.6

Instigate stronger urban and industrial demand management via auditing current water use (**KP2**).

1.7

Negotiate Federal, State and private sector investment in priority responses to the region's water security needs (**KP3**).

Key stakeholders	Other partners	Investment targets
• Department of Regional Development, Manufacturing and Water • Burdekin Shire Council • Charters Towers Regional Council • Townsville Enterprise Ltd.	• North Queensland Water Infrastructure Authority	• National Water Infrastructure Development Fund • DAFF Regional Planning (EPBC) • Regional Water Assessments • Local Government Subsidies and Grants Programs

Economic outcomes		Improved resilience of local economies and businesses to drought impacts.
Environmental outcomes		Protection of key environmental values in the Burdekin catchment.
Social and cultural outcomes		Protection of cultural values in water.
Governance outcomes		Improved coordination and regional governance for achieving water security.

Pathway 2: Business and sector development for economic diversification and resilience.

Economic revitalisation and diversification across key towns in this region is key to long term drought resilience. This means building strong business and sector capability across the economy and building on economic, human, and natural assets. The economies of Burdekin and Charters Towers region are in the midst of transition, with climate, economic, social, supply chain and other impacts necessitating the navigation of multiple pressures. Significant new economic and social opportunities are also emerging. Recent studies of agricultural supply and value chains in North Queensland highlight the demand for targeted agricultural products in South-East Asia, China, and the Middle East. Other studies highlight new and emerging opportunities in other sectors including health, education, ecosystem services, energy, and tourism/culture. However, capitalising on these opportunities requires proactive planning and action to strengthen enterprise capacity, support innovation and foster a revitalised and skilled workforce. Developing new and emerging industry sectors will particularly mean supporting associated value and supply chains.

Key regional actions

2.1

Develop plans within both Council areas to build regional business ecosystems by Initiating community/business led programs to identify and address business level vulnerabilities to drought (**KP1** and **KP2**).

2.2

Enable broad and coordinated strategies to support the strengthening of agricultural business efficiency, cost reduction, resilience planning, action and adoption of innovation (**KP1** and **KP2**).

2.3

Support the development of different business and finance models to support enterprise/farm resilience and risk management for drought resilience (**KP1**, **KP2** and **KP3**).

2.4

Support partnerships and initiatives that facilitate vegetation management planning and encourage best practice land management in the interests of a resilient environment.

2.5

Help develop collaborative industry development and innovation clusters within our two communities and develop cohesive cross-industry action strategies associated with supply and value chains (**KP2** and **KP3**).

2.6

Support the stronger emergence of Indigenous-led businesses and social enterprises (**KP2**).

Key stakeholders	Other partners	Investment targets
• RDA Townsville and North West • TEL • DAF • NQDT • Industry Bodies • TNQ Drought Hub • Burdekin Shire Council • Charters Towers Regional Council	• North West DESBT • Smart Precinct • Chambers of Commerce	• Building Better Regions Fund • Drought and Climate Adaptation Program • Climate Solutions Fund • QRIDA and Future Drought Fund • Advance QLD Regional Collaboration Grants • Industry Partnership Program • National Indigenous Australians Agency

Economic outcomes		Improved resilience of local economies and businesses to drought impacts.
Environmental outcomes		More efficient use of water and natural resources within businesses.
Social and cultural outcomes		Increased social resilience and cohesion within our communities.
Governance outcomes		Improved drought support coordination and regional governance for drought resilience.

Pathway 3: Boosting innovation and agricultural technology for drought resilience.

Agri-technology and other digital technologies can provide transformative solutions to drought resilience and can amplify positive economic, social and environmental impacts. The Burdekin and Charters Towers region have identified a strong foundation and readiness for the development of innovation and AgTech development and adoption. Collaborative platforms for innovation in key AgTech areas (including capital and commercialisation support streams) will enable technology scaling. It is recognised that enabling technologies (e.g. digital infrastructure), new data management systems, smart devices, remote and autonomous technologies and intelligent process control systems can support change, improve on farm innovation and increase water efficiency, productivity and value chain efficiencies. This will build resilience, sustainability and competitive advantage for industries in the long run. Supporting capacity and capability for translation of technological knowledge at the enterprise level, adoption by local businesses with confidence and accelerating scaling up of cutting-edge technologies are critical initial steps.

Key regional actions

3.1

Develop a strong Burdekin node via the TNQ Drought Hub with a focus on scoping innovation in business/production systems, brokering business knowledge needs, developing incubation/accelerator programs, and establishing adoption support (**KP2** and **KP3**).

3.2

Develop a strategy for cohesive training and educational pathways that deliver capacity building and new skills including agricultural production in a drought context and facilitate adoption and change management via extension and mentorship programs (**KP2** and **KP3**).

3.3

Identify and address digital technology infrastructure challenges for innovation and AgTech development (**KP2**).

3.4

Improve baseline level weather monitoring and the relevance and deployment of prediction tools in the region (**KP1**).

3.5

Develop proposals and advocacy for multi-stakeholder investment in technological innovation that supports drought resilience (**KP2** and **KP3**).

Key stakeholders	Other partners	Investment targets
• TNQ Drought Hub • NQDT • Industry Bodies • DAF	• Councils • JCU • CQU • CSIRO • Agforce • Growcom • Canegrowers • SRA • Telcos (NBN, Telstra)	• North Australian Regional Connectivity Program • CRCNA • QRIDA and Future Drought Fund • Black Spot Program • Industry funding • Philanthropic and start-up funding

Economic outcomes		Improved resilience of local economies and businesses to drought impacts.
Environmental outcomes		More efficient use of water and natural resources and investment into sustainable economies and communities.
Social and cultural outcomes		Increased social resilience and cohesion within our communities and innovation in the protection of cultural values.
Governance outcomes		Improved coordination and regional governance for drought resilience.

Pathway 4: Address drought related workforce disruption, skills, labour and housing shortages.

Labour and skills shortages in rural communities strongly impinge on their competitiveness, adaptive capacity and resilience in the face of drought and other changes. The Burdekin and Charter Towers region faces challenges of population attraction, retaining a skilled workforce, labour and housing shortages, an ageing workforce and the challenges of building a workforce ready for the digital future. Current opportunities to meet workforce needs vary, including local supply challenges, fly/drive in-out pressures, migration, short stay foreign workers, and access to temporary workers. There are several impediments to workforce development, including fragmented ways to meet labour market needs and career pathways and to match education and training with industry demand. There is a strong need for a proactive regional population and workforce strategy development with structured and coordinated workforce plans for key priority industries to 2030.

Key regional actions

4.1

Audit and cost place-based labour market challenges facing key industries affected by drought, including demand/supply, skills gaps, training and education, migration, FIFO and temporary arrangements (**KP1**).

4.2

As a trial of state-significance, develop local government area-based population and workforce plans with strong cross-regional connectivity across priority economic sectors, including options for meeting labour and skills needs, including digital technologies, with coordinated cross-provider partnership responses (**KP1** and **KP2**).

4.3

Within the local plans, encourage workforce and skills development networks within key industry clusters, education, and employment providers to coordinate and jointly address employment, training and skills needs in the region (**KP2** and **KP3**).

4.4

Develop an innovative housing strategy for the region that supports a growing workforce and provides stable accommodation for a resilient community (**KP2**).

4.5

Negotiate Federal, State, and private sector investment to meeting labour market skills shortages (**KP2** and **KP3**).

Key stakeholders	Other partners	Investment targets
• RECoE • TEL • RDA Townsville and North West • Burdekin Shire Council • Charters Towers Regional Council	• Jobs Queensland • CQU • JCU • TAFE • RTOs • Schools • State and Federal Departments of Education, Employment, Small Business and Training • Smart Precinct	• Skilling Queenslanders for Work • Queensland Jobs Fund • Realising Our Potential Grants • Industry and Philanthropic Funding • Assisted Migration Programs

Economic outcomes		Improved resilience of local economies and businesses to drought impacts.
Environmental outcomes		More efficient use of water and natural resources and investment into new sustainable industries.
Social and cultural outcomes		Increased social resilience and cohesion, and integration of cultural considerations in workforce development.
Governance outcomes		Improved coordination and regional governance of workforce development for drought resilience.

Pathway 5: Building community and personal resilience.

Drought and multi-hazard stress is experienced by farmers and businesses at both the family and personal levels and has impacts across local communities. The impacts of drought are environmental, social, cultural, wellbeing and psychosocial. Key areas of impact in Burdekin and Charters Towers region include financial hardship; social cohesion impacts including conflict; relationship strains; mental health impacts including suicide; and physical health challenges at the farmer level and the depletion of social capital at the community level. Access to appropriate support services was identified as being very challenging, often with limited-service options as well as challenges arising with the availability of qualified staff in the region. The need for more preventative and acute health care arrangements were identified. The need for a collaborative, place-based community planning for health and community resilience planning was identified.

Key regional actions

5.1

Identify and document the hardships due to drought on individuals, families, businesses, and communities and develop priority project approaches to address the hardships (**KP1** and **KP2**).

5.2

Develop innovative programs to support landholders in self-care, stress management and managing change, including building the capacity of local integrated service providers (**KP2** and **KP3**).

5.3

Undertake strategic community cohesion and community development projects to support the community with change management and the transition to emerging and enhanced strategies for resilience (**KP2** and **KP3**).

5.4

Align the consideration of liveability challenges in strategic projects to address population, workforce attraction and retention, community cohesion and service gaps (**KP2** and **KP3**).

5.5

Encourage the development of a place based, collaborative framework for meeting preventative and acute needs for positive physical and mental health outcomes (**KP2** and **KP3**).

Key stakeholders	Other partners	Investment targets
• Institutions Lead need further negotiation	• Health and social service providers in the region • Industry bodies • Community agencies • Local businesses • Schools • DAF • QFES • NQDT • TNQ Drought Hub • Prospect (Charters Towers) • Burdekin Community Association	• Building Better Regions Fund • Drought Hardship Grants • Information, Linkages and Capacity Building (ILC): Economic and Community Participation Program • Hospital Board and Primary Health Network • Philanthropic Investors

Economic outcomes		Improved individual, family and business resilience.
Environmental outcomes		Prevention of acute environmental and animal welfare problem arising from distress.
Social and cultural outcomes		Increased social resilience and cohesion.
Governance outcomes		Improved coordination and regional governance for all aspects of drought resilience.

Pathway 6: Improving the Regional Governance Capacity within the Region to Plan, Deliver and Monitor Progress Towards Regional Drought Resilience.

Regional Drought Resilience Planning is just one area of focus within the wider process of building regional resilience in the face of drought, flooding and growing risks likely to emerge from climate change in the Burdekin-Charters Towers region. All three pillars of the DRAMP Framework need to be operational (early warning, assessing risk and response). This means building long term capacity in the region and at Council, institutional and property/business levels to grow overall disaster and drought resilience. This particularly means Federal, State and Local Governments working well together and with regional institutions, industries, and communities to support regional and local action.

Key regional actions

6.1

Include drought considerations in Burdekin and Charters Towers disaster and multi-hazard management planning processes (**KP2**).

6.2

Continue a regional approach to managing drought resilience with cohesive and coordinated approaches with key stakeholders, including NRM bodies, industry bodies, education providers, governments, and regional economic organisations (**KP2** and **KP3**).

6.3

At Council level, establish a foundational capacity for long term drought resilience planning, delivery, monitoring, evaluation and learning embedded within the QRA resilience planning framework (**KP1**, **KP2** and **KP3**).

6.4

Work with BOM to develop anticipatory capacity, data and knowledge systems and resources for drought resilience (**KP2** and **KP3**).

6.5

Operationalise regional drought resilience action tracking to start to measure RDRP impacts (**KP1** and **KP2**).

Key stakeholders	Other partners	Investment targets
• Burdekin Shire Council • Charters Towers Regional Council • TNQ Drought Hub • RECoE • NQDT • DAF	• Local Drought Committees • QRA • QFES	• Future Drought Fund • DCAP

Economic outcomes		Early action to reduce the economic impacts of drought.
Environmental outcomes		Prevention of acute environmental and animal welfare problem arising from drought onset.
Social and cultural outcomes		Increased social resilience and cohesion across the drought governance system.
Governance outcomes		Improved coordination and regional governance for drought resilience.

Community partnerships and communication strategy

Building local priorities and action initiatives

This Regional Drought Resilience Plan (RDRP) is focused on developing the broader regional strategies required at the whole of region scale. This is needed to structure and enable local scale responses to these issues in several contexts:

1) At local community scales (Ayr, Charters Towers, Home Hill, Brandon, Clare, Dalberg, Giru, Millaroo, Charters Towers, Millchester, Queenton, Greenvale, Hervey Range, Homestead, Pentland, Sellheim, Mingela, Hidden Valley, Balfes Creek and Ravenswood).
2) At a property or enterprise scale on small business, pastoral and farming properties across the region.
3) At an Indigenous community and business level.

As a regional plan, this process has not been sufficiently resourced or programmed to develop detailed local drought responses at these two scales, but this effort is progressing well in the context of the QRA Resilience Strategy process. Indeed, the region is well positioned to progress support for the resolution of regional plan priorities at those scales. Partnerships between the public sector, private enterprise and the community are required to fund and specific outcomes.

The following details, how the regional strategies outlined, will enable the progression of local priorities into action.

Translating regional strategies into local community action

As outlined in the regional strategy, this plan uses localised strategic action by relevant stakeholders on several key "whole of region" issues of importance in building drought resilience. With examples of emerging local area actions, these include:

1) Water security (e.g. more drought resilient water supplies through a whole of catchment approach).
2) Business and sector development (e.g. more drought resilience through business sector and enterprise capability for innovation, revitalisation and capitalising on emerging opportunities).
3) Innovation and agricultural technology (e.g. innovation hub with a focus on innovation in business systems, ag-tech adoption and incubation/accelerator programs).
4) Workforce and labour shortages (e.g. regional population, workforce and housing plans).
5) Community and personal resilience (e.g. more innovative and preventative service approaches).
6) Governing to build community resilience (e.g. dealing with drought as part of multi-hazard planning and regional collaboration).

Translating regional priorities into local level actions

There are three key mechanisms for supporting the translation of regional priorities for action in improving drought resilience at local level across the region. These are:

1) **Business and property level actions:** Supporting business/property scale drought resilience planning. Pathways 2–5 outline the strategies for coordinating and supporting business/property scale planning at the microscale drought resilience.
2) **Place-based actions:** Within an overarching regional drought resilience planning ensuring differentiated local drought resilience actions that take account of the specific nuances of place-based or community characteristics and needs.
3) **Cascading risk and vulnerability actions:** Regional drought strategies focus on exposing and addressing cascading risk and vulnerability at locality level and working with critical stakeholders for a coordinated approach to mitigating vulnerability and risk. This will involve appropriate data and evidence at the granular level to inform sustainable decision making.
4) **Local network development actions:** Strengthening local networks for drought resilience including connectivity, information sharing and social capital building.

Together, the above regional approaches will deliver local action to secure regional drought resilience.

Our core approach for the implementation of this RDRP is based on the emergence and continued growth of several layers of partnership that will ensure a firm and continuing commitment to achieving impact. At the centre of these arrangements sit the commitment of several key regional partners to act as the long-standing owners of RDRP. There are three layers of partnership, however, that will be important in mobilising these arrangements.

Burdekin-Charters Towers local government partnership

Strong partnership between Burdekin Shire Council and Charter Tower Regional Council for effective regional approach including partnerships with neighbouring Councils who face similar drought issues.

This partnership is at the core of driving the Drought Resilience Regional planning and action, bringing together key stakeholders and aligning drought planning to other initiatives in the region and LGA. Resourcing both Councils to have capacity to lead drought resilience actions will be a critical aspect of the implementation of regional drought resilience plans.

Partnerships among key regional institutions

Active coordination of drought resilience strategy development and delivery is increasingly building through cooperation across several key regional institutions that will partner with Burdekin Shire Council and Charters Towers Regional Council in supporting strategy implementation.

Both Local Government communities and the region's land holders and businesses are the key players most directly affected by drought and water shortage. Hence raising capacity of both Councils and the region's regional NRM body is crucial to ensure RDRP delivery. NQ Dry Tropics is an NRM body that has aligned interests, particularly working toward addressing relevant environmental challenges including livelihoods, sustainable agriculture, effective natural resource use including water and are committed to landholders leading change and can be an effective partner. The NQ Drought Hub is hosted by James Cook University and can be a source of partnerships, particularly around agricultural technologies and innovation. The regional development and economic/industry bodies have aligned strategies to the drought resilience regional plan priority areas and are integral to coordinated action.

As the key DAF-sponsored drought resilience planning agency, the Regional Economies Centre of Excellence (RECoE), with its local linkages and presence provides the overall planning support and additional facilitation support to ensure that partnerships continue into the future.

Image: Burdekin Shire Council Chambers. *Source: Burdekin Shire Council.*

Partnerships with key federal and state agencies

Federal and state agencies are critical to progressing policy and bilateral budgetary and program solutions to the long-term drought related issues facing the region. Combined Federal interest in broader resilience building (both drought, flood, and other natural disasters) is led through the new Australian Government Recovery and Resilience Agency. This agency leads Australian responses to natural disasters and holds responsibility for dispersal of the Future Drought Fund. Other key Australian Government agencies that need to be drawn into this response include the National Water Grid Authority, Department of Agriculture, Water and the Environment, Department of Infrastructure, Transport, Regional Development and Communications, and Austrade.

At the State Government level, both Councils have strong relationships with the QRA and the Queensland Fire and Emergency Service (QFES) and are collaborating to build and implement the region's broad Resilience Strategy, of which, this RDRP is a component. The region's capacity to drive these partnerships, however, is funding dependent. Queensland's DAF as the Queensland lead on drought response and recovery, will need to increasingly partner the region in supporting responses to, and long-term monitoring of, this RDRP. Other key Queensland Government Departments that need to be drawn into this response include Regional Development, Manufacturing and Water; State Development, Infrastructure, Local Government and Planning; Employment, Small Business and Training; Environment and Science; Transport and Main Roads; Communities, Housing and Digital Economy.

Image: Gill Street, Charters Towers City. *Source: Charters Towers Regional Council.*

Monitoring, evaluation and learning (MEL)

The FDF represents the Australian Government's ongoing commitment to strengthen drought preparedness and resilience. Development and publication of Regional Drought Resilience Plans (such as this one) aim to identify and guide actions to build the region's resilience to future droughts. The overall benefits of regional planning are aimed to:

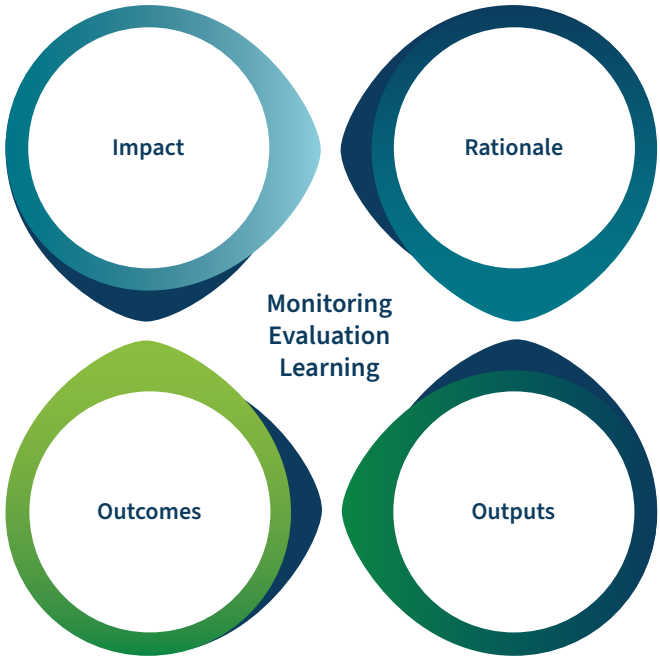
- empower communities to identify the impacts of drought and develop regional drought resilience and response management plans
- support communities to consider the incremental, transitional and transformational opportunities needed to strengthen drought resilience and encourage innovative initiatives at the regional level
- facilitate increased community understanding of their resilience to drought, including encouraging communities to share their learnings with each other
- encourage improved natural resource management capability through planning.

Any planning process, however, requires a strong monitoring, evaluation and learning cycle. For the purposes of this plan, we adopt the framework of FDF for evaluation with a focus on impact, effectiveness, appropriateness and efficiency as shown in Figure 21.

Figure 21: Adapted from Future Drought Fund (FDF) approach to Monitoring, Evaluation and Learning (MEL).

Impact
What signs of progress are there towards long-term drought resilience? What priorities and opportunities do the Fund and programs reveal for drought resilience policy, funding and programs?

Effectiveness
To what extent are programs achieving their intended outcomes (and any unintended outcomes)? What could be done to improve the outcomes of the investments?



Appropriateness
To what extent are the programs aligned with the strategic objectives of the Fund, and targeted at important needs? What can be done to improve the appropriateness of the investments?

Efficiency
To what extent are the Fund and program outputs being administered and delivered efficiently, and to the expected quality? What can be done to improve efficiency of the investments?

Theory of Change

The core underpinning our rationale is that building regional resilience will improve capacities to respond and adapt to the impact of drought. Resilience is a multifaceted concept involving a range of views that combine resistance in the face of adversity, rebounding and transformation (Dale et al. 2014, Babacan et al. 2020). Three common conceptualisations of resilience include an engineering resilience return to a point of stability following a disturbing event (Grimm and Wissel, 1997); the amount of disturbance a system can absorb before changing to another stable state of equilibrium (Gunderson & Holling, 2002); and a characteristic that allows members to thrive in an environment characterised by change, uncertainty, unpredictability, and surprise (Hightree et al., 2018). The theory of change adopted for this project incorporates dimensions of the wider context for drought and increased community capacity for planning and transformation in the face of drought. Drought resilience is more than susceptibility and vulnerability (Birkmann and Fernando, 2007). Resilience thinking addresses the dynamics and development of complex social–ecological systems (Miller et al, 2010). Our theory of change commences with consideration of the wider context and addresses social and economic resilience as well as the resilience of agricultural and environmental systems.

Overall Program Outcomes

While our pathways and strategies are derived from the above theory of change, the Burdekin and Charters Towers RDRP sets the quadruple-bottom line regional outcomes intended from these, including economic, environmental, social and governance and cultural outcomes.

Outcomes	Examples
Economic	Reduced economic costs arising from drought.
Environment	Reduced environmental decline emerging from drought.
Social and Governance	Increased general community health as a key resilience factor.
Cultural	Greater integration of cultural considerations in planning/delivery.

Program Logic

The program logic of the RDRP identifies the outcomes from each of the activities in the Plan, based on the theory of change and overall program outcomes.

RDRP Drought Resilience Vision			
Activity	**Delivery Process**	**Outcome**	**Process Indicator Examples**
Whole of Catchment Water Security	→	Risks and vulnerability are assessed and cohesive measures to ensure water security for the region are developed.	Review of Burdekin Water Plan. Collaboration across stakeholders towards water security and new water opportunities. Infrastructure and technology options identified; proposals developed. Water audits for urban and industrial demand. Advocacy initiatives to attract public and private sector investment for water security.
Business and sector development for economic diversification and resilience	→	Strong business sector and enterprise capability for innovation, revitalisation and capitalising on emerging opportunities.	Development of regional business ecosystems across both Councils and collaborative industry development and innovation clusters.
Boosting innovation and agricultural technology for drought resilience	→	Agri-technology and digital technologies are adopted to provide transformative solutions to drought resilience with positive economic, social and environmental impacts.	Burdekin innovation hub established with a focus on innovation in business systems, ag-tech adoption and incubation/accelerator programs.
Address drought related workforce disruption, skills, labour and housing shortages	→	Population, labour and skills shortages are not barriers to competitiveness, adaptive capacity and drought resilience.	Multi-stakeholder regional population, workforce and housing strategies planned and implemented.
Building community and personal resilience	→	Improved health and wellbeing outcomes and liveability within the region's communities.	Regional partnership framework established for a proactive and preventative place-based planning for health and community services.
Improved Regional Governance Capacity	→	Improved region capacity to drive resilience strategies.	Drought considerations included in disaster and other planning processes.

MEL Data Collection Methods

Data will be collected at established points in implementation of the RDRP. Collecting and collating data will interweave collaborative planning meetings, ongoing desk top analysis, review of existing data, surveys, interviews and focus groups, and case studies. The data collection process will balance qualitative and quantitative methods to enable deep data capture change and overall program outcomes.

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