South East Queensland Regional Drought Resilience Plan

2024–2030

Australian Government
Department of Agriculture, Fisheries and Forestry

Future Drought Fund

Queensland Government

Rural Economies
Centre of Excellence

The South East Queensland-Rural Regional Drought Resilience Plan has been developed as a partnership between the Rural Economies Centre of Excellence, the Council of Mayors South East Queensland (COMSEQ) and City of Gold Coast.

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 Primary Industries).

Acknowledgement of Country

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.

Contact us

drought@dpi.qld.gov.au

Call

13 25 23 (Queensland callers only)
(07) 3404 6999 (outside Queensland)

Monday, Tuesday, Wednesday and Friday: 8am to 5pm
Thursday: 9am to 5pm

Post

Department of Primary Industries
GPO Box 46 Brisbane QLD 4001 Australia

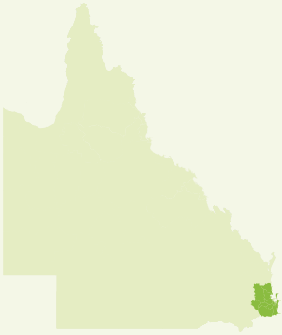
Interpreter statement

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.

Cover image: View from Mount Coot-tha lookout. Queensland.

Contents

Foreword



The South East Queensland region has long been at the forefront of climate resilience, enduring floods, droughts, and economic shifts that have shaped a resilient and adaptable culture. Recent decades have seen an increase in the frequency and severity of droughts, with the prolonged dry spells of 2019 and 2020 serving as a reminder of the urgent need for effective planning and community cohesion. These challenges have tested our region's resilience and highlighted our capability to respond effectively to such crises.

Image: Bli Bli, Queensland.

South East Queensland (SEQ) is one of Australia's fastest-growing regions, home to diverse communities across coastal areas, urban centres, and rural townships.

In recent decades, SEQ's resilience has been tested by severe floods and droughts. These events remind us how vulnerable the region is to climate impacts and highlight the need for strong, coordinated responses from all levels of government.

The SEQ Regional Drought Resilience Plan recognises these evolving challenges and underscores the importance of building economic, social, and environmental resilience across the region.

Developed by the University of Southern Queensland's Rural Economies Centre of Excellence, the plan draws on local knowledge and experience to identify key priorities and a clear pathway for improved adaptation and preparedness.

Importantly, this initiative is supported by the Australian Government and Queensland Government, and SEQ councils look forward to working closely with them to implement the plan.

As we look ahead to major events such as the Brisbane 2032 Olympic Games, water security is emerging as a critical issue. Population growth, climate variability, and prolonged dry periods mean we cannot afford to be complacent. Strengthening drought resilience now will help safeguard our communities, our economy, and our reputation on the world stage.

This shared and ongoing commitment is essential to ensuring SEQ remains strong and sustainable, and that our communities continue to thrive into the future.

Lord Mayor Adrian Schrinner

Chair
Council of Mayors—
South East Queensland

Acronyms

ABS	Australian Bureau of Statistics
ABARES	Australian Bureau of Agricultural and Resource Economics and Science
BOM	Bureau of Meteorology
CALD	Culturally and linguistically diverse
CBA	Community benefit agreements
CMIP	Coupled Model Intercomparison Project
COMSEQ	Council of Mayors, South East Queensland
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DAFF	Department of Agriculture, Fisheries and Forestry (Commonwealth Government)
DETSI	Department of the Environment, Tourism, Science and Innovation (Queensland Government)
DPI	Department of Primary Industries (Queensland Government)
DRAMP	Drought Resilience, Adaptation and Management Policy
ESI	Evaporative Stress Index
FDF	Future Drought Fund
GRP	Gross Regional Product
GSP	Gross State Product (Queensland)
KBDI	Keetch-Byram Drought Index
LGA	Local Government Area
LGAQ	Local Government Association of Queensland
LiDAR	Light detection and ranging
MEL	Monitoring, evaluation and learning
NRM	Natural Resource Management
PHN	Primary Health Network

Image: Brisbane, QLD. © Megan O'Neill, 2019.

QDMA	Queensland Disaster Management Arrangements
QFD	Queensland Fire Department
QPWS	Queensland Parks and Wildlife Service
QRA	Queensland Reconstruction Authority
QSDR	Queensland Strategy for Disaster Resilience
RDA	Regional Development Australia
RDRP	Regional Drought Resilience Plan
RECoE	Rural Economies Centre of Excellence
RFC	Rural Financial Counsellor
RSPCA	Royal Society for the Prevention of Cruelty to Animals
SEIFA	Socio Economic Index for Area
SEQ	South East Queensland
UNCDD	United Nations Committee on Drought and Desertification
ToR	Terms of Reference
UNDRR	United Nations Office for Disaster Risk Reduction
UniSQ	The University of Southern Queensland
UQ	The University of Queensland
WCRWS	Western Corridor Recycled Water Scheme

Introduction

Background

The Regional Drought Resilience Planning (RDRP) program is jointly funded through the Australian Government's Future Drought Fund and the Queensland Government.

The Queensland Department of Primary Industries (DPI) has partnered with the Rural Economies Centre of Excellence (RECoE) with the purpose of having an impact on how regions can survive and thrive into the future.

The RDRP process will:

- foster learning and build social capital
- foster co-designed, community-led planning and collective ownership of the resulting plan and its implementation
- leverage existing local, regional and state strategic planning
- recognise the diversity of people, businesses and landscapes involved in agricultural production
- provide linkages with the FDF Drought Resilience Adoption and Innovation Hubs.

Five regions produced RDR plans in the foundational year. In the second round, the remaining nine regions developed RDR plans to prepare for future droughts, with a sharp focus on the agricultural sector and allied industries.

Each plan will build upon the Regional Resilience Strategy as part of the Queensland Government's Strategy for Disaster Resilience, led by the Queensland Reconstruction Authority (QRA). Based on evidence and collaboration through partnering with local councils, regional stakeholders and other organisations, the plans – led and owned by the community – aim to drive decisions, actions and investments to proactively manage drought risk.

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 very significant and diverse. 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

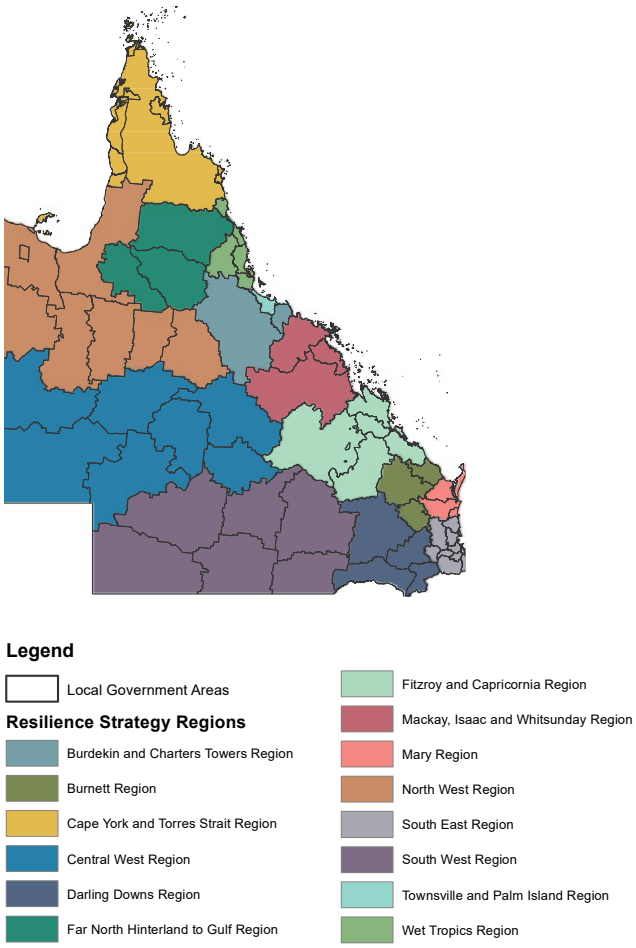
Queensland is the most disaster impacted state in Australia, and Queenslanders are susceptible to a variety of hazards. We are facing unprecedented change in both our current and future operating environment with a dynamic political, social, economic and policy landscape surrounding disaster risk reduction 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 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.[33]



Regional planning and engagement

The SEQ RDR plan was developed through collaboration between RECoE, COMSEQ, City of Gold Coast, and key regional stakeholders.

The engagement model was developed from earlier work undertaken by RECoE, Red Cross Queensland[2], the QRA[3], CSIRO[4] and was informed by international best practice from the World Bank[5] and the UNDRR[6]. 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 RDRP engagement process was iterative and involved a systems approach that has enabled community reflection on issues, combined with data paying respect to local, traditional and scientific knowledge. 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. The process utilised applied these approaches and developed adaptation pathways to build resilient and sustainable futures.

A participatory and deliberative model of co-design

At the conclusion of the co-design process, 539 unique stakeholders have been engaged with the project (Table 1), which included workshops, forums, and correspondence with community representatives and key stakeholder organisations across the region. Stakeholders include representatives from the community, local and state governments, First Nations organisations, water authorities, charity organisations, advisory bodies and not-for-profit organisations.

Figure 2: Co-design engagement methodology with key stakeholders.[34]

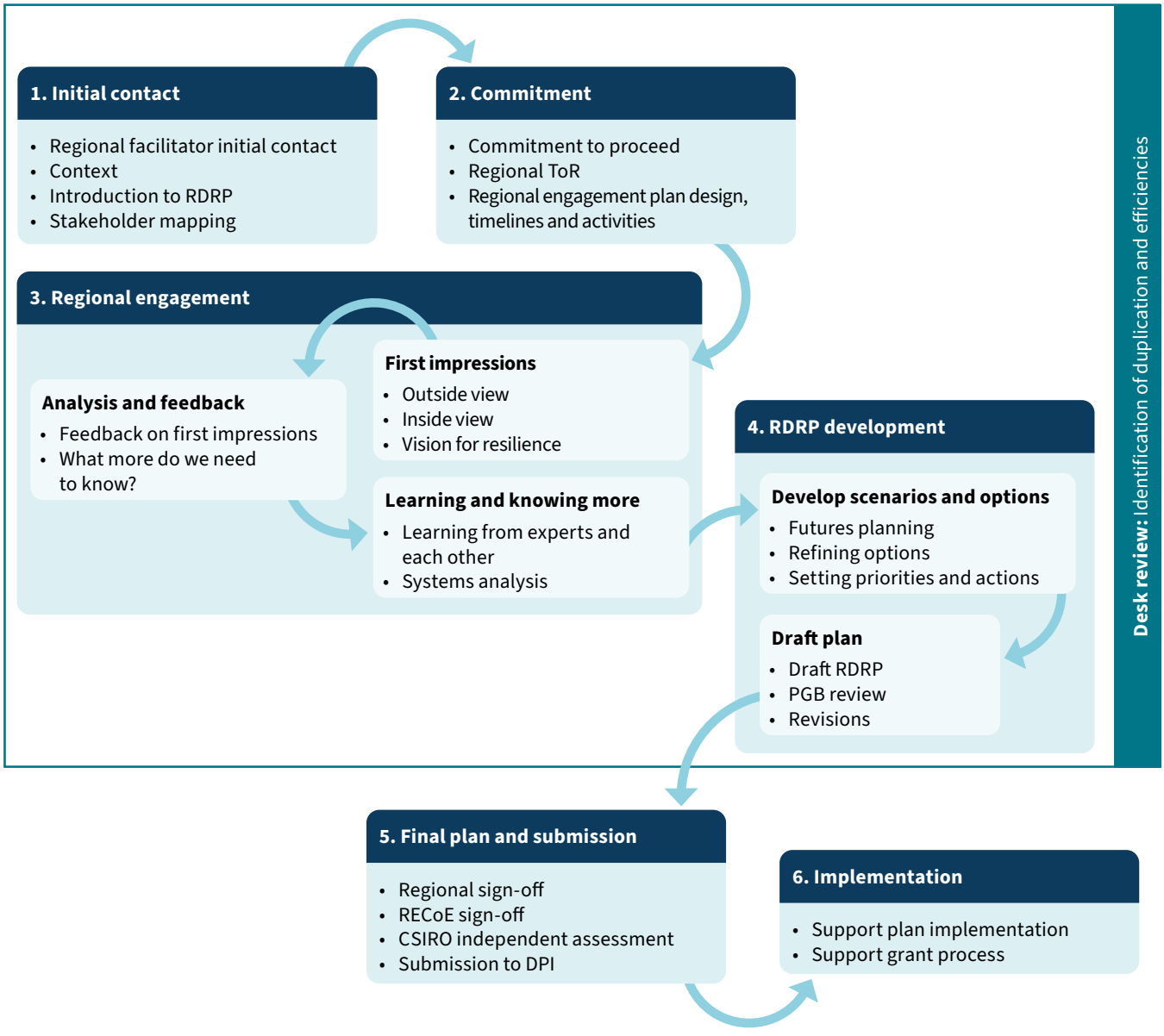


Table 1: Stakeholder engagement metrics - new stakeholder groups engaged and consultative activities in RDR Plan development.

Unique stakeholders	Number
LGAs	59
Formalised conglomerations of LGAs	7
Farming groups	8
Farming businesses	125
Regional Development Australia Committees	2
Regional NRM organisations	15
Indigenous groups/ organisations	8
Agricultural industry representative groups (peak bodies)	35
Development commissions	1
Emergency services	3
Community service organisations	110
Research organisations	7
Water authorities	17
Utility organisations	9
Financial institutions	3
Farm Advisers/ Consultants	12
Drought Resilience Adoption and Innovation Hubs	11
*Chambers of Commerce	3
*Agribusinesses	1
*Other businesses	17
*State Government agencies	36
*Federal Government agencies	7
*Other FDF programs	13
*Individual/community member	30
*Governance Groups	0
Total engagements	**539**

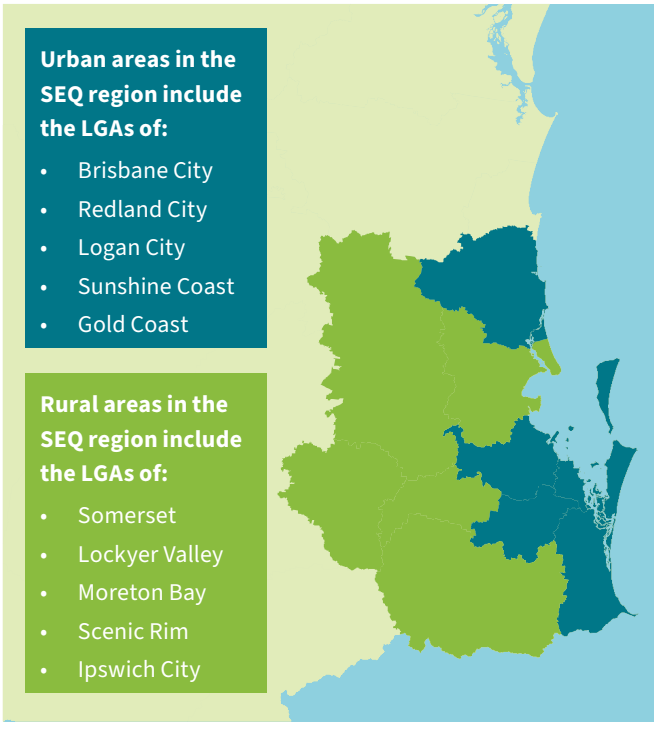
Communication activities	Number
Formal network meetings	26
Consultation/information forums	10
Workshops and other interactive activities (including online)	12
Communication activities	242
One on one consultation	154
Total activities	**444**

An ‘Urban’ and ‘Rural’ Approach

South East Queensland (SEQ) is a unique and diverse part of the world, in terms of communities, economy, landscapes and built infrastructure. Initial interviews, desk review and consultations revealed two clear themes in relation drought impacts and potential resilience responses – ‘urban’ issues mainly related to urban water security for domestic, institutional and industrial purposes, and ‘rural’ drought issues that were a more varied range of urban/township water security, agricultural drought impacts, and the issues related to drought impacts on rural and regional communities.

The distinction between ‘urban’ drought and ‘rural’ drought in SEQ are thematic, and there are not simple geographical boundaries. It is recognised that there are number of ‘rural’ areas located within mainly urbanised LGAs. Nevertheless, it was decided to ‘split’ the engagement process between ‘urban’ (managed by a team from University of Queensland) and ‘rural’ (managed by the team from University of Southern Queensland). There were differences in engagement approach utilised in ‘urban’ and ‘rural’ areas – designed to suit the context and preferences of key stakeholders. Hence, the following sections of the plan may outline key information that is specific to either ‘urban’ or ‘rural’ drought issues in SEQ – where it is appropriate.

Figure 3: Key focus areas for ‘urban’ and ‘rural’ RDRP in SEQ.



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"*.[7]

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"*.[8] 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"*.[9]

The Sendai Framework for Disaster Risk Reduction: 2015-2030 defines resilience as *"…the ability of a system, community or society exposed to hazards to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions through risk management"*.

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".[10]

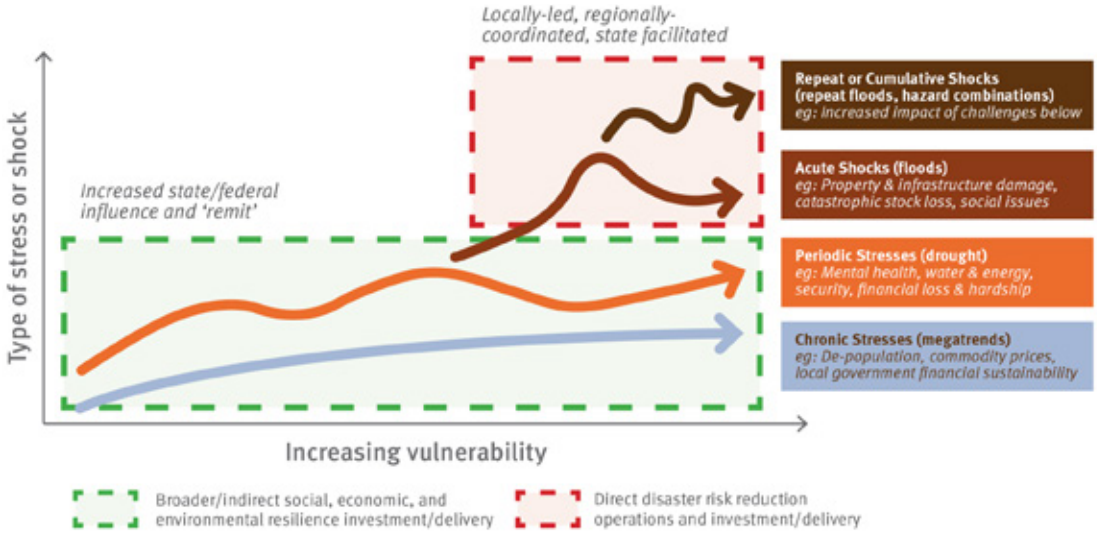
This plan utilises drought resilience objectives that broadly align with the four key objectives underpinning the Queensland Strategy for Disaster Resilience.

Figure 4: Four key objectives of the Queensland Strategy for Disaster Resilience 2022–2027.[35]

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).

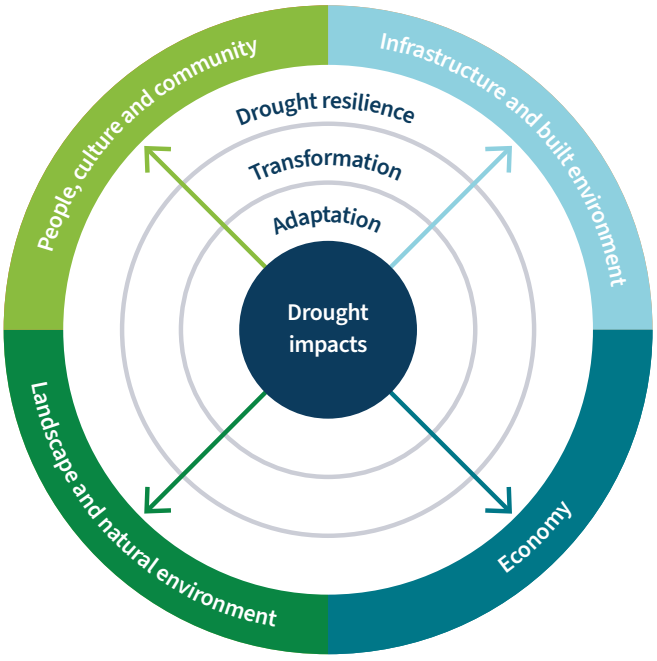
Whilst drought has been often referred to as "*an enduring feature of the Australian landscape*", when viewed in this context of community resilience, drought is also understood as a periodic stress that comes and goes. However, it is now evident that the warming caused by climate change has added to the variability in Queensland's weather and *"increased the severity of drought conditions during periods of below-average rainfall"*.[11]

Figure 5: How resilience is affected by stresses and shocks, adapted from the Queensland Strategy for Disaster Resilience 2022–2027.[37]



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 6: Queensland RDRP elements of drought resilience.[36]



How to use this plan

The purpose of the plan

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

The purpose of this RDRP is to:

- Express the outcomes of the RDRP process and the aspirations and commitments of the region's people.
- 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 used to inform the development of this plan include:

- *National Disaster Risk Reduction Framework*
- *Profiling Australia's Vulnerability*
- *Queensland Strategy for Disaster Resilience 2022-2027*
- *SEQ Water Security Program 2023*
- Red Cross: *"Not if…but When" - Planning for the Challenges of Drought 2021*
- *Queensland Neighbourhood Centres Strategy for Drought Resilience 2020-2023*
- Drought Resilience, *Adaptation and Management Policy Framework 2018*
- Resilient Rivers Initiative: *SEQ Waterways and Wetlands Investment Strategy*
- *South East Queensland City Deal Implementation Plan*
- *Brisbane 2032 Olympic and Paralympic Games Legacy Strategy*
- *Gold Coast Water Strategy 2019 – 2024*
- *Brisbane - Water Smart Strategy 2015*
- *Sunshine Coast Environment and Liveability Strategy 2041*
- *Logan Climate Change Resilience Strategy 2021 – 2031*
- Redlands: *Confronting our Climate Future 2011*
- *Queensland Climate Adaptation Strategy*
- *"Shaping SEQ – SE Queensland Regional Plan (2023 Update)*
- *"Water for Life - South East Queensland's Water Security Program" 2015-2045*
- Resilient Queensland.

Other important linkages

This plan should be 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.

The plan could be considered relevant to charities, non-government organisations, not-for-profits, businesses, and government agencies with an interest in responding to the effects of drought in the region.

Regional Profile

The broad South East Queensland (SEQ) region assigned in Queensland's RDRP program is shown in the map below. The region comprises the 10 Local Government Areas (LGAs) of Sunshine Coast, Somerset, Moreton, Brisbane, Redlands, Ipswich, Lockyer Valley, Scenic Rim, Logan and Gold Coast.

According to recent Queensland government publications[12], the SEQ region is home to 3.8 million people, or one in seven Australians, and the population is expected to increase by over 1.58 million people by 2041. The region employed 1.92 million people in 2020 and projected employment in 2041 is expected to rise to 2.62 million.

The area designated as 'SEQ' can be divided into three main topographic regions, namely: the coastal zone, dominated by Moreton Bay, its sand islands and coastal plains; the major river floodplains and estuaries; and the hinterland foothills and mountains. Around 6,000 flora species and 2,400 native flora fauna species have been identified in the region.

Figure 7: South East Queensland regional map.[38]

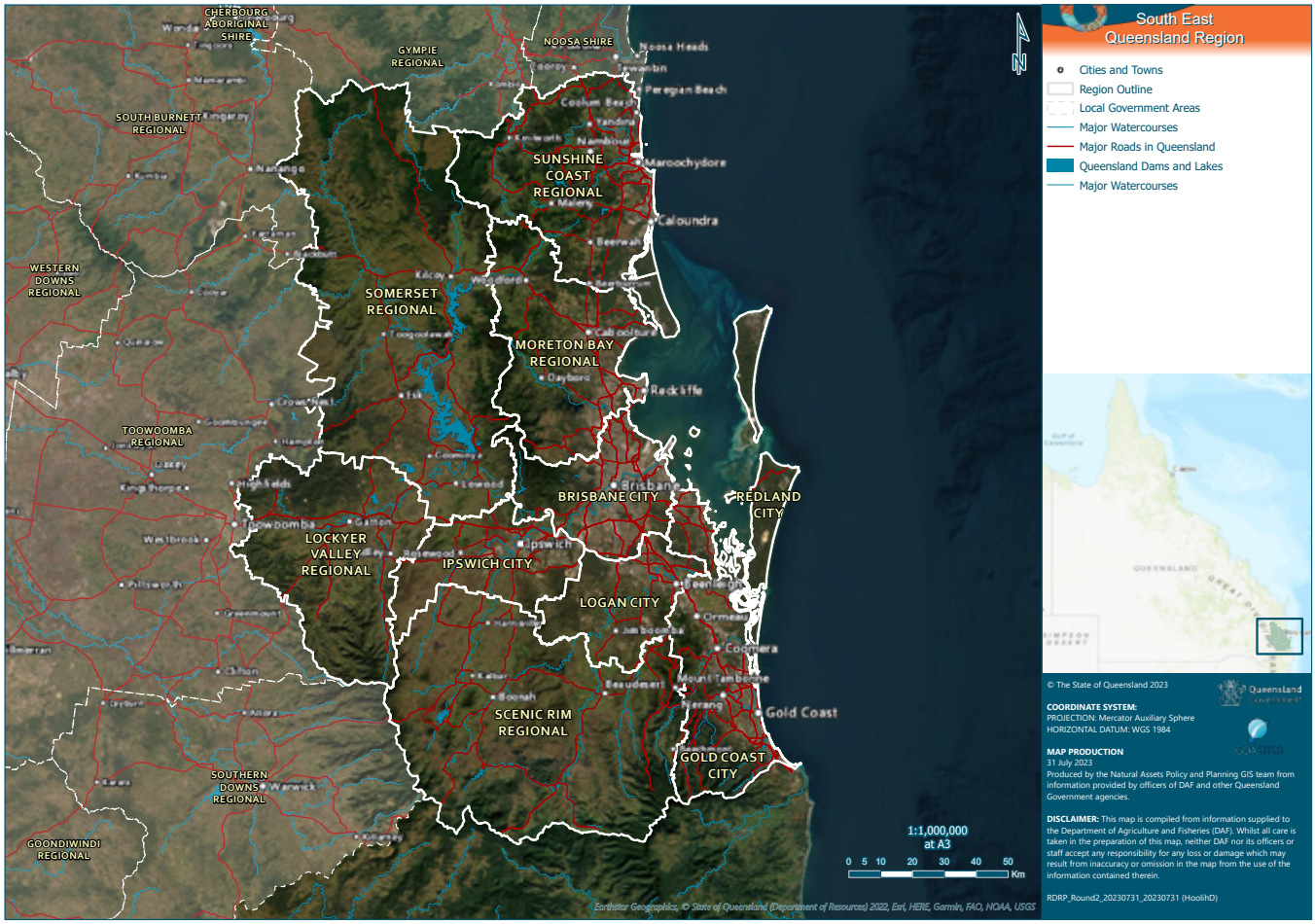


Figure 8: Regional socioeconomic profile.[39]

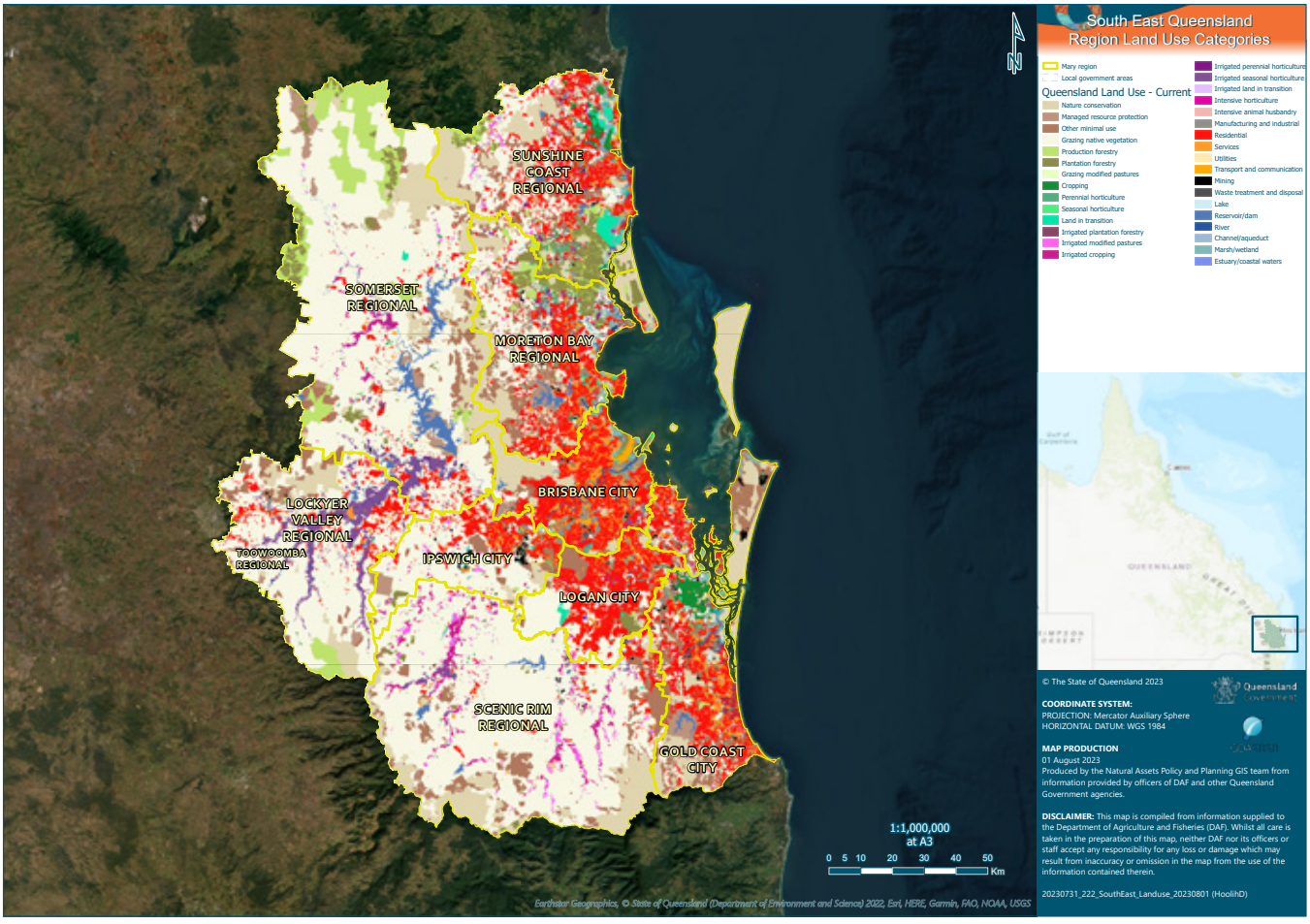
Brisbane	Gold Coast	Sunshine Coast	Scenic Rim	Somerset	Region-wide
Lockyer Valley	Ipswich	Moreton	Logan	Redlands	Queensland
Population (2023)					
1,323,162	666,087	365,942	45,248	26,251	3,776,371
43,847	251,148	510,104	377,773	166,809	5,460,420
Australian Digital Inclusion Index (2022)					
77	74.6	72.6	70.1	69	
70.9	74.4	73.9	72.7	72.7	73
Unemployment rate (%) (2021)					
5%	5.4%	4.4%	4%	5%	
5.4%	6.7%	5.6%	7%	4.4%	5.4%
Median age of residents (2023)					
35.7	39.1	43	46.6	42.9	
39.1	33.6	39.1	34.3	43.4	38.5
SEIFA 2021 Socio Economic Index of Social Disadvantage					
1,045	1,019	1,022	986	944	
948	958	992	944	1,024	
Aboriginal or Torres Strait Islander Peoples (%) (2021)					
1.8%	2.2%	2.4%	3.7%	4.7%	
5.1%	5.5%	3.9%	4.2%	2.9%	4.6%
Number of registered businesses					
138,801	78,020	36,811	4,932	2,267	347,495
3,507	12,382	31,803	26,413	12,559	497,025
Households where a language other than English is used (%) (2021)					
24%	13.7%	6.1%	3.6%	5.1%	
7.1%	14.1%	8.5%	18.1%	7.4%	13.2%
Persons who have need for assistance with core activities (%) (2021)					
4.6%	5.1%	6.2%	6.8%	8.3	
7.7%	6.6%	7.1%	6.6%	6.7%	6%
Median total personal income (excl. Government pensions & allowances) ($) (2020)					
56,564	47,126	46,376	44,902	47,348	
45,600	53,745	51,476	52,338	52,338	50,298
Protected area – parks, forests, reserves area (ha)					
30,913	16,434	42,554	51,895	57,234	284,987
33,463	5,710	29,253	2,723	14,808	15,061,088

Land Use

Land use is varied across the SEQ region with population density higher in the coastal areas. The cities of Brisbane, Gold Coast, Logan and Ipswich are modern and bustling metropolitan areas with a wide range of infrastructure and world-class services. Across SEQ there are significant and ever-increasing urban developments that contain housing and infrastructure to service the growing populations. There are both large population areas and regional centres, as well as smaller towns and villages dotted throughout SEQ, along with large forestry reserves, national parks and extensive areas of farming land. The SEQ region also includes the islands of Moreton Bay.

The LGAs of Somerset, Lockyer Valley and Scenic Rim are traditional agricultural areas and contain many historic communities and properties. There are also significant areas of agriculture and 'rural' communities living and working on the western sides of Moreton Bay and the Sunshine Coast – as well as 'pockets' of agricultural production and rural communities dotted throughout all the coastal LGAs, and in the hinterlands of Gold Coast, Ipswich, Logan and Brisbane Cities. In fact, 'rural' lands make up about 1.9 million hectares or 85% of the land area of South East Queensland[13]. Grazing is the predominant land use and utilises 51% of the land area in SEQ, whilst other agricultural activities, such as irrigated cropping and horticulture, as well as intensive animal production, take up a further 8%. The Lockyer is one of the most productive irrigation regions in the country and Somerset and Scenic Rim LGAs also have large areas of irrigated cropping. Hence, there are a number of significant agricultural producers, processors and supply chain businesses in the region - and they are collectively a major contributor to the local, state and national economies. Groundwater supply for agriculture became a major issue in the 2013-2019 drought period. Most other areas of the broader SEQ region are dominated by dense residential/commercial land use where urban water security is the priority issue during times of drought.

Figure 9: South East Queensland land use map.[40]



"Urbanisation is a huge issue … horticultural land being sold for subdivision and pushing prices up … bigger farmers buying land in more marginal areas where land is cheaper and can still get irrigation e.g. Millmerran".

- Lockyer Valley Farmer

All of the region is impacted by drought events, and given the size and diversity of the SEQ region it is not surprising that drought impacts in different ways, in different places. Some drought impacts are consistent across the region and all land uses whilst other impacts are specific to particular land uses. Whilst this varied range of land use and complex interaction of drought impacts isn't unique to this region (the Mary region is somewhat similar) it does shape the drought 'personality' for this region.

Climate

The climate summary for the region – *The SEQ Regional Weather and Climate Guide*[14] – advises the observed trends are:

"In the last 30 years in the SEQ region:

- Annual rainfall has decreased by 8% from about 1120mm to 1030mm. This is considered to be in the range of natural variability.
- Dry years (lowest 30%) have occurred 14 times and wet years (highest 30%) eight times. Note that eight of the 14 dry years occurred in the Millenium Drought period (2001-2009).
- There has been a decrease in rainfall in the winter and spring months.
- Summer rainfall has been moderately reliable (low rates of variability) however autumn and winter rainfall are less reliable.
- Useful rain events (>50mm) have occurred four times every wet season on average but can range from zero to nine. The average of >50mm events in winter and spring have declined. For winter, the average was one every other year for the period 1959-1988. For the period 1989-2018 there were only two events. The number of >50mm events for autumn have also declined by 50% in the last 30 years to 2018 to one every two years rather than one every year.
- There have been more hot days (>35°), with more consecutive days above 38°. Gatton experienced for the first time six or more consecutive days above 38° in 1994 and again in 1996. Gatton experience 43° five times for the 1989-2018 period and twice for the preceding 30 years"[15].

Table 2: Local government regional average annual rainfall for the 2000-2022 and 1888-2022 periods.[16]

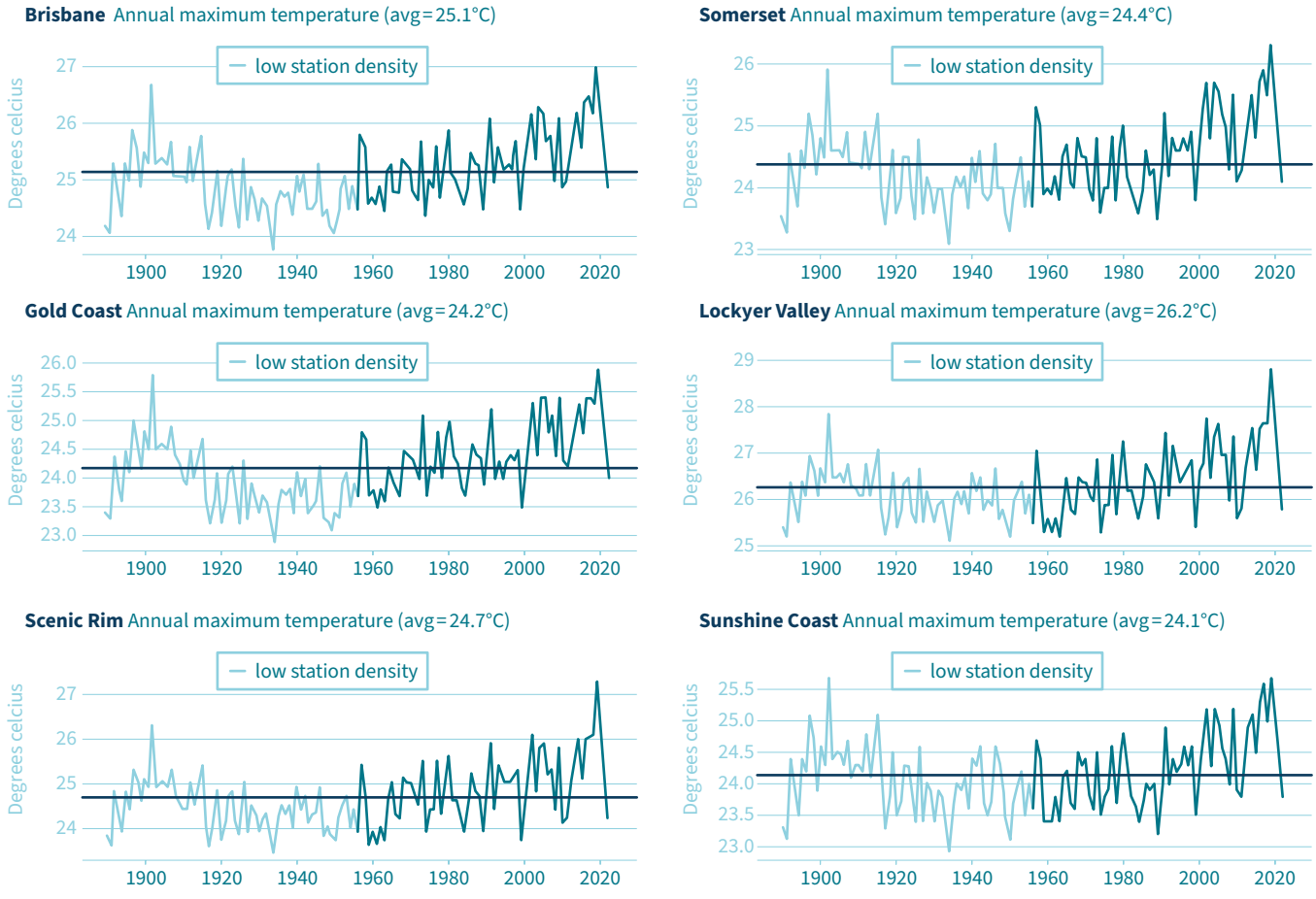
	2000-2022	1888-2022	% change
Brisbane	1041mm	1140mm	**-8.6**
Somerset	890mm	937.4mm	**-5.1**
Gold Coast	1409mm	1463mm	**-1.0**
Lockyer Valley	790mm	837.6mm	**-5.7**
Sunshine Coast	1503mm	1601mm	**-6.1**
Scenic Rim	932mm	961.9mm	**-3.1**

Table 2 provides a comparison between the average annual rainfall for the 2000-2022 period and the long term 1888-2022 period for a sample of 6 urban and rural based SEQ LGAs. For all the LGAs in the SEQ rural area the 2000-22 average annual rainfall is less than the long-term average with the Lockyer Valley and Somerset LGAs being 5.7% and 5.1% respectively, lower. On average for all of the SEQ LGAs, 2019 was the driest year since 2000 and had 70% less than the wettest year of 2022. Analysis of long-term annual rainfall for the SEQ LGAs indicate that 2019 was the driest year on record for the Ipswich, Scenic Rim, Lockyer Valley and Somerset LGAs.

Examination of the six long-term annual maximum temperature averages shows an increasing trend across six representative LGAs in the SEQ region shown in Figure 11.

Figure 10: South East Queensland total annual rainfall for 'urban' LGAs between 2000-2022.

Figure 11: Annual maximum temperature (averages) in representative LGAs for the SEQ rural region.[41]



SEQ Urban area

The following section contains pertinent overview information relating to urban areas in SEQ.

Brisbane and Gold Coast Region

Socioeconomic Profiles

The Brisbane and Gold Coast regions are relatively advantaged and economically active in comparison to the SEQ region and state at large. Figure 8 outlines the key socioeconomic indicators across the Brisbane and Gold Coast LGA, as well as the Queensland average.

The majority of the SEQ population reside in Brisbane (54%) and the Gold Coast (27%), contributing approximately 24% and 12% to the state population, respectively. Current 2046 projections indicate that the difference between Brisbane and Gold Coast populations could be diminishing with Brisbane and Gold Coast growing at 1.0% and 1.8%, respectively. Brisbane's population further exhibits slower growth than the state average (1.4%). Brisbane also featured a younger population (35.9 years) than the average age in Queensland (38.4 years). The Gold Coast roughly tracks SEQ for median age, at 39.2 and 39.8 years respectively. The Queensland average was lower at 38.4 years.

The Socio-Economics Index of Areas (SEIFA) suggests the Brisbane and the Gold Coast regions are relatively advantaged, with areas scoring above 1000. Brisbane scored higher relative to the Gold Coast, which could be attributed to a higher average total personal weekly income in Brisbane ($947) relative to both the state and Gold Coast averages ($787). Unemployment was also lower in Brisbane (5%) than Queensland (5.4%) and the Gold Coast tracked the state average (5.4%). Brisbane and the Gold Coast contributed 28.02% and 15.69% of state businesses, respectively. Internet access was also higher on average in the Brisbane and Gold Coast LGAs (77% and 74.6%, respectively) than in the larger Queensland (73%) region.

Table 3 indicates that Brisbane and the Gold Coast are more culturally diverse than Queensland but have a significantly smaller proportion of First Nations residents. Brisbane more than doubled the state in proportion of those speaking a language other than English at home, scoring 24% and 10.8%, respectively. Gold Coast's proportion of those speaking a language other than English at home (13.7%) was closer to the SEQ average (13.2%) than Queensland (10.8%). A smaller proportion of First Nations People reside in Brisbane (1.8%) and Gold Coast (2.2%) when compared to Queensland (4.6%). Proportion of persons in need of assistance for a disability was smaller in Brisbane (4.6%) and Gold Coast (5.5%) than Queensland (6%). As relatively urban areas, the Brisbane LGA and Gold Coast LGA comprised a minor share of Queensland's protected areas, comprising 0.08% and 0.00094%, respectively.

Table 3: Top 10 Queensland Local Government Areas ranked by percentage of population born overseas.[17]

Rank	LGA	Population born overseas	
		Number of persons	Percent
1	Brisbane	395,289	**31.8%**
2	Gold Coast	181,797	**29.1%**
3	Logan	96,284	**27.9%**
4	Noosa	12,991	**23.1%**
5	Redland	36,713	**23.1%**
6	Cairns	37,278	**22.3%**
7	Ipswich	49,794	**21.7%**
8	Douglas	2,643	**21.4%**
9	Moreton Bay	99,800	**21.0%**
10	Sunshine Coast	70,747	**20.7%**

Economic Characteristics

Brisbane and the Gold Coast are significant players for the region, state, and national output (Table 4). In 2022, Brisbane and Gold Coast comprised the majority share of SEQ Gross Regional Product (GRP) (51.41% and 14.67%, respectively), with Brisbane contributing nearly a third to the state (32.03%) and a little over a tenth to national GDP (10.83%). Gold Coast contributed 9.17% to Queensland Gross State Product (GSP) and approximately 3% of national GDP in 2022.

Table 4: Gross Regional Product as a share of Southeast Queensland, State, and National Output.[18]

	Brisbane	Gold Coast
GRP ($)	143.49b	40.98b
SEQ share	51.41%	14.67%
QLD share	32.03%	9.17%
National share	10.83%	3.09%

Industry Breakdown

Figure 12 graphs value added to output for each industry across the Brisbane, Gold Coast, SEQ, and Queensland regions. Brisbane exhibits industry diversity, where no one industry contributes more than 15% to employment or GRP. In terms of value added to gross product, professional, scientific and technical services (12.7%), financial and insurance services (10.5%) and health care and social assistance (9.3%) were the largest industry contributors. This could suggest that the Brisbane LGA has a higher concentration of highly skilled workers in comparison to the larger SEQ region, which experienced the largest value added by the health care and social assistance (11%), professional, scientific and technical services (9.9%), and construction (9.3%) industries. Similarly, Queensland's largest industries in terms of GSP were health care and social assistance (10.2%) and professional, scientific and technical services (7.9%), but with a larger mining industry (8.5%). In comparison, mining contributed only 2.1% and 1.7% to Brisbane and SEQ outputs respectively (Figure 12).

Gold Coast exhibits slightly more industry diversity, where no one industry contributes more than 11% to GRP and largely tracks SEQ and Queensland across employment and value added. Health care and social assistance (11.6%), construction (10.8%), and professional, scientific and technical services (8.7%) were the largest industry contributors to GRP. Agriculture (0.7%), mining (0.9%), and utilities services (1.7%) were the three smallest industries in the Gold Coast LGA in 2022 (Figure 12).

Figure 13 graphs total employment by industry against the percentage proportion of the population employed for the Brisbane, Gold Coast, SEQ, and Queensland regions. For Brisbane, industry share of employment were health care and social assistance (14.5%), professional, scientific, and technical services (11.9%), public administration and safety (8.5%), and education and training (8.5%) were the largest contributors. The financial and insurance services share of GRP (10.5%), was significantly smaller than share of employment (4.4%) in the Brisbane LGA. SEQ and Queensland also had a large share of employment in the health care and social assistance and education training industries but was also characterised by a large share in the construction and retail trade industries in comparison to Brisbane (Figure 13).

Within the Gold Coast LGA, construction (12.8%) and health care and social assistance (15.3%) were also two of the largest employment industries for the region. Retail trade (10.5%) was the third largest contributor to employment, whilst professional, scientific and technical services comprised a smaller share of employment (8.7%) relative to value added. Similarly, the largest employment industries for SEQ and Queensland were health care and social assistance, construction, education and training, and retail trade (Figure 13).

Figure 12: Value Added to Output by Industry Brisbane, Gold Coast, SEQ, and Queensland 2022.[42]

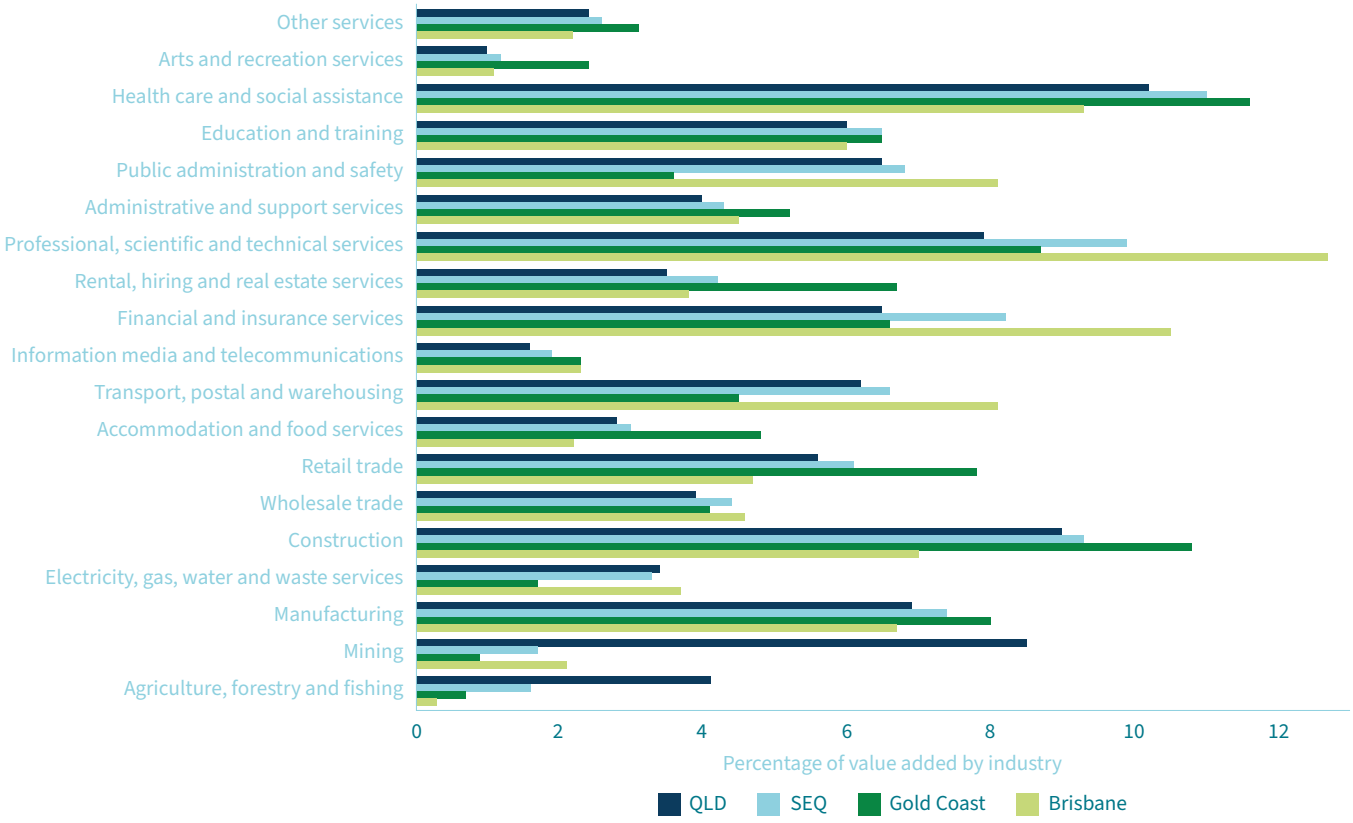
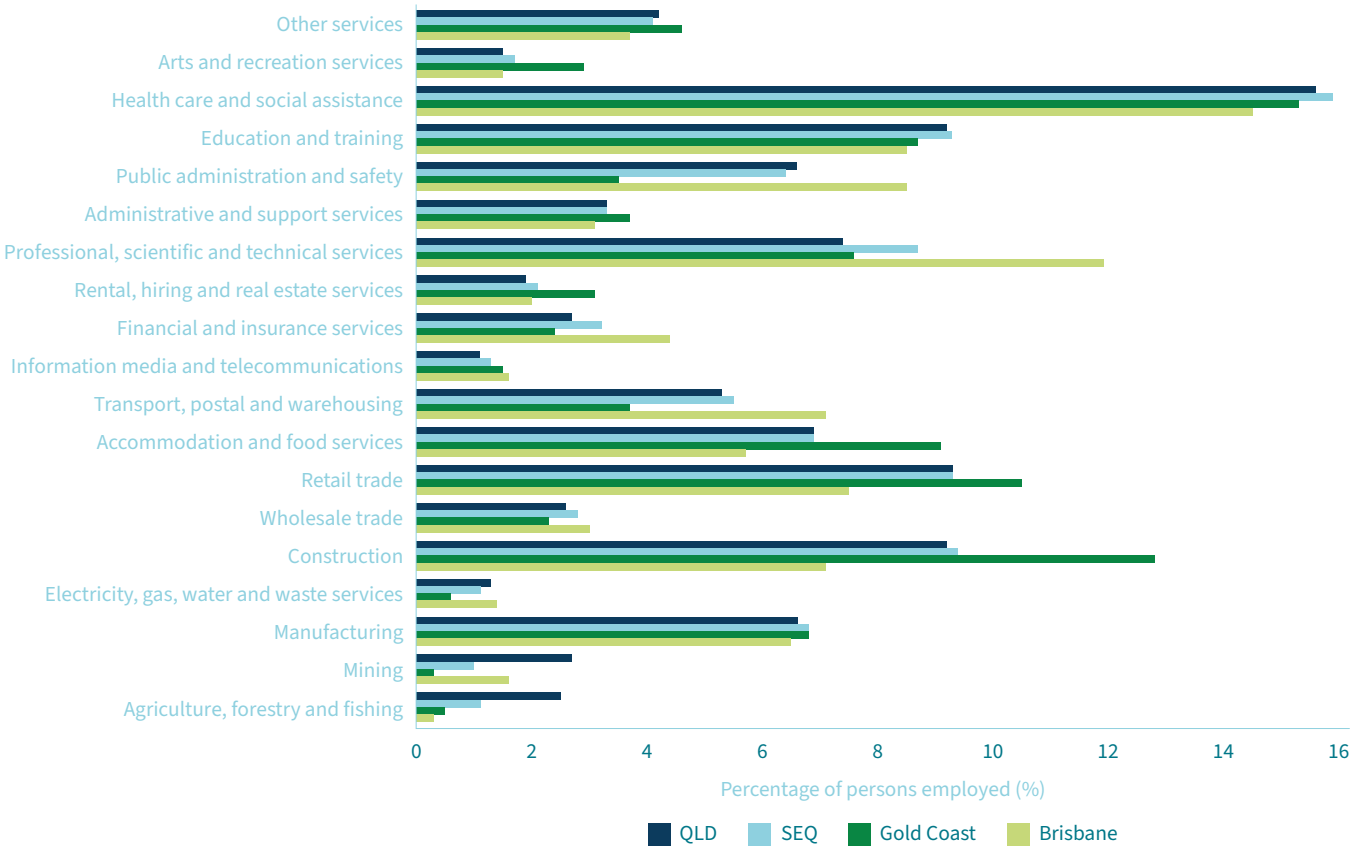


Figure 13: Total Employment by Industry Brisbane, Gold Coast SEQ and Queensland regions 2022.[43]



Sunshine Coast, Logan, and Redland Region

Socioeconomic Profiles

Figure 8 outlines the key socio-economic indicators of the Sunshine Coast, Logan, Redland, and Queensland regions. The Logan LGA has the largest population, followed by Sunshine Coast, whilst Redland's population is almost half the size. The Sunshine Coast population is growing at a slightly faster rate (1.8%) than the Logan region (1.7%). Redland exhibits significantly slower growth (0.5%) than the other regions including the state average (1.4%). Sunshine Coast and Redland had an older average age (43 years) compared with the Logan LGA (34 years) and state average (38 years).

Logan exhibits the most significant socio-economic disadvantage according to the SEIFA index, scoring below 1000 (944). Redlands scored the higher on the 2021 index (1024) followed closely by the Sunshine Coast (1022). Average personal weekly income is lowest in Logan ($736), with Redland ($786) roughly tracking the QLD average ($787). Sunshine Coast was the only region to earn a higher weekly personal income ($795) than the state average. Unemployment was highest in Logan (7.7%) than the Sunshine Coast and Redlands (4.4%), however, both regions were higher than the state average (3.9%). Internet access across all regions tracked the state average, ranging between 72.6% to 73%.

Logan illustrates wider cultural diversity than Redland and the Sunshine Coast with higher proportions of those speaking a language other than English at home, estimated at 21.1% and 9.8%, and 6.1%, respectively. The proportion of the population who identify as Aboriginal and Torres Strait Islander were lower in all regions than the state average (4.6%). Logan had a higher proportion of First Nations peoples' (4.2%), than the Redland (2.9%) or Sunshine Coast (2.4%) regions. The Sunshine Coast (6.0%) tracked the state average of persons with a disability (6%), whilst Logan (6.6%) and Redlands (6.7%) had slightly higher proportions of persons with a disability.

Economic Characteristics

Table 5 details total Gross Regional Product for the three regions, as well as their respective share of SEQ and QLD output. Sunshine Coast LGA contributes the largest share to both SEQ GRP and Queensland's GSP, comprising 7.48% and 4.53%, respectively. Redland's GRP was significantly smaller than the other regions, sitting at less than half of Logan's GRP in 2021/22. Gross State Product (GSP) was estimated at $464.58 billion in 2021/22.

Table 5: Gross Regional Product as a share of Southeast Queensland GRP, and Queensland GSP.[19]

	Sunshine Coast	Logan	Redland
GRP ($ billion)	$20.96	$15.04	$7.87
SEQ share	7.48%	5.37%	2.81%
QLD share	4.52%	3.24%	1.69%

Industry Breakdown

The largest industries by value added to GRP in the Sunshine Coast was health care and social assistance (14.8%), construction (12.6%), and education and training (8.1%). The smallest industry across all the LGA was in arts and recreations services. The largest industries in the Redlands and Logan regions were also healthcare and social assistance and construction. Retail trade, however, was the third largest industry with respect to value added, sharing 9.3% and 9.0% of the Redlands and Logan GRP, respectively. Mining was a significantly larger industry for Queensland (9.0%) than the three regions, which all shared under 1.5%. Figure 14 graphs share of value added by Industry across the Sunshine Coast, Logan, Redland, and Queensland regions.

Figure 15 depicts industry shares of employment across three regions, as well as the state. In 2021, health care and social assistance comprised the largest shares of employment accounting for 17% and 18.8% in the respective Logan and Redland LGAs. Education and training was also a key employer in all regions comprising 10.4% in Logan, and 10.1% in Redland. Residents employed in manufacturing within Logan and Redlands comprised 7.3% and 6.3%, respectively. Logan and Redland regions also saw significant employment within construction (13.8% and 12.8%) and retail trade (11.7% and 12.2%). Across both regions mining comprised the lowest share of employment (<0.5%). Employment distribution of industries within the Sunshine Coast LGA largely tracked value added to GRP. Most residents were employed in health care and social assistance (19.6%), construction (12.3%) and education and training (10.4%) (Figure 15). Employment in the agriculture, forestry and fishing industry contributed 0.7% to Logan, 1% to Redlands, and was largest in the Sunshine Coast (1.9%).

Figure 14: Value Added to Output by Industry Sunshine Coast, Logan, Redland and Queensland regions.[44]

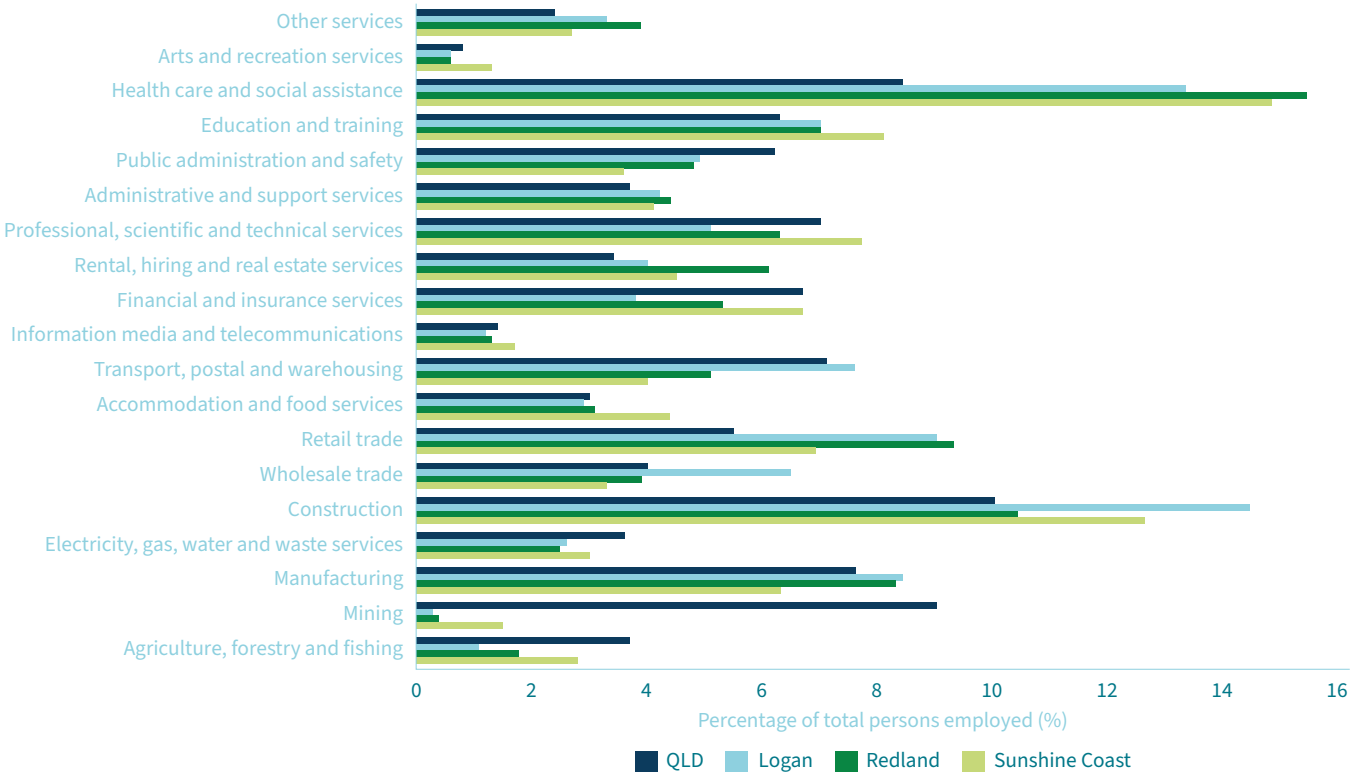
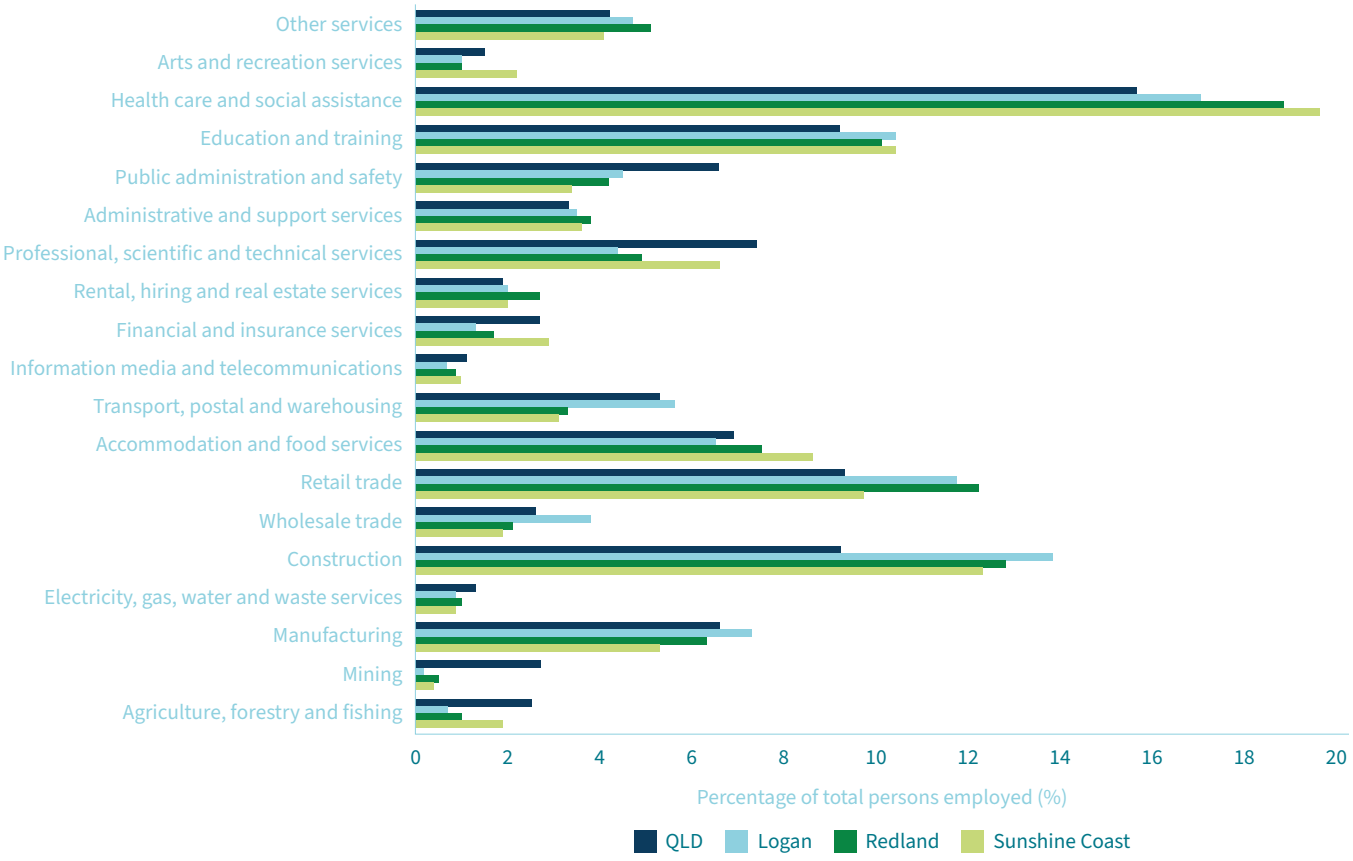


Figure 15: Total Employment by Industry Sunshine Coast, Logan, Redland and Queensland regions.[45]



Water Supply and Demand across Urban regions

Water Supply

The SEQ Water Grid is a bulk water supply network for SEQ and off-grid communities. The SEQ Water Grid is a bulk water supply network of:

- 12 dams
- 31 conventional water treatment plants
- 3 advanced water treatment plants
- 1 desalination plant
- 33 bulk water reservoirs
- 22 pump stations
- 600km+ of bulk water supply pipelines.

The SEQ Water Grid also supplies drinking water to 53,000 people living in 16 off-grid communities. The water for these communities is sourced and treated locally, then distributed to households and businesses[20].

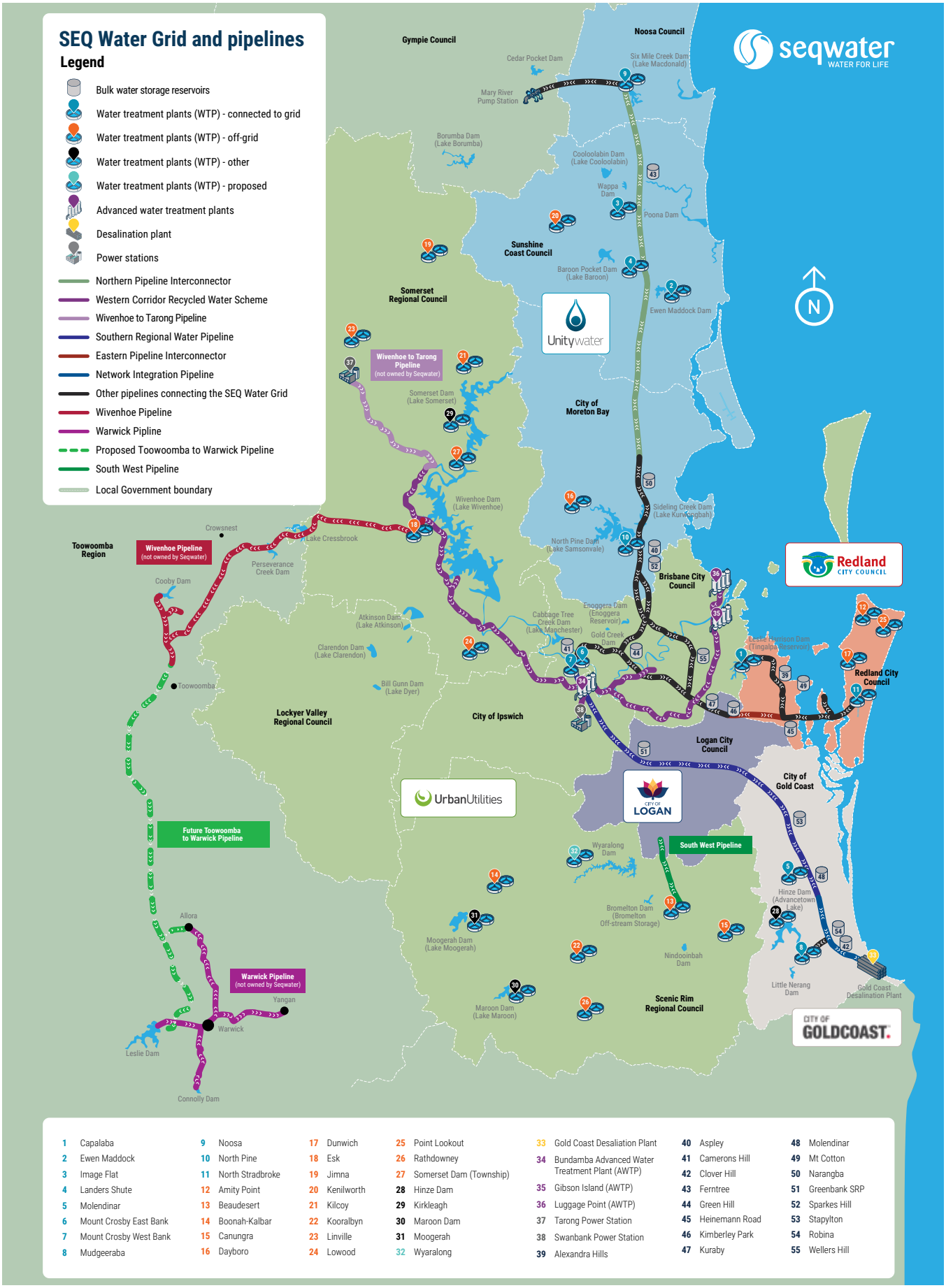
The SEQ Water Grid allows water to be sourced from multiple catchments and redistributed where it's needed most. Through this system, Seqwater can balance water storage levels across the region, respond to localised droughts by transferring water from areas with surplus to those in deficit, and maintain continuous supply even during maintenance or emergencies.

Seqwater is the Queensland Government statutory authority responsible for ensuring a safe, secure, and reliable water supply for South East Queensland (SEQ through sourcing, storing, treating and supplying bulk drinking water through the SEQ Water Grid. Organisation plays a critical role in long-term planning for water security in the face of population growth and climate variability. It undertakes strategic infrastructure planning, drought response planning, and oversees water quality management to meet stringent health guidelines.

While Seqwater is responsible for bulk water supply and infrastructure, local water utilities and local governments handle the distribution of water to homes and businesses, as well as the collection and treatment of wastewater. Urban Utilities supplies water to Brisbane, Ipswich, Lockyer Valley, Scenic Rim, and Somerset; Unitywater provides water in Moreton Bay, Sunshine Coast, and Noosa; and local councils (Logan, Redland, and Gold Coast) supply their own local government areas. These entities purchase bulk treated water from Seqwater and ensure it reaches end users, maintaining service standards and responding to issues like leaks or bursts. Together, SEQ Water and the local utilities form a collaborative framework that underpins SEQ's water supply and delivery services.

Image: Wivenhoe Dam spillway near Brisbane, Queensland.

Figure 16: SEQ Water Grid map.[46]

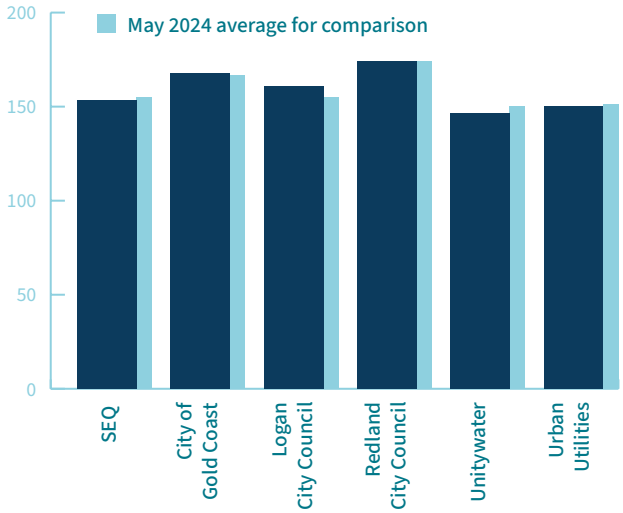


Water Demand

Average residential consumption in May 2025 was 155 litres per person per day (LPD) across SEQ. This represents a decrease in consumption compared to the 156 LPD recorded in the same month last year.

Over the last three years a trend towards lower residential daily water consumption has been identified from the Seqwater security reports. In May 2025 the highest water consumption was in Redlands City Council followed by City of Gold Coast (Figure 17). Unity Water and Urban Utilities consumption was similar or lower than the Queensland average. Water demand varies with a range of factors including weather conditions, population growth, consumption behaviour and system shocks[21].

Figure 17:Average residential daily water consumption, May 2025.[47]



Water Security

Water security in the region is dependent on many factors including growing population pressures and change in climate including drought. SEQ's water security is anchored by the 30-year Water Security Program, released in October 2023. Continuous planning adjusts for rising demand, climate variability, and El Niño impacts. SEQ water emphasises a diverse, climate-resilient infrastructure portfolio of water supply including dams, desalination, recycled water, pipelines, and treatment plants. The multidimensional approach to water security includes:

- Water Security Program, 2023 and regular monitoring of the water supply for on and off grid communities.
- Data and evidence on future water demand assessment projections as well as review developments in climate change science and data for water supply modelling.
- Optimisation of the existing water supply assets including 25 grid and off-grid dams, the SEQ Water Grid network infrastructure as outlined above.
- Expansion of water supply to the SEQ Water Grid, e.g. connection of supplies from the Logan River, including Wyaralong Dam, to the SEQ Water Grid.
- The Gold Coast Desalination Plant is a critical water supply asset and plays an important role supplementing the SEQ Water Grid, particularly during severe weather impacts such as drought or floods. It is not dependent on rainfall into catchments for source water but can be impacted by source water limitations such as exceptionally hightides or seaweed blooms. When not in production, the GCDP is maintained in a 'hot standby' mode and can be operational at a rate of 33% capacity within 24 hours and up to the maximum production capacity of 133 ML/d within 72 hours.
- Western Corridor Recycled Water Scheme - consists of three advanced water treatment plants and a 200 km pipeline network designed to supply purified recycled water primarily for industrial use, power generation, and as a drought contingency for potable supply. The scheme serves as a backup during extreme shortages, activated when dam levels drop under 40%, it supplies purified water to industrial users and can support drinking water supplies as required. When not needed it is in standby mode although it can be rapidly brought online to supplement drinking water supplies if dam levels fall below critical thresholds.
- Determining levels of service yields in the face of changed water demand while at the same time and working with SEQ Retailer Customers to manage water demands, improve water use efficiency and reduce water use.
- With drier and hotter climate forecast, SEQ Water are considering future looking options such as connecting Wyaralong Dam to the network, expanding desalination capacity, and expanding recycling capacity[22].

Drought and Water Security

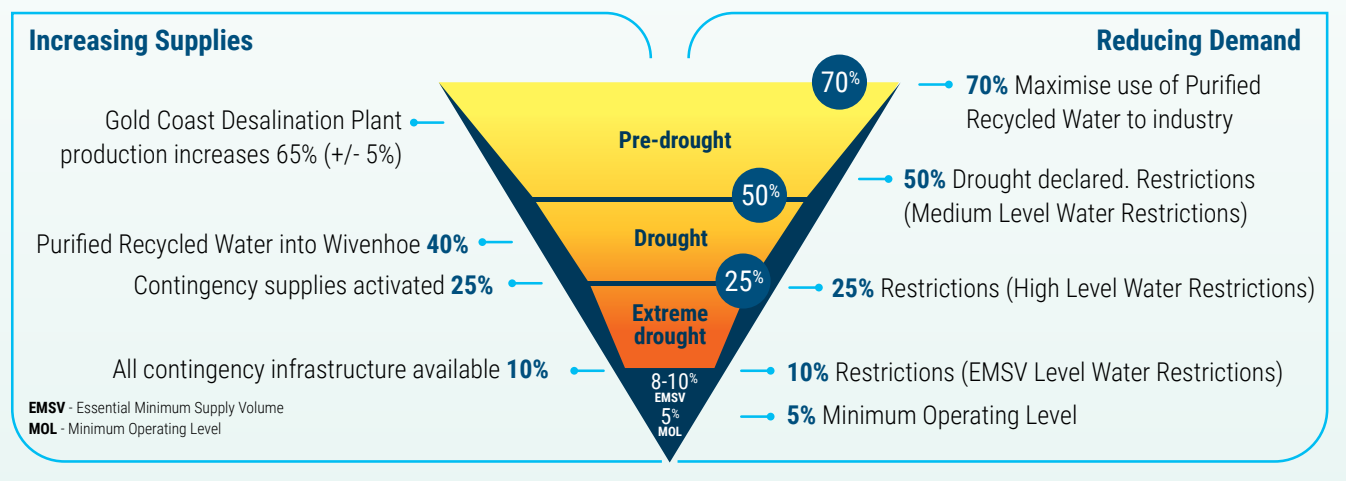
SEQ Water is responding to drought as part of water security measures. It will enter pre-drought phase when the SEQ Grid storage level reaches 70%. This then triggers different types of action to respond to the water security challenge (Figure 18).

This includes actions to:

- Add direct water in the SEQ Water Grid to where it is needed
- Implement water restriction measures
- Increase production of desalination water or recycled water
- Raise public awareness of declining dam levels
- Initiate further measures as necessary
- Ensure the Grid can provide essential minimum supply volume (EMSV), between 8% and 10% storage levels.

There are off-grid communities with their alternative local water sources. These communities have their own drought response plan including Beaudesert, Boonah-Kalbar, Canungra, Dayboro, Jimna, Kenilworth, Koorablbyne, Linville, Mnjerribah and Rahtdowney.

Figure 18: SEQ drought response triggers.[49]



SEQ Rural area

The following section contains pertinent overview information relating to rural areas in SEQ.

Figure 19: Value added by agriculture 2021/22.[50]

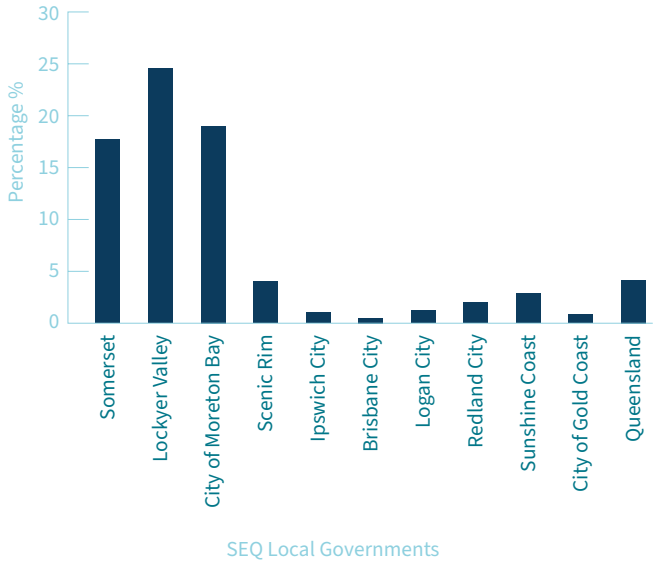
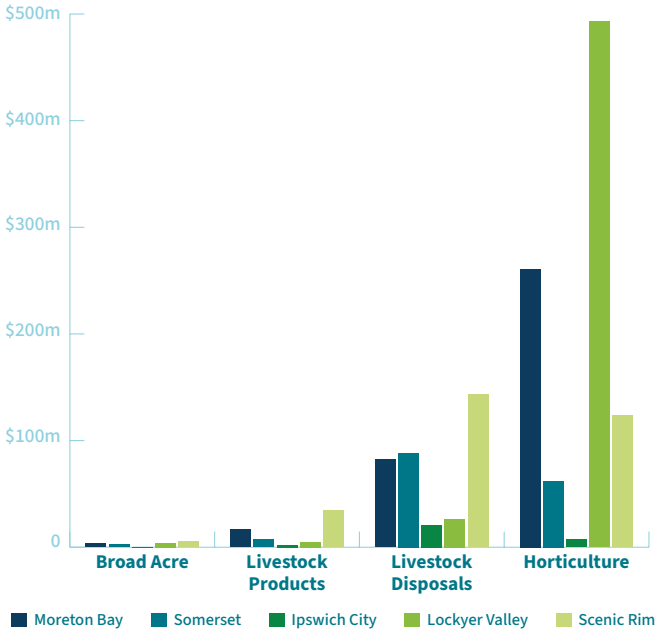


Figure 20: Estimated Gross Value of Product (GVP) by agricultural commodity for 2023-2024 financial year.[51]



Agriculture in the rural areas

The rural areas are predominantly found in the five LGAs: Somerset, Lockyer Valley, Moreton Bay, Scenic Rim and Ipswich. However, as Figure 19 highlights, there are also significant areas of agriculture and rural communities living and working on the western sides of Moreton Bay and Sunshine Coast – as well as pockets of agricultural production and rural communities dotted throughout all the coastal LGAs, as well as Logan and Brisbane City. In fact, rural areas make up about 1.9 million hectares or 85% of the land area of SEQ[23]. Grazing is the predominant land use and utilises 51% of the land area in SEQ, whilst other agricultural activities, such as irrigated cropping and horticulture, as well as intensive animal production, take up a further 8%. The Lockyer is one of the most productive irrigation regions in the country and Somerset and Scenic Rim LGAs also have large areas of irrigated cropping. Hence, there are a number of significant agricultural producers, processors and agricultural supply chain businesses in the region - and they are collectively a major contributor to the local, state and national economies. Groundwater supply for agriculture became a major issue in the 2013-2019 drought period.

Output by industry is a gross measure of the total sales of each industry sector and provides a good insight into the economic structure of the region. Figure 20 provides the percentage of output that agriculture has made to the regional economy and that of individual LGAs. However, it should be noted that for the total SEQ region, manufacturing and construction was the largest contributor of regional output and food product manufacturing is the largest portion of this sector.

History of drought in this region

"Millennium Drought – some farmers changed their practices – water table dropped so much, they needed to build dams… to pump bores in to have enough volume to irrigate… lined dams and installed trickle irrigation."

– Lockyer Valley Farmer

The South East Queensland (SEQ) region has long been the home of First Nations traditional owners from the Kabi Kabi, Jinibara, Quandamooka, Kombumerri, Ngaraghwal, Mununjali, Wangerriburra, and Yuggera Ugarapul peoples. As with most of Australia, there is a strong link between water — the waterways, waterholes and the patterns of rain and flood — in this region and the cultural practices of the First Nations people.

Connolly, Williams and Williams (2017) describe the importance of having sufficient 'cultural water' in the following statement:

"Water is integral to Aboriginal culture and belief systems. We define cultural water as having four distinctive components, that are associated with (1) healthy rivers, (2) resource availability, such as bush tucker and medicine, (3) cultural practices that form custom and belief systems, and (4) the contemporary economic and social requirements of Aboriginal people, such as formal water allocation for economic advancement."

European settlement in Queensland differs from that in other states where settlement often radiated out from coastal penal colonies – following waterways. In SEQ, the inland areas of the region were rapidly settled by 'squatters' (mostly pastoralists) who drove large flocks of sheep up inland routes from southern regions in New England and the Hunter valley. The establishment of large pastoral 'runs' led to the development of towns and villages to the west of the SEQ region which quickly exceeded the development of the Moreton Bay penal colony (1824-1842).

Figure 21: SEQ's Traditional Land Owner groups.[52]

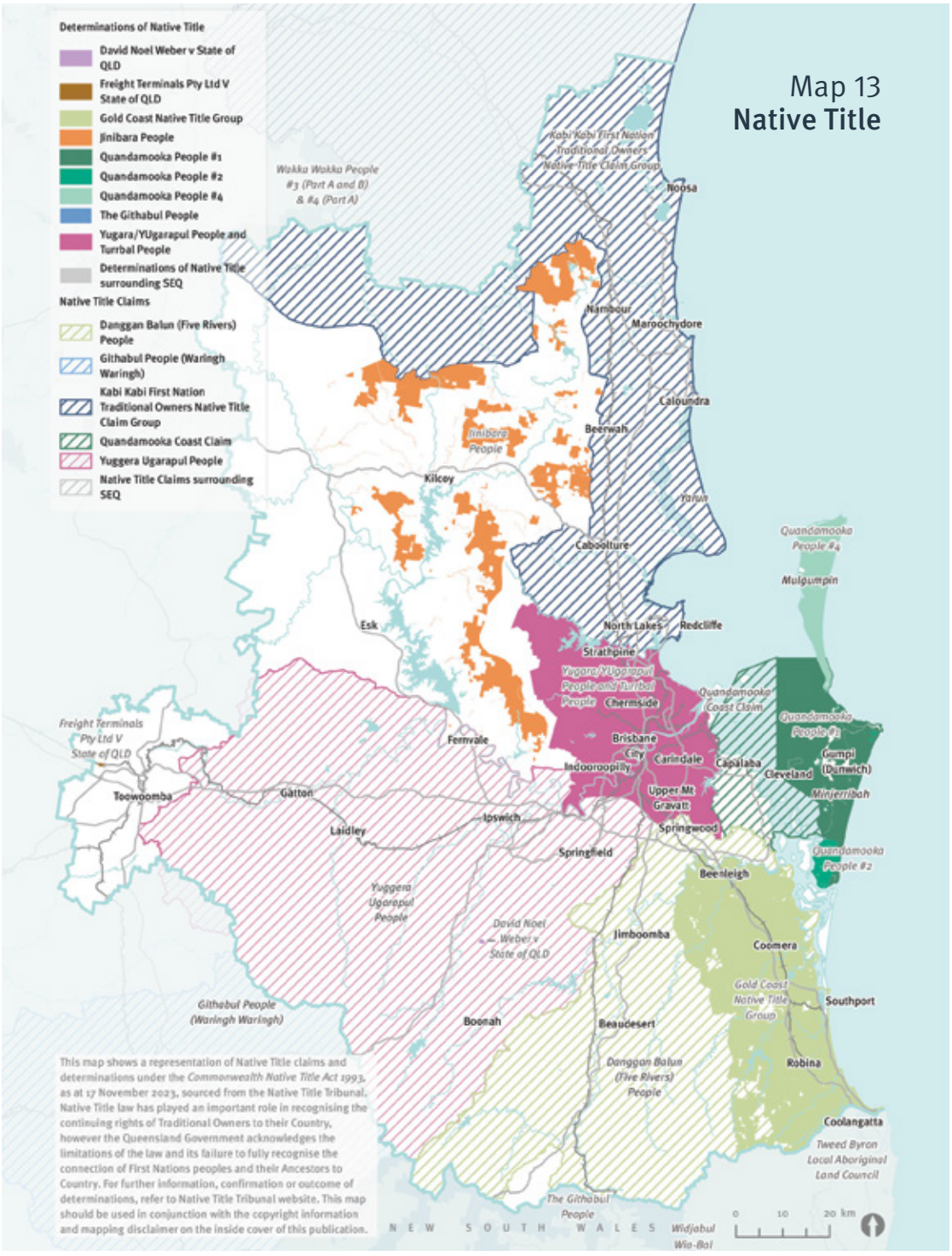
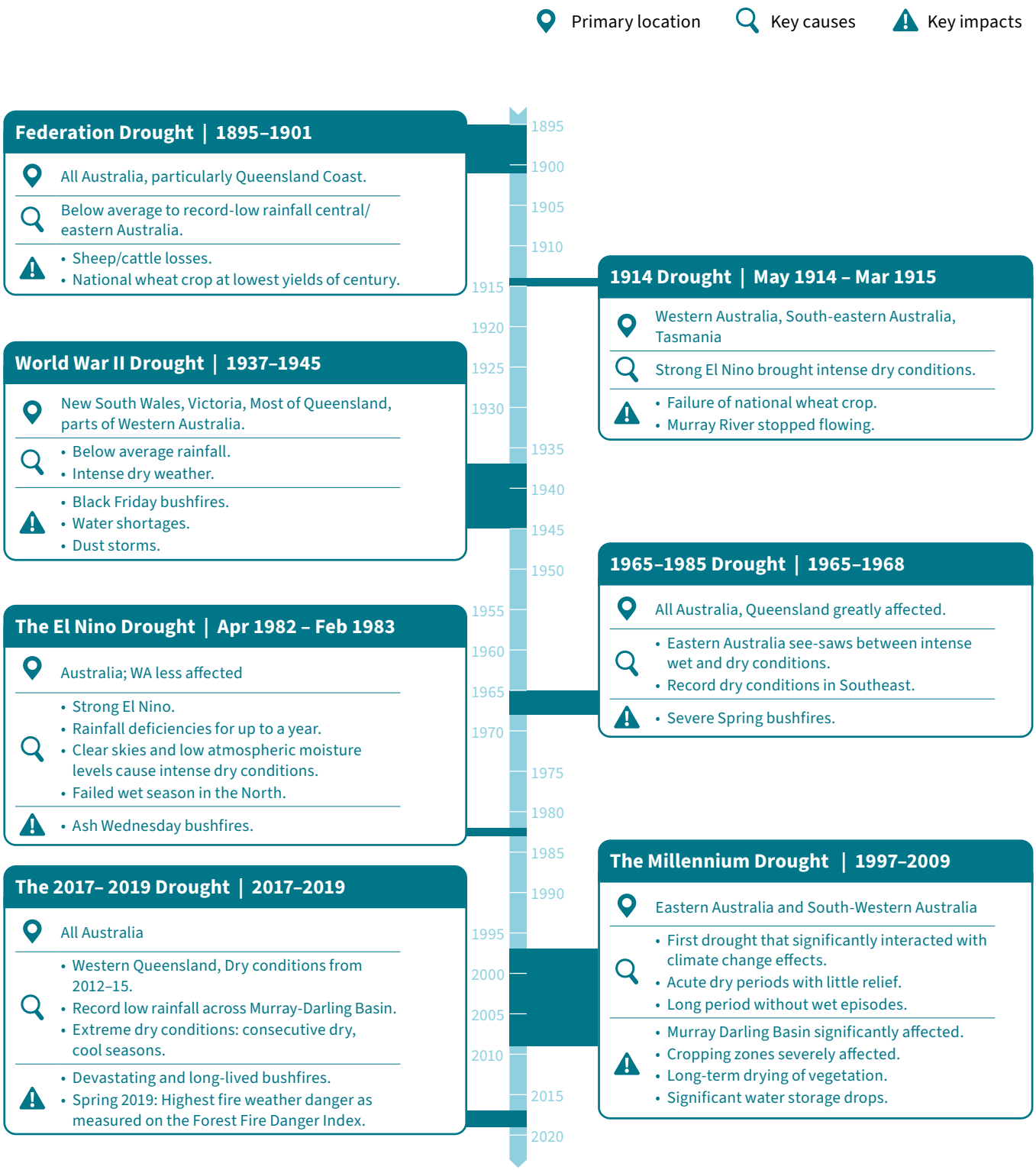


Figure 22: Significant Droughts in Australia.[53]



The early commandants of the penal colony enforced a rudimentary ban on free settlement within 50 miles of the penal settlement on the banks of the Brisbane River. This led to the early establishment of agricultural properties and settlements in an arc around the western rim of the region and gave rise to some of the earliest examples of the SEQ grazing industry that still flourish today. Around that time, agriculture/horticulture was mostly limited to house gardens that provided food for the settlers in early years – but quickly expanded to include cash crops where good soil and water were found. The accounts of early settlers do not emphasise the impacts of drought as much as the western regions of the Darling Downs and South-West Queensland. Nonetheless areas of what are now the Somerset, Lockyer Valley and Scenic Rim LGAs suffered rainfall and water shortages that affected both households and agricultural production.

Figure 24 shows the significant droughts that have been recorded and impacted on the SEQ region.

"Drought isn't a water issue; it is a heat issue – warm weather is good for veggies but really hot weather isn't."

– Regional Development Officer

"Droughts or hot dry weekends reduce nursery sales as city people don't want to go out into the garden."

– Lockyer Valley Plant Nursery Manager

Figure 23: Annual Frequency of Flash Droughts.[54]

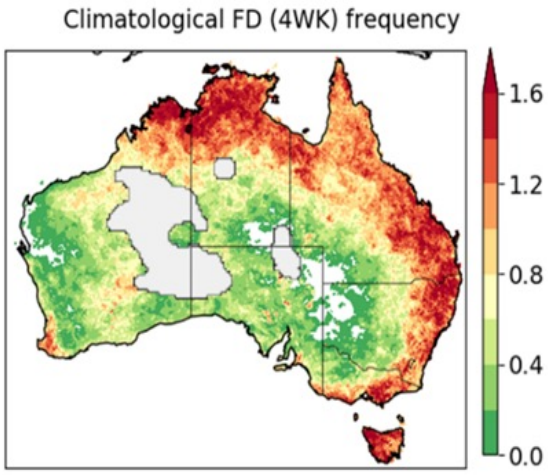
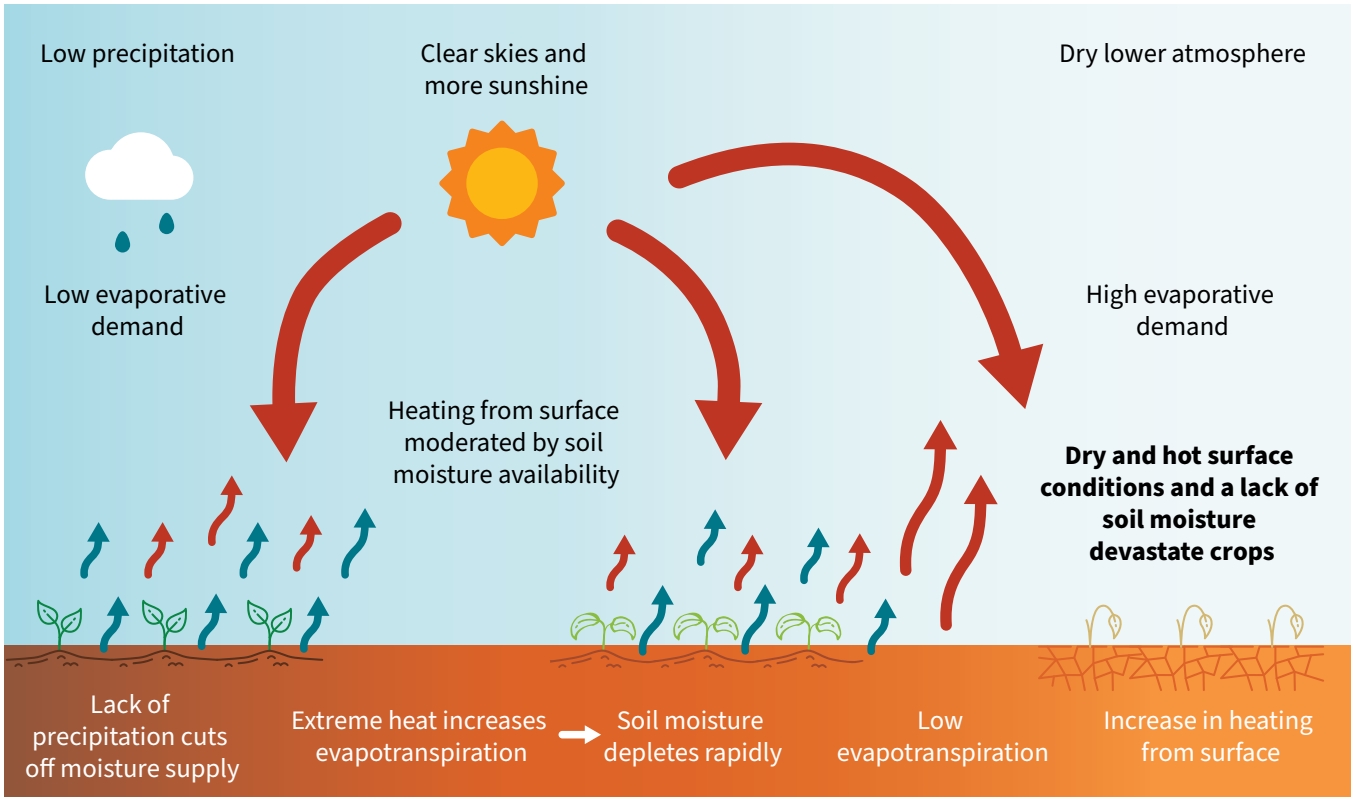


Figure 24: Conditions for flash droughts.[55]



There may be short term weather conditions that have similar impacts as long term droughts. These weather conditions are commonly being referred to as 'flash droughts'. The SEQ region is highly susceptible to flash droughts that typically last for as little as a month and as long as six months. They are caused by a sequence of climatic conditions, such as heat wave conditions increasing evapotranspiration and rapidly depleting soil moisture.

Researchers are investigating the possible link between conditions that initiate a flash drought and those areas that are susceptible to flash droughts and the risk of bushfire. The ESI link between (indicator of flash drought) and KBDI (an index used to determine forest fire potential) is strong and varies according to the time of the year and where in Australia. In simple terms, high fuel loads occur after a series of above average rainfall years. This fuel load becomes dangerous when biomass (grass) cures/dries. This curing is often associated with the onset of drought (either short or long term).

Figure 25: The linear correlation between ESI and KBDI.[56]

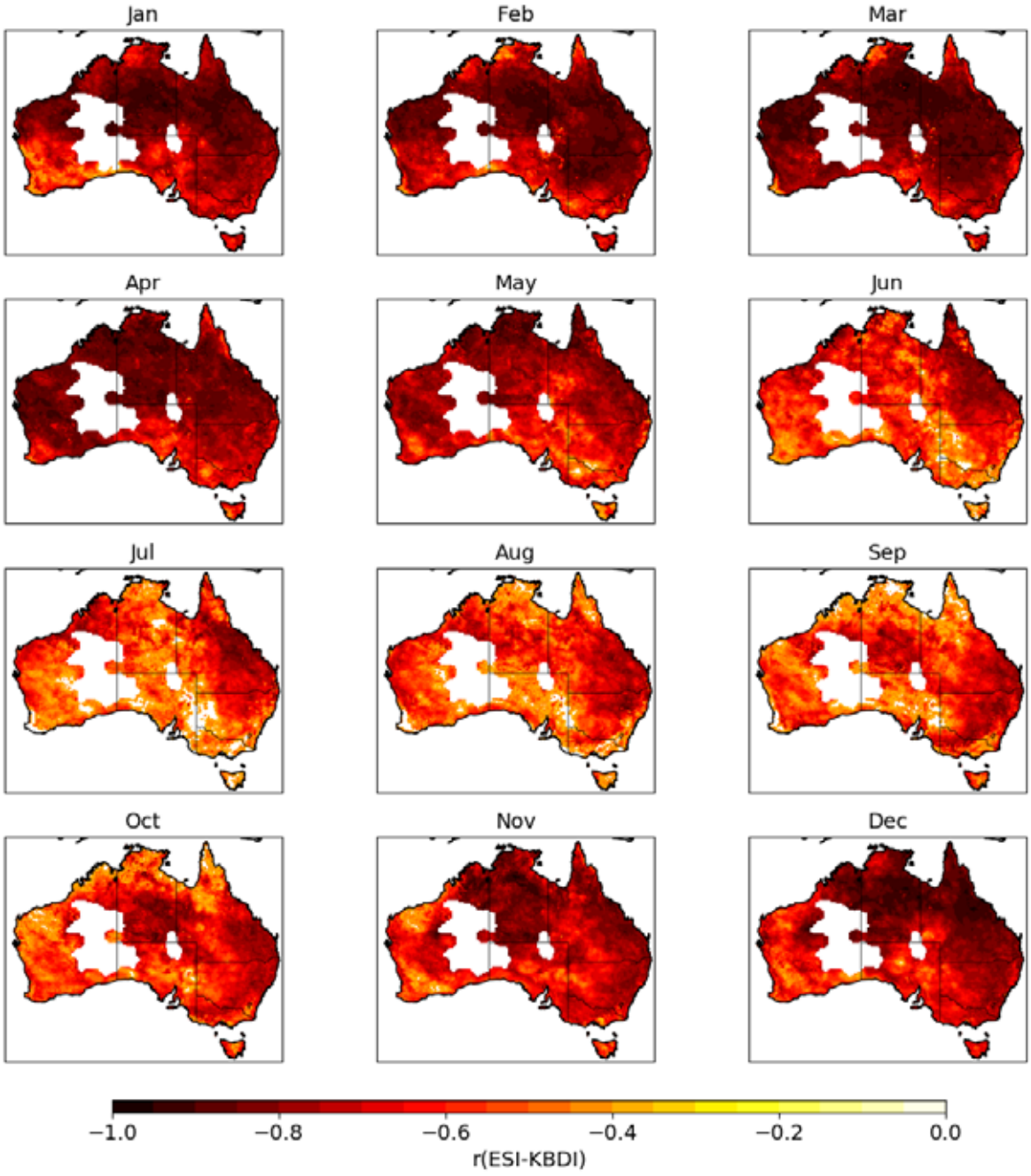
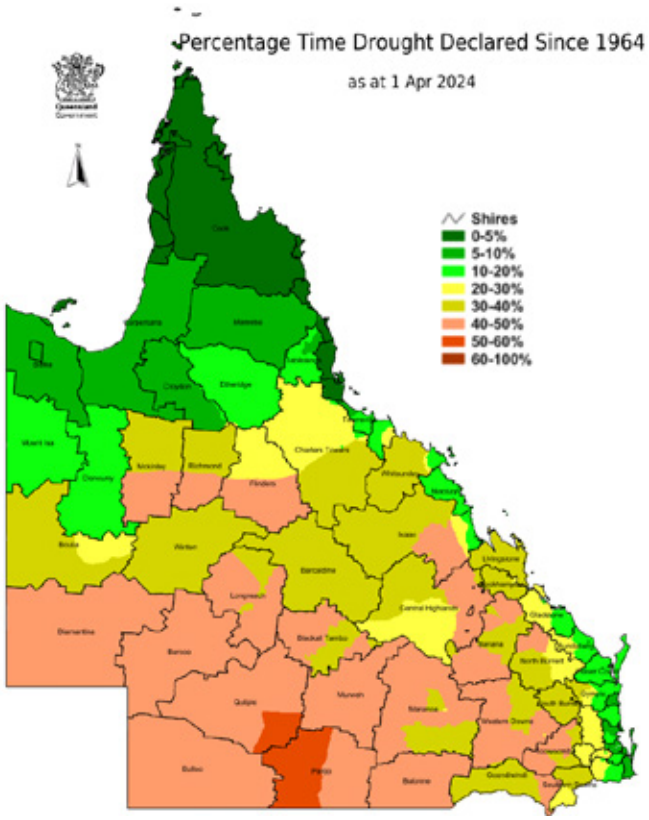


Image: View of the Glass House Mountains and Beerburrum State Forest, Queensland.

Past impacts of drought in this region

When looking at the percentage of time individual LGAs have been drought declared since 1964, it can be seen that Somerset, Lockyer Valley, Ipswich City and the western portion of Scenic Rim were drought declared 20-30% of the time. Moreton Bay and the Eastern portion of Scenic Rim were drought declared for 10-20% of time. Whilst this metric provides an insight into the time spent in drought, it does not provide an insight into the severity of drought. As mentioned, the 2019 year was the driest year since rainfall recordings were commenced and recorded for all SEQ LGAs, except Moreton Bay.

Figure 26: Time drought declared since 1964.[57]



In urban and coastal areas of SEQ, there are differing and varied opinions on what constitutes drought. Generally speaking, stakeholder discussions were related to the impacts on water security, the increased risk of bushfire, and links to the cost of living and social justice aspects of accessing water during periods of lower rainfall. In urban areas, often the implications of a drought or dry periods are not considered until it is visible in their suburb, with the other most common measure discussed being the publication of dam levels and council water restrictions. In this sense, some communities are not making the link from an agricultural and primary production issue to an urban community or island issue. Limited community exposure to drought conditions over the last few decades has resulted in some complacency within SEQ communities when it comes to awareness and understanding of drought, which includes an increase of the average household water usage since the Millennium Drought.

"The Logan region has two major rivers running through it, therefore, it's often difficult for people to acknowledge drought, as they see the rivers flowing and think that water security isn't an issue."

– Logan Council member

That is not to say that nearly all parts of the SEQ have not been impacted by drought. The Millennium Drought saw water restrictions enforced for community members, which, through educational and awareness campaigns, was successful in reducing the residential per capita daily consumption of pre-Millennium Drought demands from 300L per person per day to 143L per person per day.

The SEQ region is also at particular risk of compounding disaster events and has a long history of impacts from other natural hazard events with linkages to drought conditions, including bushfires and flooding. These compounding impacts have been known to have consequential effects on the people, culture, community, economy, natural landscapes and the built environment.

People, culture and community

"The mental health impacts of drought are worse than any other disaster."

– Council Worker

Having strong, healthy and vital communities is central to building drought resilience in the region. The strength and health of the economy and landscape is intrinsically linked to that of the people and their communities. Community feedback, government reports and statistical evidence all point to a decline in the health and vitality of people and their communities during times of drought.

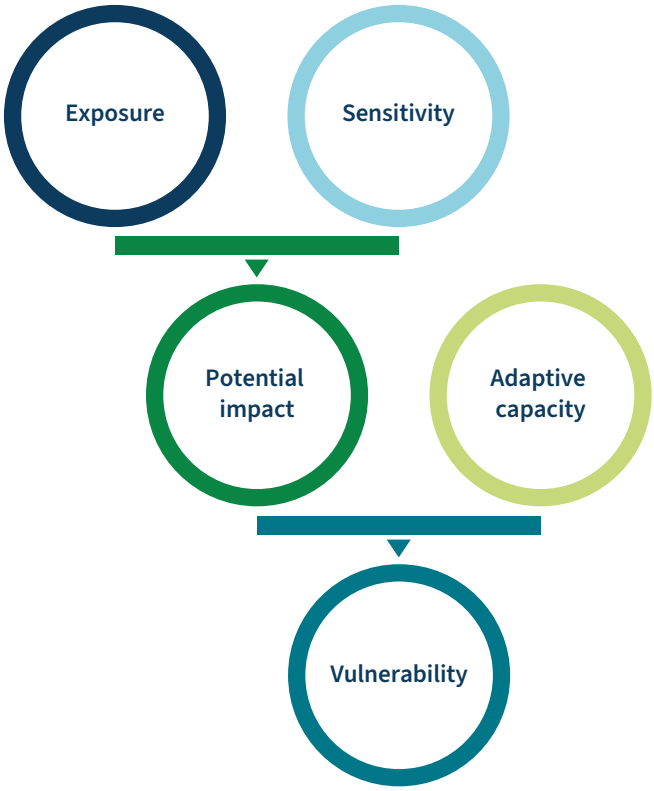
In a 2012 report to the Murray-Darling Basin Authority, ABARES proposed the following framework as a useful way to understand community drought vulnerability and drought resilience.

Their exposure is best understood as: *"the presence of people; livelihoods; species or ecosystems; environmental functions, services, and resources; infrastructure; or economic, social, or cultural assets in places and settings that could be adversely affected"*[24]. Their sensitivity relates to their dependence on the factor that is changing (e.g. rainfall or water supplies) – these combined determine the level of impact. However, the community's adaptive capacity or resilience can mitigate some of the impacts and hence reduce their level of vulnerability. Community feedback, government reports and statistical evidence all suggest that the vitality of the community is a critical factor in their capacity for local drought resilience.

"Marriage breakups and mental health – not talked about so much."

– NFP Organisation Officer

Figure 27: Drought Vulnerability Framework.[58]



Whilst there is no definitive list of the factors that contribute to community vitality, there is general consensus that it includes such indicators as:

- growth/decline in population,
- availability/diversity of local employment,
- connectedness and participation in community groups/events,
- access to knowledge, ideas and advice,
- evidence of community pride,
- community health (physical/mental),
- local investment,
- availability of affordable housing,
- liveability and local amenity,
- community governance and leadership,
- cultural identity,
- subjective levels of wellbeing, and
- levels of security crime and conflict.

The McConnell Foundation (2017), summarises community vitality as: *"Creative Placemaking; Fostering Local; Future Readiness; Active Lifestyles and Civic Engagement."*

All of these factors affect the adaptive capacity of communities and hence their drought resilience. Many of these factors were highlighted through our review of outside expert knowledge (data and reports) and through our engagement in the region (interviews, meetings and comments). Some may be considered chronic stresses that increase the impacts of drought, and in turn, there is clear evidence that drought has had a negative effect on many of these factors. Hence, strong action should be taken to address factors and build drought resilience for the future.

The SEQ region has participated in the University of Canberra's *Regional Wellbeing Survey* since 2016. The survey is extensive with a number of wellbeing indicators assessed. Figure 28 illustrates the results of some key indicators.

Urban impacts

The SEQ areas are no stranger to disasters and climate events such as droughts, having been historically impacted by over 15 events since 2010. The compounding effects of disasters has had significant impacts on the region, leading to exacerbation of existing and underlying issues and inequalities within communities. Additional stressors including cost of living increases and unforeseen financial burdens have previously seen mental health impacts rise across the region. Brown and dying landscapes have also been known to negatively impact the community as some feel like they are unable to escape the reality of what is occurring around them.

"The community has become so fragmented from the compounding impacts of multiple disaster events over the last few years."

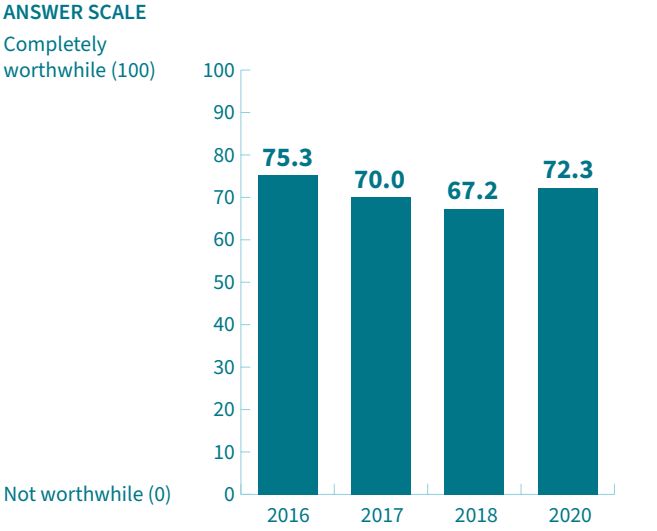
– Brisbane workshop representative

Other health related impacts, including respiratory issues, have been reported during previous drought conditions, as air quality has been impacted by increased dust in the air. In addition, water quality has also been known to be problematic, as water borne diseases, weeds and pests, have been more commonly found in drinking resources, such as water tanks. Similar impacts to recreational water assets have been reported, as increases in pathogens have reported, impacting water quality impacts and disrupting natural ecosystems.

Figure 28: Sample of results from the Regional Wellbeing Survey.[59]

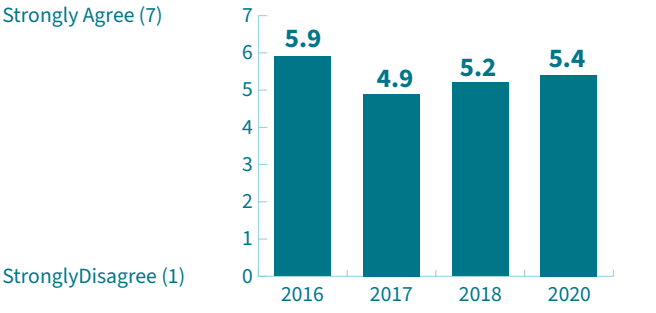
Individual Wellbeing

Feeling life is worthwhile.



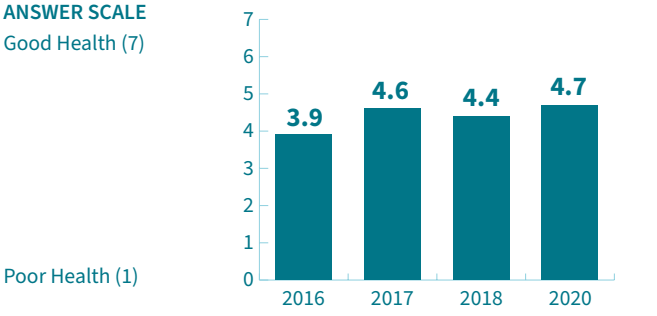
Community Wellbeing

(i) My community is a great place to live.
(ii) This community copes pretty well when faced with challenges.
(iii) I feel proud to live in this community.
(iv) This community has a bright future.
(v) There's good community spirit around here.



Natural Capital

Perceived environmental health.



"Rainwater naturally flushes out water tanks. When there's no rain, the water sits stagnant, inviting weeds and pests to use them as breeding grounds."

–QLD Water representative

Peri-urban properties and fringe communities have previously been particularly impacted by drought impacts. Many households rely on tank water, which has resulted in residents needing to source and purchase water from outside of their community. In addition to this, peri-urban communities who host livestock on their land, such as horses and chickens have been burdened with needing to source fodder for their animals due to limitations with natural fodder growth.

"Many peri-urban property owners keep livestock as pets. Unlike many primary producers who offload their stock during drought, they are unable to part with their animals when times get tough."

– Not for profit representative

Water security has been known to be of great concern during previous drought conditions, which, following the Millennium Drought, resulted in the establishment of the Gold Coast desalination plant to prevent similar threats from reoccurring. Given the region's heightened risk of bushfires occurring under drought conditions, water availability is of particular concern during bushfire season. While SEQ water security program identifies a range of measures such as grid optimisation, desalination and water treatment and recycling option, the need for ongoing infrastructure investment in water security will persist in the face of rising demand and the impact of changing climate on water supply availability.

"One of the first issues that come to mind when I think of drought, is the increased risk of bushfires, and where water can be sourced from."

– Emergency Services representative

SEQ's urban region is known for its diverse communities, including various vulnerable community groups, such as individuals with disabilities, elderly, and a broad range of culturally and linguistically diverse (CALD) residents. During previous disasters, reports have shown that some vulnerable community groups have felt confused or have been unaware of support available to them, some of which require translation services and plain English information to be made available. Outreach services engaged to support these groups have advised that online services are not always accessible to many vulnerable community members, and therefore, mobile outreach units have been required to respond to requests for assistance.

"There has been a significant shift in cultural diversity over the last 10-20 years. New and emerging multicultural groups have recently relocated into the South East Queensland region. It is likely that many will have limited understanding on how to navigate drought and know what support is available."

– Community representative

Island communities have also reported concerns regarding water security and the transferring of water resources from islands to the mainland, and potential impacts that has on ecosystems and other natural resources on the islands.

The SEQ urban region hosts Australia's third-largest capital city, generating almost two-thirds of the state's gross product. The region's diverse economic footprint provides employment and economic activity across a variety of industries, many of which rely on water resources as part of everyday function. During previous drought conditions, businesses have been significantly impacted, which has resulted in consequential impacts for employers and staff, reductions in income, staff redundancies and decreased labour conditions.

"South East Queensland has a significant number of overseas and interstate visitors that come to the region looking for seasonal work. When local businesses are impacted, there are usually flow on effects that limit employment opportunities, resulting in a reduction in tourism."

– Logan workshop representative

Unlike many regional and rural areas of Queensland, the SEQ urban region has a smaller percentage of primary producer stock, and boasts much greater population numbers. This means that food produce is often sourced from outside of the region, relying on supply chains and growers located in other parts of Australia. There are, however, a broad range of peri-urban producers, who provide food resources to the local community. It has been previously identified that peri-urban producers do not have access to similar support networks, funding and services as primary producers, which has resulted in many peri-urban producers being forced to sell their property.

"Peri-urban producers seem to always miss out on funding opportunities and support. For many, growing is their primary source of income."

– Brisbane workshop participant

Supply chains are imperative to the SEQ urban region businesses, including restaurants, grocery stores and retail. Disruptions to supply chains have been reported during previous droughts, as food, which is sourced outside of South East Queensland and unable to be grown within the region, is unavailable due to drought conditions. The consequential impacts of supply chain disruptions have previously been significant for South East Queensland's economy.

Rural impacts

"People feel disconnected because communities in drought are so close to large populations who don't get it."

– Community Workshop Participant (Gatton)

During our engagements in rural areas, the increasing average age of farmers in the region was raised as a major factor which contributes to stress levels during drought. There were examples given of farmers that were eligible for the old-age pension but were still able to carry out small-scale cropping, so they continue to farm. However, they become no longer financially viable once a drought hits, so they have to draw on their savings. It would appear that many older farmers have not done any succession planning, nor have planned how to effectively move out of business and get some financial/social support. Rural Financial Counsellors (RFC) report that many older farmers are not aware of how to use the advantages of new succession plan rules or how to access Farm Household Allowance nor funding for professional services.

"Access to support is adequate but complicated."

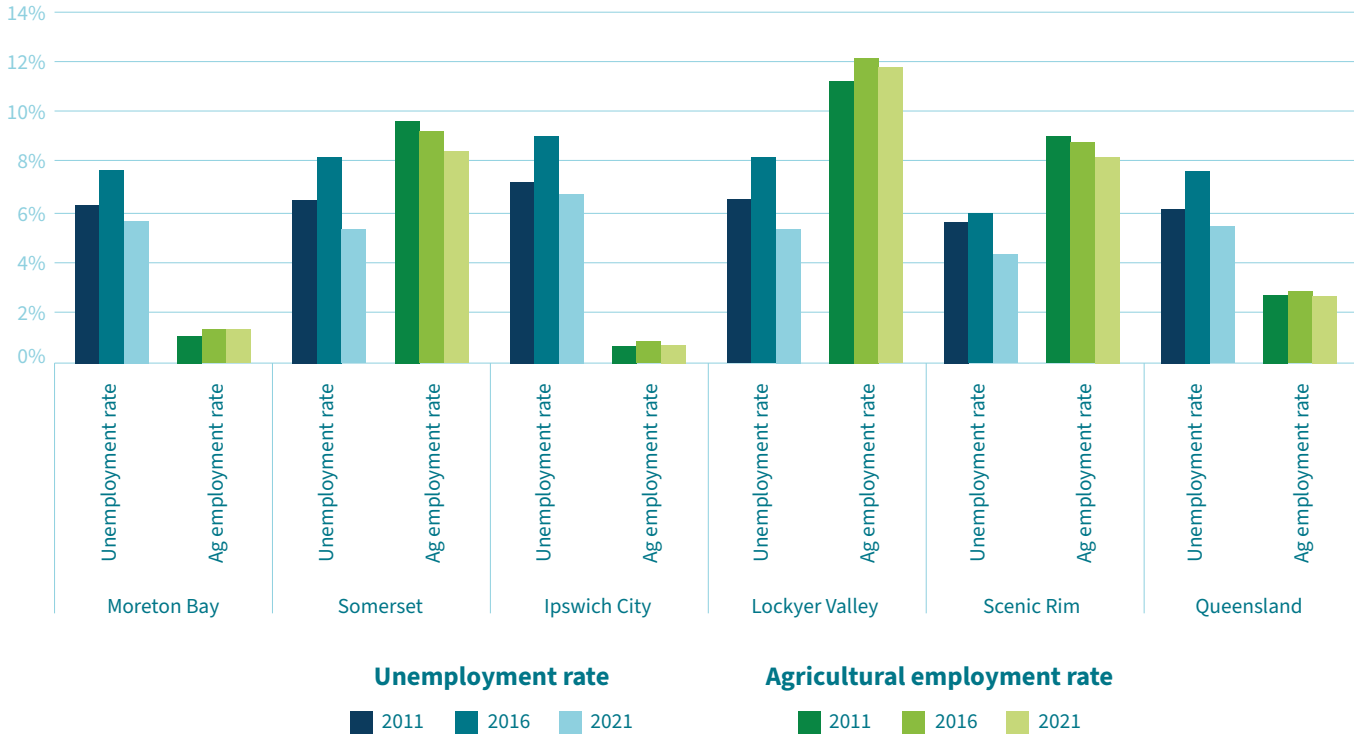
– Community Workshop Participant (Gatton)

"TRACC are already referring clients – we got a new client today who has already sought mental health support – they are now paying to feed their cattle out of their superannuation."

– NFP Organisation Officer

There appears to be little correlation between seasonal/rainfall conditions and unemployment levels in the SEQ region. An analysis of Figure 29 indicates several anomalies. Where agriculture is a major employer, it could be expected that an overall increase in the region's unemployment would be primarily due to a fall in agricultural employment - this was not the case for the three agriculturally-dominated LGAs of Somerset, Lockyer Valley and Scenic Rim. It would appear that the impacts of Covid19 were a far more significant contributor to unemployment trends in all LGAs. The variation in seasonal workers (including back packers) numbers may not be adequately reflected in the ABS statistics. These workers are significant contributors to the regional economy.

Figure 29: A Comparison Of Unemployment and Agriculture Based Employment for the Five LGAs.[60]



"Horticulture [businesses] are bringing in labour from abroad – Tonga & Solomons – it is impacting their countries and may not be sustainable. Robotics and smart greenhouses reduce staff requirements & speed up growing times, quality and efficiency."

– Large-Scale Farm Manager

"Increasingly, robotics addresses labour shortages."

– Corporate Farm Manager

The engagements for this RDRP often raised the issue of drought and increased suicide – and the perceived link between the two. Whilst there is continued debate about whether there are proven causal links specifically between drought and levels of suicide, there is no debate in the SEQ rural region that many people's recollections and personal experiences highlight a collective perception that the drought intensified stress, which triggered mental health problems, which in turn led to an increase in suicides.

The Centre for Rural and Remote Mental Health -Queensland reported in 2008 that *"Due to the reliance on primary industries in rural and remote areas, climate variability is the factor that has the greatest influence on the stress levels of individuals in rural and remote areas"*. Drought exacerbates chronic stresses and underlying issues such as legal and financial problems; medical and health problems; alcohol and substance abuse; isolation and social withdrawal; breakdown of relationships and in the worse cases, self-harm and suicide. These individual stresses, in turn also influence (and are influenced by) the collective wellbeing effects on communities and landscapes – in effect, drought can create a vicious cycle of stress and decline in mental health. Nevertheless, amongst mental health experts and practitioners, it has also been discussed that in fact de-stigmatising mental health issues and increased availability of services can have the effect of increasing the number of people self-identifying with mental health issues and seeking services.

"Lots of Mental Health Support providers… lots of services are free… but do they have good relationships with the organisations (DPI, QFF, agronomist, etc) who can introduce them to individuals and build trust?"

– Industry Officer

The SEQ rural region is within the service boundaries of three public health networks: North Brisbane, South Brisbane, and Darling Downs and West Moreton. An examination of the health needs assessments for all three reveal health priorities that are similar to other regions, and with no trends that appear to be attributable to weather patterns of any kind. Access to health services is more noticeable in the five key LGAs of this RDRP, and whilst this is not attributable to drought, clearly it is an exacerbating issue that would amplify the effects of drought.

Economy

"Droughts are not about water…they are about economics."

– Regional Development Officer

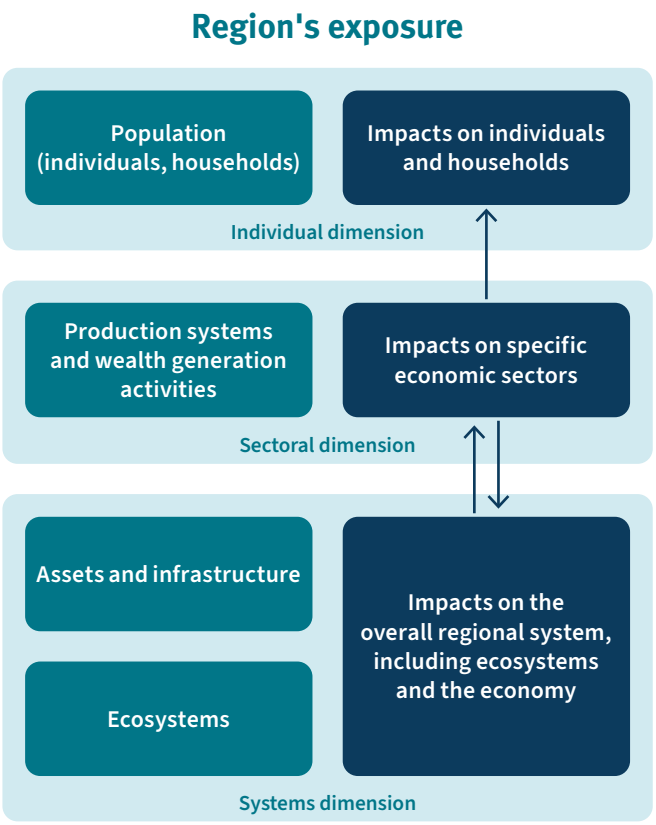
"Dry = pumping water = rising energy costs = impacts what they choose to grow so they can get the highest value per megalitre costs."

– Industry Officer

Within South East Queensland urban areas, the impacts of drought—and associated climate risks—have created observed impacts. Considering the impacts of drought across different pillars, CSIRO argues that we must understand all potential aspects[25]. CSIRO proposes a model for understanding the impacts at individual sectoral and systems dimensions.

However, there are currently no detailed reports that analyse and discuss comprehensively on the economic costs of drought across SEQ – and particularly in the urban areas.

Figure 30: Dimensions of cost of drought.[61]



Rural impacts

In the key SEQ rural LGAs — Somerset, Sunshine Coast, Moreton Bay, Lockyer Valley, Ipswich and Scenic Rim — agriculture and agricultural supply chain businesses form a far more significant percentage of economic activity and output, and hence our engagement produced more specific evidence of the economic impacts of drought. Not surprisingly, the correlation between average rainfall patterns and economic output in these LGAs is more profound.

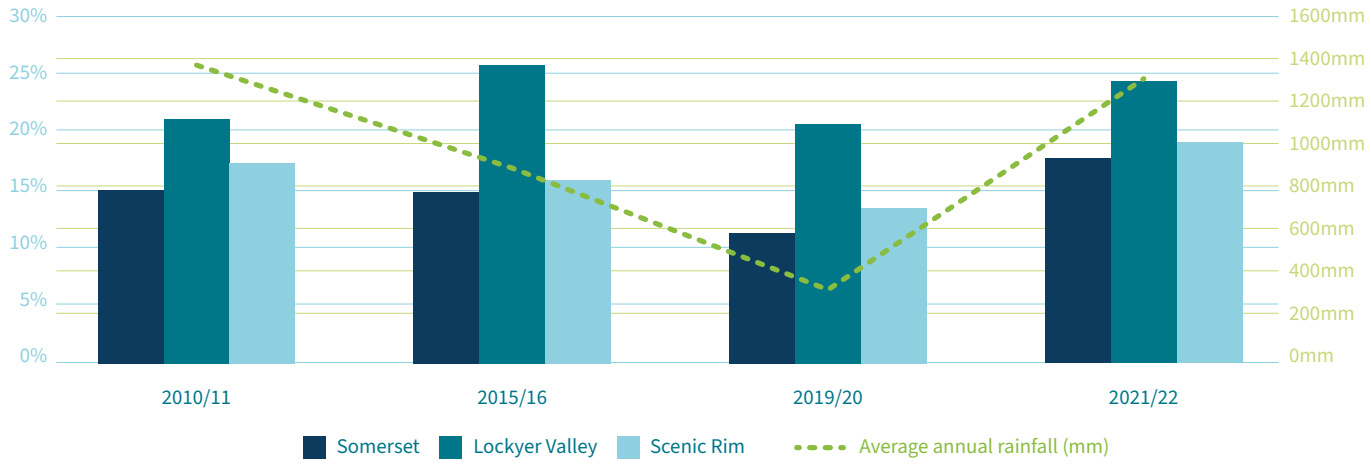
As an example, Figure 31 indicates the significant contribution from agriculture to the regional economy for the Somerset, Lockyer Valley and Scenic Rim LGAs. Agriculture is the largest contributor for both the Scenic Rim and Lockyer Valley. Figure 31 indicates that the lowest contribution by agriculture to the regional economy coincides with the lowest annual rainfall in 2019. It is worth noting that the ability to draw on water reserves for irrigation allowed record agricultural production in the Lockyer valley despite less rainfall in 2015/16.

Concessional loans and grants have played an important role in helping primary producers reduce the economic and natural resource drought related impacts on their businesses. It has been reported that many primary producers in the region applied for concessional loans to build enterprise resilience, however a lot were not able to be granted loans because of their debt structure, for example applicants had home loans rather than business loans. Where loans were granted, they covered some business debt but not credit card debt which created major stress on producers. There are anomalies with the eligibility criteria for many of the loans and grants. An example is that some drought relief schemes do not cover horse related enterprises, of which there are many in the region. Whilst these horse related businesses are not eligible for loans, they are eligible for Farm Household Allowance and are considered primary producers by the Australian Tax Office.

"Unfortunately, funding models still support old behaviours like funding going towards overhead sprinklers."

– Lockyer Valley Farmer

Figure 31: Agricultural Contribution (%) to LGA Annual Output with Total Annual Rainfall (mm/yr)[62]



The Australian Bureau of Agricultural and Resource Economics and Science (ABARES) carried out a national survey of farmers in 2021. The surveyed targeted practices related to natural resource management and drought resilience and preparedness. There were 478 farms survey in Queensland. Practices undertaken to build drought resilience included:

- Diversification as a way farm households can spread risk and moderate decreases in farm income that come with changing seasonal conditions and fluctuating commodity prices. This can be achieved by either increasing income from non-farm sources or undertaking a wider range of agricultural activities on farm.
- Over the last 3 years, an estimated 37% of farms diversified their agricultural enterprises to increase their resilience to drought, while 31% increased their non-farm income.
- Around 58% of farms had some non-farm income on average over the last 3 years. Of those farms, the average proportion of household income from non-farm sources was 38%, making many farms well placed to deal with a short-term downturn in farm income.
- An estimated 38% of farmers had a written farm plan with business objectives. The combined planning index shows that, for those farmers with a written plan, around 34% engage in 3 features of farm planning which are important contributors to drought resilience – their plan includes strategies for coping with drought, addresses other risks, and they actively use the plan to make decisions.

When asked how farmers sourced information, the following was provided:

- In implementing NRM and drought preparedness practices, the most used sources of information were peers, neighbours or friends (49%), internet (32%) and private consultants (24%). Only 10% of farms used government extension officers (with the majority of those being broadacre farms).
- The use of industry bodies as a main source of information was more common in the sugar and other livestock industry (36%), compared to horticulture (27%), dairy (20%), and broadacre (8%).
- An estimated 35% of farms attended an NRM information event in the last 3 years. This proportion varied slightly by industry with 41% for dairy, 36% for broadacre, 35% for horticulture and 18% for sugar and other livestock.
- The majority of farms receiving NRM advice from an event indicated the most recent event attended was a field day (46%), followed by meetings (23%) and training courses or workshops (21%).
- Workshops and demonstrations were regarded as being most effective at influencing attendees to adopt a new practice, with an estimated 89% of farms who attended a workshop adopting a practice as a result and 87% for demonstrations.
- The main groups or organisations delivering these events were private consultants or agribusinesses (28%), local farmer network groups (27%) and Landcare groups (16%).

Figure 32: The ABARES 2021 national survey.

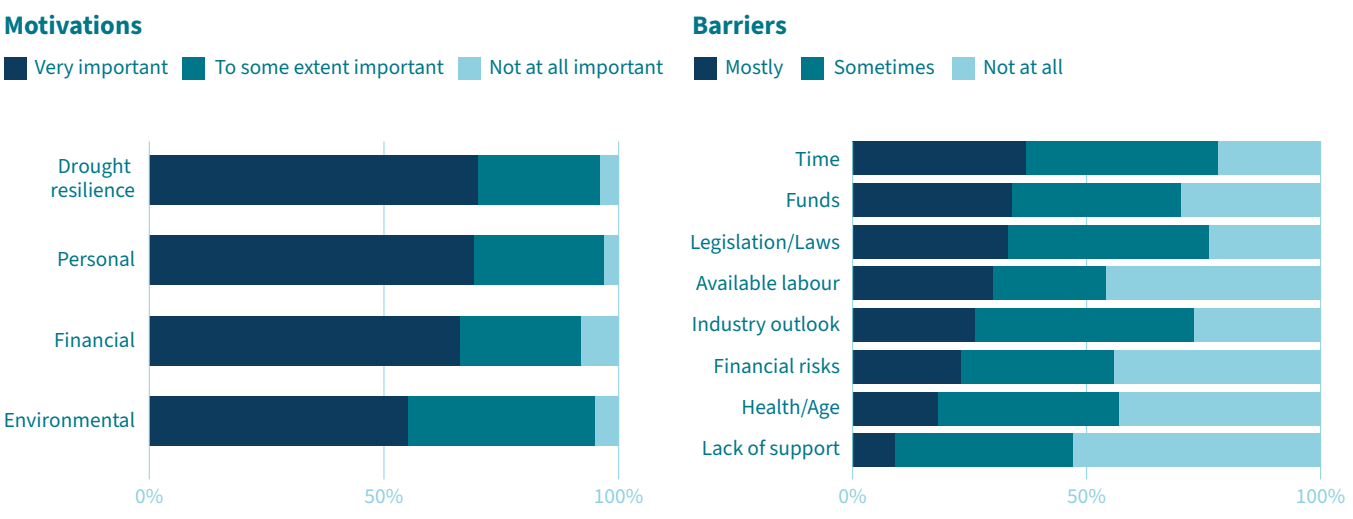


Figure 32 outlines the motivations and barriers to new practice adoption that farmers identified:

"Difference between cost of production - which increases in drought (e.g. cost of electricity up) - is not reflected in the prices received."

– Community Workshop Participant (Gatton)

ABARES produces extensive data on agriculture in Australia. The ABARES Queensland Southern Coastal - Morton to Curtis region encompasses the SEQ rural region. Their research shows, that whilst the patterns of farm profit do not directly correlate to high or low rainfall periods, the data highlights a number of concerning issues for farms in the region:

(a) for only two years from 2005-2020 were farms in the region recorded as making a profit,
(b) farms in the region consistently hold high levels of debt compared to their reported income,
(c) farms typically take on more debt to 'get through' periods of drought and this carries on for some years after the drought may have broken.

Given the proven (and increasing) variability of intense weather in the region, droughts may 'break' with periods of heavy rain and flooding – which only further exacerbates the damage done to landscape, crops and livestock (and communities) during the drought. This pattern leaves peoples adaptive capacity to bounce back after the drought significantly weakened.

"Additional pressures…urban planning and development/change in approach to farming from drought & flooding and now heading into the next dry…how do you sustain the financial viability?"

– Industry Officer

The grazing enterprises in SEQ rural areas face similar challenges as those in other regions. The viability of farm/property size in these regions has often been cited as an issue. A number of producers and business support professionals commented that smaller (and often family-run) farms in the region were becoming too small to allow for long term viability and that off-farm income was essential to keeping the farm. The observations and experience of SEQ rural primary producers regarding small farm size being a major issue is supported by ABARES analysis where farm size groupings are based on farm capital holdings relative to

Figure 33: Farm business profit for the Curtis to Moreton ABARES region.

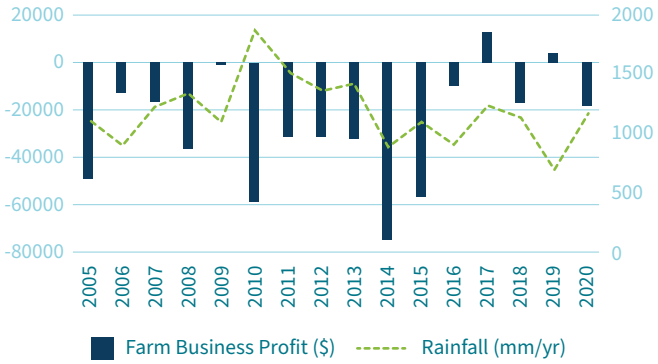
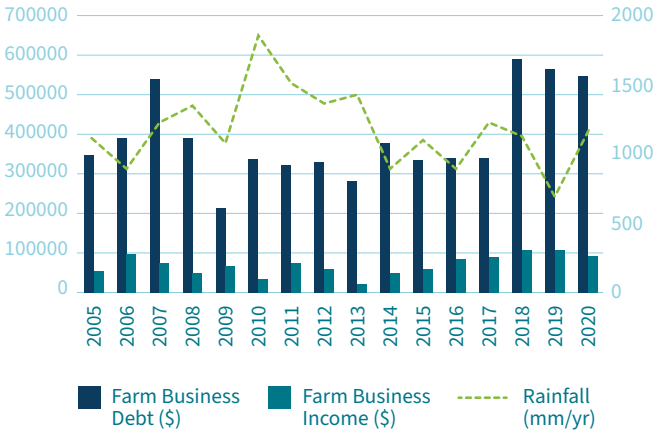


Figure 34: Farm business debt and income for the Curtis to Moreton ABARES region.



farms in the same industry and region group. In general, smaller farms tend to have lower profit margins than larger farms[26], and as a result they show significantly higher percentage changes in profits under future climate scenarios.

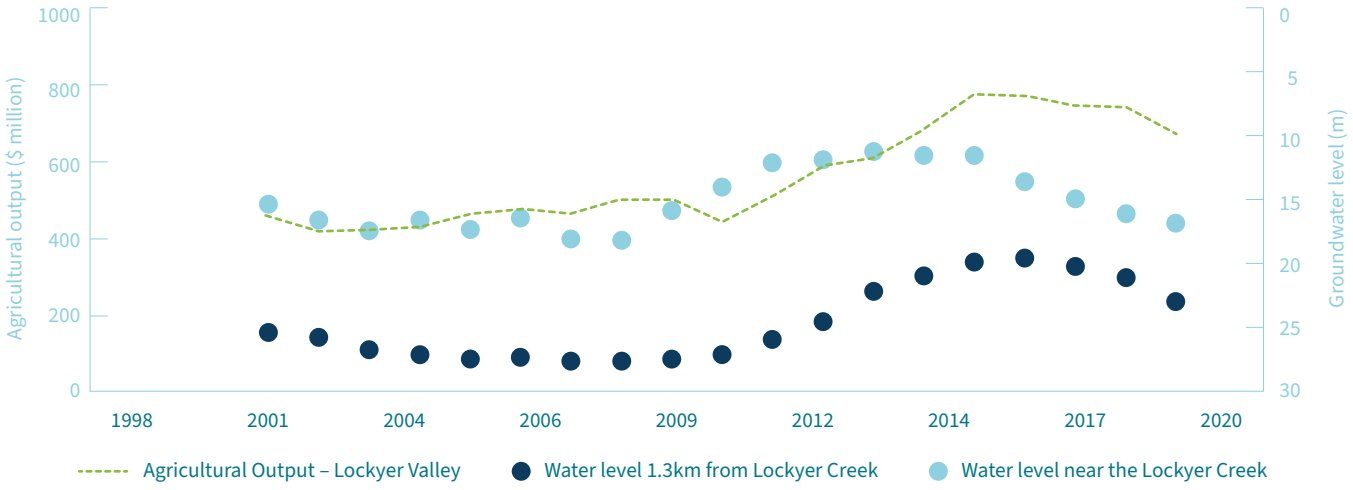
"Banks aren't willing to lend money to smaller farmers as easily (smaller loans so banks do them as home loans and not business loans – very few overdrafts here) and as a result during drought there is a large number of the older farmers using credit cards because they can't borrow working capital."

– RFC Officer

Table 6: Average percentage change in profit by farm size group relative to *Historical (1950-2000).*[63]

Farm size	Historical	Recent	Future (RCP4.5 2050)			Future (RCP8.5 2050)		
			Min.	Mean	Max.	Min.	Mean	Max.
Small	$17,688	-96.0	-130.9	-52.8	-9.4	-197.9	-100.4	-41.5
Medium	$171,877	-22.6	-32.2	-14.6	-4.1	-49.6	-26.8	-12.2
Large	$661,259	11.9	-19.4	-9.1	-2.6	-29.7	-16.2	-7.8

Figure 35: Agricultural output compared with groundwater availability.[64]



"You need to have economy of scale to be viable. $5 – 10m turnover…with a net margin of at least 20%".

– Farm Manager

The relationship between groundwater availability and production is much stronger than the relationship between rainfall and production, although large rain events (floods) serve to recharge alluvial groundwater aquifers providing a lag benefit. The strong relationship between water availability and production results in the lack of access to water being a major barrier to increasing horticultural production in the region. Several business cases have been developed to investigate the viability of increasing the amount of water available for irrigation.

"Anyone drawing from the riverine system…bottom end of Scenic Rim/ Gold Coast, Albert River and Logan catchments… there are currently lots of conversations about water use. Legislated water plan = metres and moving to caps on water use".

– Industry Officer

For instance, the Lockyer Valley is considered one of Australia's major horticulture food bowls. Groundwater availability and use underpins the viability of the majority of irrigators in the region and those communities that depend on the horticulture industry.

"The Horticulture industry always operates like it is in drought – water efficiency is always a focus."

– Farm Manager

In January 2024, the Queensland Government announced: *"A $10.8 million investment will progress Water Initiatives in the Lockyer Valley, a proposal to consider options that support increased agriculture production in the Lockyer Valley and Somerset regions. The Water Initiatives in the Lockyer Valley proposal will align with Seqwater's 2023 Water Security Program, which committed to examining opportunities to supply industry and agricultural customers with recycled water to offset demand for potable water and reduce demand on Wivenhoe Dam. The $10.8 million in funding may also be invested in supporting a range of activities to inform future decision making. The Western Corridor Recycled Water Scheme (WCRWS) will continue to remain a drought response."*

"It's very competitive…there's mostly an individual perspective on water use rather than a collective one."

– Government Officer

Landscape and natural environment

Drought has impacts across all kinds of landscapes – both urban and rural. The SEQ prides itself as a green region and even in urban areas, the impacts are most noticeable through the condition decline of parks, green spaces, effects on native animals and even home gardens. In rural areas the landscape impacts are more varied and complex.

Traditional owners across in SEQ talk of the multi-faceted impacts of drought on the landscape in a variety of areas and the effect it still has on their communities. So too, do many of the other people that live and work on the land. Sometimes their stories contain dramatic images, but sometimes the changes are subtle and happen over time.

"Flooding patterns across the whole region have changed due partly to urbanisation… flooding now where it hasn't before."

– Local Farmers

Urban impacts

The urban areas of SEQ are filled with pockets of natural reserves, gardens, parks and rainforest, as well a significant canopy of street trees which are home to many different species of flora and fauna. The region's heritage listed national parks and rainforests are also a significant economic driver, attracting tourists from all over the world. During drought conditions, the natural environment has been known to become compromised, resulting in an increased hazard risk to the surrounding communities and wildlife, as vegetation dries out and becomes a potential fuel source for bushfires.

It is not only bushfire events that are at higher risk of impacting the landscape from the impacts of drought. Increased sediment, nutrients and other pollutants have previously impacted water quality for the region, which has been known to be exacerbated by periods of heavy rainfall and flooding following long periods of drought.

"You can't plan for drought impacts in South East Queensland, without also considering flood impacts that might follow"

– Gold Coast workshop representative

Soil erosion has also been known to be problematic during drought events, resulting in a decline in plant growth and vegetation cover. Other impacts have also included damage to road assets and buildings, including cracked pavement and seal.

Engagement with Traditional Owner corporations in the Redland region confirms that many Elders have observed changes in the natural environment and their ecosystems over more recent years, which has never been recorded throughout their history.

"Elders have reported changes to the natural landscapes and water ways, which has never been seen before."

– Indigenous representative

Impacts to animal welfare have been particularly prominent during previous drought events in the SEQ urban region. Animal welfare organisations, such as the RSPCA have observed substantial increases in animal welfare concerns during drought conditions, as owners are, in some cases, unable to afford to feed their animals. Animals that are usually self-sustainable on small blocks of land, such as horses and chickens, often require additional feed due to lack of ground cover from reduced rainfall. As a consequence, there is an increased financial demand on animal owners to source fodder for the animals, which has been known to be costly, and in some cases, hard to obtain. Biosecurity issues relating to increased fodder imports have also impacted the region, with an increase in unwanted weeds and pests having been previously reported.

"Many small-block owners become desperate to feed their animals, resulting in becoming complacent in ensuring fodder is safe to bring into the region."

– Industry representative

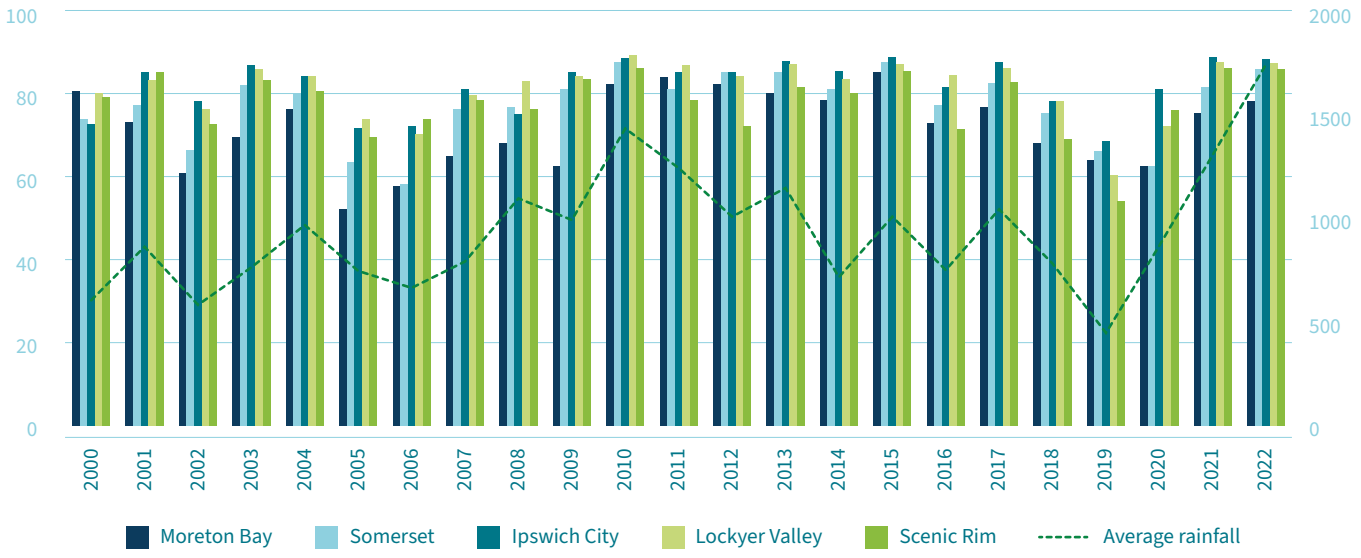
Rural impacts

"We have just had drought, then storms and floods…now… this heatwave."

– Grazier

Since 1999, modelled annual pasture growth has been used as an indicator of the severity of drought conditions on agricultural land. Annual pasture growth is influenced by rainfall (amount, timing, and intensity), temperature, radiation and soil moisture and condition. It is closely linked to total ground cover. There has been extensive research into the influence of total ground cover on sedimentation of water ways and wetlands.
Low or no ground cover results in major mobilisation of sediment from paddocks to river along with increased water velocity in these streams increasing stream bank erosion. The diagram below provides a snap shot of total ground cover for the LGAs and annual rainfall. There is a strong correlation between total ground cover and rainfall.

Figure 36: Total ground cover 90 **and average annual rainfall (mm/yr).**[65]



"Trying to get producers to maintain ground cover to control sediment is a challenge."

– Community Workshop Participant (Gatton)

There has been a declined in total ground cover for all LGAs averaged over the last 20 years when compared to the 1890-2021 period average. This reflects the average total annual rainfall comparisons although not in the same order. The Scenic Rim has the greatest comparative discrepancy for rainfall with -5.7% and Lockyer Valley the lowest with -2.5%.

Extract from the *South East Queensland Natural Resource Management Plan* [27]:

"In 2021 many rural western catchments recorded the poorest freshwater condition since 2007, following several years of drought. Flooding is an important natural process for freshwater and coastal ecosystems. Floods recharge groundwater aquifers, deposit nutrients, support recruitment, growth and productivity of river and wetland species and facilitate the dispersal of animals and plant propagules. However heavy rainfall and runoff is faster, stronger, and higher in pollutants in landscapes cleared of trees, lacking groundcover, and affected by catchment urbanisation and stream modification. These human modifications of the catchment exacerbate flooding and can slow ecosystem recovery and have long-term impacts on waterway health.

We need to slow water and reduce erosion in the upper catchment by protecting and increasing vegetation (especially along riparian zones) and engaging floodplains through policy, land-use planning and compliance. Note that clearing continues, with the highest annual rates of loss/clearing of riparian vegetation notable in Pumicestone (215ha), Caboolture (55ha), Bremer (188ha), and the total for the region was 1400ha (last measure for 2019). For the downstream communities, conservation of existing riparian vegetation and revegetation of degraded areas will lower flood heights and reduce damage to roads, bridges and buildings. For the environment and cultural heritage, this will protect banks from erosion, resulting in cleaner floodwaters and enhanced protection of cultural heritage values."

Figure 37: Sediment Loads (tonnes/year) for SEQ catchments.

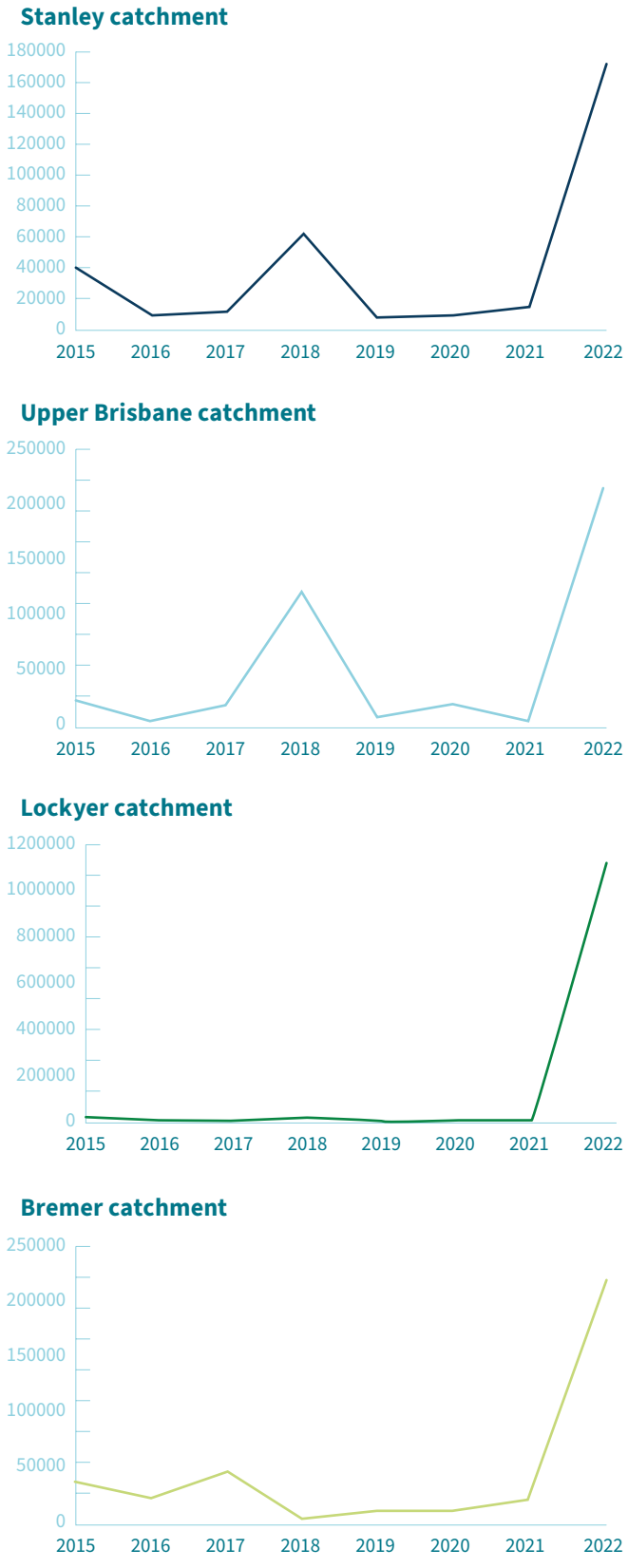


Figure 37 shows the sediment loads against time for the major catchments in the region, highlighting how sediments are mobilised after periods of drought and low ground cover followed by high rainfall events. All the catchments had high levels of mobilised sediments in 2021, which followed below-average annual rainfall for the preceding five years.

The environmental impacts of drought are also significantly affected by landscape management practices – especially vegetation clearing. The SEQ rural region is particularly vulnerable to droughts due to the intensive clearing of woody vegetation. The total clearing rate of woody vegetation between 2010 and 2018 for the SEQ NRM region area is shown in the graph below. The graph indicates the top three purposes for clearing are forestry, pastures and settlement. In 2019, only 35.3% of the Healthy Land and Water NRM region was classified as being remnant woody vegetation. This is the lowest level in the state[28].

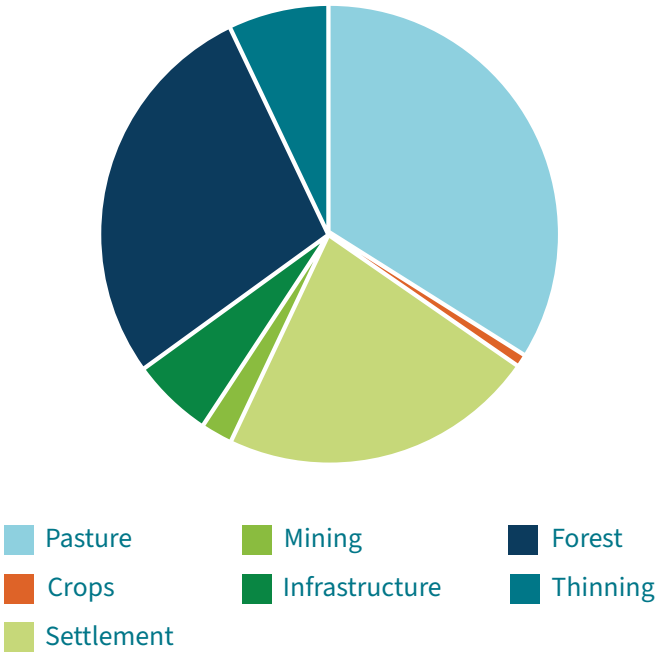
The impacts of drought on terrestrial and aquatic fauna and flora populations are well documented for some species and evolving for others. Endemic species have evolved to survive the impacts of drought (ecological resilience) however their ability to do this is closely correlated to the health of the populations and the environment going into drought. For aquatic dependent species, both water quantity and quality are integral to their survival. High levels of extraction leading into and during dry times potentially reduces water quality (e.g. increases salinity levels) thus placing stress on aquatic ecosystems. Also, climactic conditions associated with drought, such as prolonged periods of hot days, are also impacting on species such as fish when river warming isn't producing the appropriate conditions required for breeding.

"Water security is very high priority, but biosecurity is also a priority issue."

– Community Workshop Participant (Gatton)

There are 11 SEQ threatened ecological communities which are listed on the *Environment Protection and Biodiversity Conservation Act 1999* list of threatened ecological communities. This is not surprising when considering that only 35% of the SEQ region has intact remnant woody vegetation. There are many threatening processes which impact on the status of these vegetation communities, of which drought and associated bushfires are two.

Figure 38: Total 2010-18 woody vegetation clearing rate (ha).



During the engagement it was noted that biosecurity issues are heightened during times of drought – often farmers import fodder from other regions to hand feed stock. Whilst the SEQ rural region would appear to be a net exporter of fodder, it was still reported that during times of drought, opportunistic weeds, pests, and feral animals become an increasing problem.

Infrastructure and built environment

Infrastructure takes many forms including physical infrastructure such as roads, rail lines, water storages/structures, buildings, weather stations and communication towers as well as utility services infrastructure and non-physical infrastructure that allow digital connectivity. Drought may also result in increased use of some transport infrastructure such as roads and rail and can often lead to a decline in condition and/or the need for increased maintenance or services.

Table 7: SEQ threatened ecological communities.[66]

Kingdom	Class	Native	Introduced	Wetland indicator species	Rare or threatened species	Total
Animals	Mammals	138	20	10	21	**158**
	Birds	569	14	102	53	**583**
	Reptiles	175	3	20	20	**178**
	Amphibians	58	1	22	13	**59**
	Lobe-finned fishes	1	0	1	1	**1**
	Ray-finned fishes	74	13	85	6	**87**
	Cartilaginous fishes	21	0	21	3	**21**
	Lampreys	1	0	1	0	**1**
	Insects	308	5	89	4	**313**
	Malacostracans	21	0	0	7	**21**
	Arachnids	1	0	0	0	**1**
	Snails	2	0	0	0	**2**
Bacteria		78	0	0	0	**78**
Chromists		92	0	0	0	**92**
Fungi		1972	2	0	0	**1974**
Plants		4734	1079	372	239	**5813**
Protozoans		9	0	0	0	**9**
TOTAL		**8254**	**1137**	**723**	**367**	**9391**

For some physical infrastructure, increased heat and little or no moisture can have significant impact on their condition (i.e. road surfaces, wooden and metal structures, painted surfaces, earthen-based structures, etc) For most infrastructure, the most significant impacts of drought come from:

- lack of funds for infrastructure investment and/or maintenance,
- decrease in available (or able) personnel to carry out construction and/or maintenance.

On-site and farm improvements or maintenance are often neglected, avoided or postponed and the upkeep of community infrastructure is sometimes neglected or abandoned. Drought frequently causes a reduction in investment (both public and private) in new infrastructure in rural and regional townships – in particular, the availability of affordable housing (new or existing) declines.

While drought has little or no direct impact on digital connectivity, the most recent droughts highlighted the lack of digital connectivity even in SEQ, and the flow-on effects on other drought impacts. Many government support or relief programs often require online applications and/or the proficient use of computers to access forms or information. Even many mental health and counselling services were forced to implement telehealth sessions via the internet as their first option. During our engagements, many people remarked how their general community connectivity and their access to services decreased during the drought, as they were faced with either having to access online (sometimes impossible and often problematic in the many SEQ 'blackspots') or faced a long drive to the nearest regional service centre.

Since the building of the Enoggera Dam and reservoir in 1866, SEQ has gone on to become known anecdotally as one of the 'most-dammed' areas in Australia. Seqwater, as at 2024, owns and operates 26 dams, 48 weirs, and two borefields in the region – much of them to service the SEQ water grid.

The SEQ water grid is primarily focused on the production and distribution of bulk drinking water, however, they also supply irrigation water to about 1200 customers. However, there are 16 communities that are not on the water grid and are currently serviced locally by Seqwater. UnityWater – owned jointly by Sunshine Coast, Moreton Bay and Noosa councils – provides water distribution and sewage treatment to the northern areas of the SEQ RDRP region. There are also an unknown number of dams and bores on private property.

"Long-term strategic decisions about water infrastructure need to be factored into planning."

– Community Workshop Participant (Gatton)

Urban impacts

SEQ's urban water system is heavily reliant on regular rainfall, therefore, during drought conditions, water security is a concern for the region. Following the impact of the Millennium Drought, SEQ invested in water infrastructure improvements to enhance the region's water security, which included the Gold Coast desalination plant and purified recycled water treatment plants. The SEQ Water Security Program 2023 outlines further plans to strengthen water security, by establishing a second desalination plant in the region. Some stakeholders have questioned whether further infrastructure is required at this time, suggesting that current resources, such as the Western Corridor Recycled Water Scheme, are underutilised and boast a significant cost burden to maintain.

SEQ's (urban and rural) population growth is trending upwards at a staggering rate, resulting in a need for rapid infrastructure development to support demand. Stakeholders raised concerns regarding the impact that the development is having on the community, and what considerations were made regarding native fauna and flora. A representative from Logan noted that natural water sources for wildlife have begun to deplete, resulting in limited access to fresh water in some areas.

"Developers keep buying more land and building huge developments in areas that were once inhabited by native wildlife. We need to make sure we are considering the natural environment when building new developments."

– Logan workshop representative

Programs to enhance household resilience were adapted following the Millennium Drought, including a Home WaterWise Rebate Scheme, which aimed to encourage homeowners to install water-saving products within their homes. The WaterWise program was a known success, paying over $250 million in rebates.

Rural impacts

Drought impacts on infrastructure in the rural areas of SEQ mainly focus on four issues:

- impacts on community water storage, supply and management infrastructure,
- impacts on community infrastructure (particularly that associated with health and wellbeing),
- impacts on 'on-farm' water storage, supply and management infrastructure, and
- impacts on other infrastructure related to transport, digital connectivity and even drought monitoring and measurement.

Table 8 and Figure 39 indicate the impact that the 2015 – 2020 drought period in the SEQ rural region had on dam storage levels. Of interest is whilst there were declining storage levels, the combined storage levels didn't drop below 50% of total storage capacity. However, some storages, particularly the smaller irrigation dams, fell to as low as 3.2% of total storage.

Table 8: Capacity, lowest level and date of lowest level since 2010 - for the major irrigation and urban water storages for SEQ.[29]

Dam	**Capacity** (Megaliters)	**Lowest dam level** (% of full capacity)	**Date of lowest level since 2010**
Somerset	379,849	62.3	01/09/2021
Wivenhoe	1,165,240	37.2	01/03/2021
Moogorah	83,765	13.1	01/02/2021
Maroon	44,319	3.8	27/02/2023
Atkinson	30,401	3.2	01/02/2021

Water for irrigation is crucial for agriculture in the SEQ rural region, particularly for the Lockyer Valley and Scenic Rim/Warrell areas. The major irrigation districts of the Lockyer Valley and Warrell rely on several sources for irrigation water. Groundwater supplied by shallow aquifers is a major source of water.

New water storage infrastructure has been modelled to come on line in 2043. Figure 42 indicates that irrigation water security is predicted to decline for the next two decades.

Figure 39: SEQ collective dam capacity for the 2010-2022 period.[67]

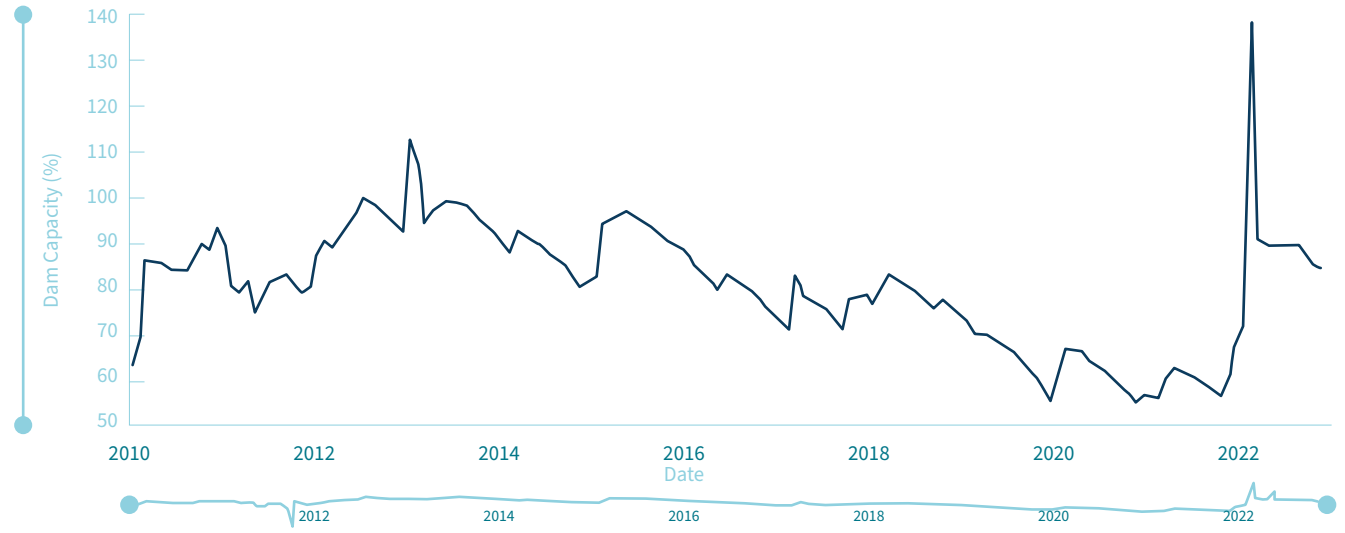


Figure 40: Sources of water in the Lockyer Valley.[68]

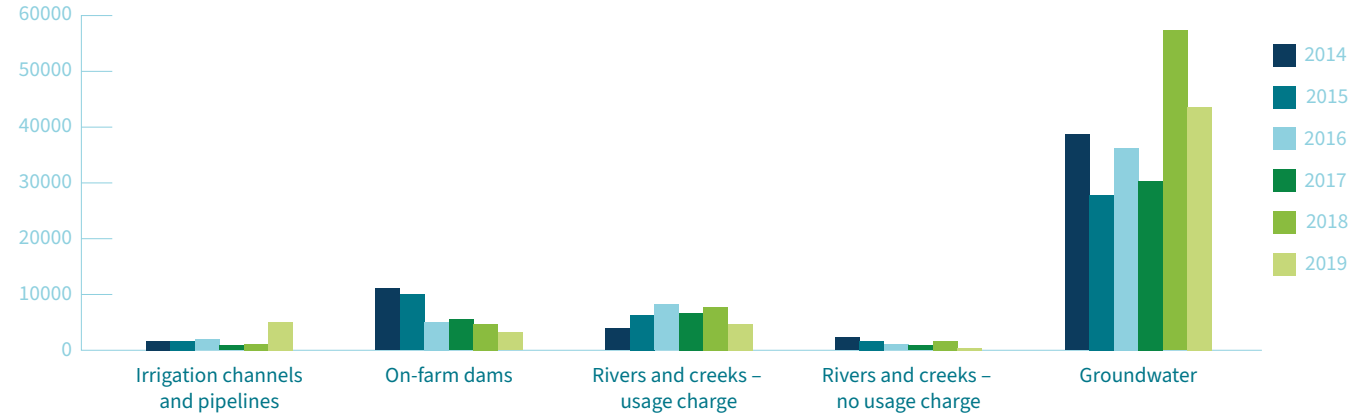


Figure 41: Scenic Rim: Sources of Water.[69]

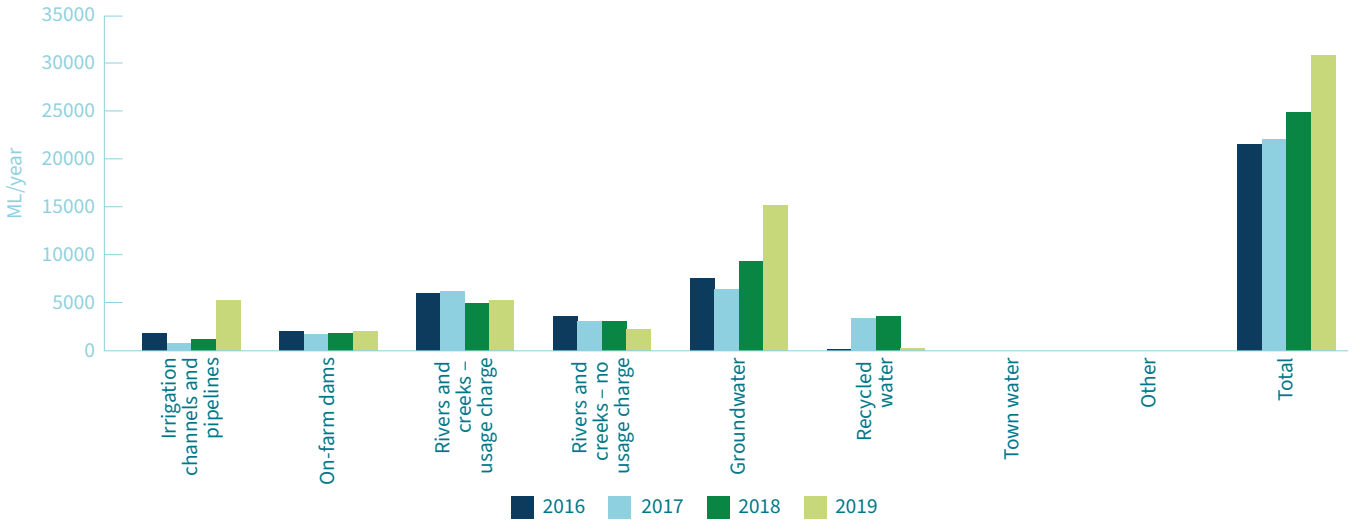


Figure 42: Reliability of irrigation water for the Lockyer Valley.[70]

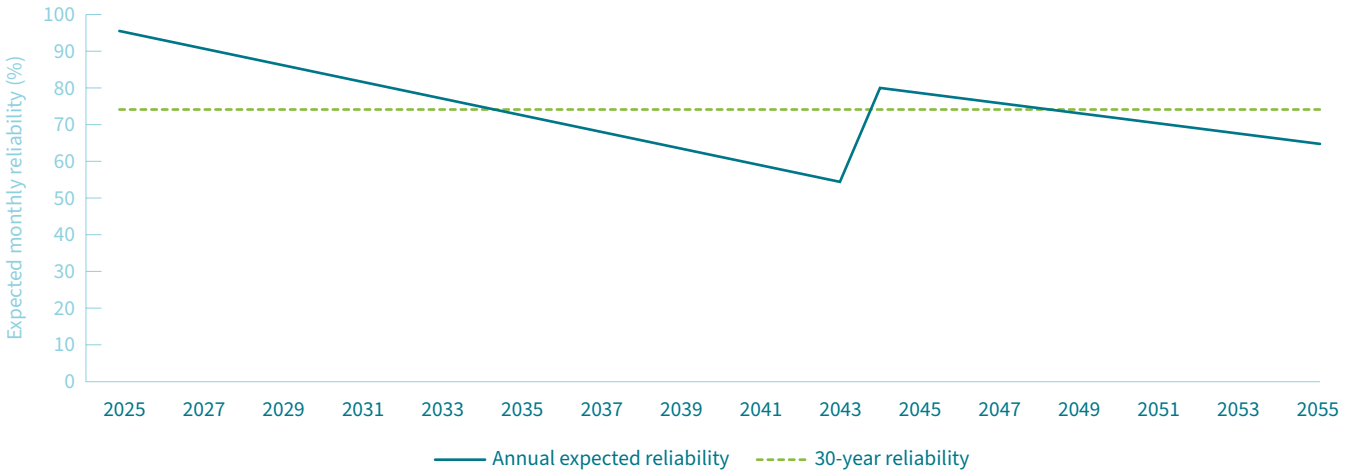


Table 9 represents the percentage of medium priority (MP%) nominal water allocation volume that is available in each water year, primarily for irrigation use. It indicates that water security for the Lockyer Valley is significantly lower than that for the Warrell Valley.

"Farmers in SEQ complain of 20-40% of time with low-no water availability."

– Community Workshop Participant (Gatton)

For regions which are linked to the SEQ water grid, a drought response is triggered when the SEQ water grid reaches 60%. At 50% capacity, mandatory water restrictions are introduced. the next major enhancement could be needed in the early 2030s but could be as late as 2037 depending on the rate of demand growth (instigated by drought or higher than expected population growth).

In response to the looming water supply challenges, Seqwater produced the *South East Queensland Water Security Program 2023*. The plan involves developing a business case for a new desalination plant and expanding the Tugun desalination plant. In addition, Wyaralong dam will be connected to the SEQ water grid. The plan also identified strategies to secure SEQ water supply into the future as shown in Figure 43.

Table 9: Lower Lockyer Valley and Warrell Valley (Scenic Rim) percentage of medium priority (MP%) nominal water allocation volume. [71]

Year	Lower Lockyer Valley MP%	Warrell Valley (Scenic Rim) MP%
2007-08	0-16	0
2008-09	13-63	5-71
2009-10	27-100	30-72
2010-11	100	56-100
2011-12	100	100
2012-13	100	100
2013-14	100	100
2014-15	81	100
2015-16	31	100
2016-17	0-10	100
2017-18	0-17	100
2018-19	0	100
2019-20	0	100
2020-21	0	19-96
2021-22	0-100	77-100
2022-23	100	100
2023-24	91	100

Figure 43: Strategies to secure SEQ water supply into the future.[72]

Reviewing SEQ Water Grid operations to ensure they are continuously optimised to match available water supplies with current and projected water demands.

Proceeding with the planning and connection of supplies from the Logan River, including Wyaralong Dam, to the SEQ Water Grid, and a new water treatment plant.

Working with power station customers to update projected water demands and ensure optimised supply and best use of the Grid.

Progressing the development of a business case to investigate the proposed upgrade of the existing Gold Coast Desalination Plant at Tugun to increase capacity.

Undertaking a detailed business case to explore opportunities for a new desalination plant for the region (likely to be required by 2035) including potential locations, capacity and timing of delivery.

Examining further opportunities to utilise the Western Corridor Recycled Water Scheme to supply to industry and agricultural customers to offset some potable demand. The Scheme will also continue to remain a drought response measure.

Working with SEQ Retailer Customers - Urban Utilities, Unitywater, Logan Water, Redland City Council and the City of Gold Coast - to update and refine water demand forecasts to inform ongoing planning and ensure timely and efficient investment in water infrastructure.

Ensuring SEQ is well placed to maintain sufficient supply during the 2032 Brisbane Olympic and Paralympic Games to meet demands from the transient population.

Bulk water drought supply objectives in the SEQ Water Security Program 2023 state that the bulk water supply system must be able to supply enough water so that:

- medium level water restrictions for residential use will not happen more than once every 10 years on average and will not restrict the average water use for the SEQ region to less than 140L for each person for each day;
- medium level water restrictions on non-residential water use that is incidental to the purpose of a business (watering a garden in the grounds of a factory for example) will not happen more than once every 10 years on average; and
- medium level or more severe water restrictions must not last longer than five per cent of the modelled time.

In December 2008, the Western Corridor Recycled Water Scheme (WCRWS) was completed and is considered Australia's largest urban drought initiative. It was developed to reduce the dependency on sources vulnerable to drought thus increasing SEQ water security. The scheme involved the construction of three advanced water treatment plants at Bundamba, Luggage Point and Gibson Island, which draw water from six existing wastewater treatment plants and produce up to 232 megalitres of purified recycled water daily. The water is then distributed via a network of pipelines measuring more than 200 kilometres in length. It has a commissioned capacity of 180 million litres per day. However, whilst the scheme was intended to supply recycled water for industry, agriculture and power station use, to date, power stations have been the only users of the water. In 2013 the WCWRS was placed into 'care and maintenance' state which translated into it being in a 15-year shutdown period. In 2018, one of the three water treatment plants was recommissioned to generate water for electricity generation. The Western Corridor Recycled Water Scheme remains an important drought supply asset, which can be considered as a drinking water supply during a severe drought when the SEQ Water Grid storage levels reach 40%.

"The Western Corridor Recycled Water Scheme will remain as an insurance policy for an extreme drought scenario where the water grid levels drop below 40%. This is the existing policy. It is already used for certain industrial purposes and will be better used for agriculture and emerging industries including hydrogen".

– Annastacia Palaszczuk, former Queensland State Premier, (10 October, 2023)

In the SEQ rural region there are 16 communities that are not connected to the SEQ water grid. They are supplied with treated water and services by Seqwater and have Drought Response Plans. These plans outline actions necessary to maintain water supplies to these local communities in drought times. The actions may include things such as demand management and water carting. Seqwater have contingency strategies in place for water supply[30].

"More peri-urban development will lead to different water issues."

– Local Government Officer

"Lack of surface water impacts our ability to maintain gravel roads. Reduced moisture in soil means they require more maintenance. We have to buy potable water, which is expensive."

– Local Government Officer

Although most commonly, people think of essential physical infrastructure such as water infrastructure (dams, weirs, pipelines, bores, etc) or roads, railways, dams, power lines and buildings, 'infrastructure and the built environment' can take many forms. There are other less obvious soft forms such digital connectivity, technical support networks and professional services ('soft infrastructure') which are equally as important – and all are affected by drought.

Access to digital services is equally important for building and maintaining drought resilience as for dealing with disaster and disruptions. A telecommunications provider noted that a major issue is the current reliance on computer delivery for many professional and government funded services. Even where there is internet connectivity, reliability remains an issue with a majority of agricultural producers stating that their connection was unreliable and the majority have to rely on expensive satellite services. This disadvantages those who have little or no capacity to use computers, the elderly and lower socio-economic sections of the community are particularly disadvantaged.

Image: Gold Goast, Queensland.

Likely future impacts (risks) of drought in this region

In 2019, the Queensland government produced the factsheet *Climate Change in the South East Queensland Region – Version*'. Using data from CSIRO, BoM and modelling from international body CMIP, they made the predictions for SEQ as shown in Figure 44.

Under both a low and high emissions scenario, the mean temperature is predicted to rise consistently across the SEQ rural LGAs. The Lockyer Valley and Scenic Rim LGAs will likely experience the greatest decline in annual rainfall in the short and long term. Under a high emissions scenario, rainfall is predicted to increase in the short term but reduce in the medium to long term.

The *South East Queensland Water Security Program 2023* states:

"If the climate-related impacts were to occur gradually over the next 30 years, the modelling indicates the existing (Seqwater) system could only sustain enough water supply to meet the desired level of service objectives until sometime between 2027 and 2032, depending on future water demands. It is important to note this does not mean SEQ will run out of water, but the reserve for severe drought is reduced."[31]

Figure 44: Climate predictions for SEQ.[73]

In the future, the state can expect:

- higher temperatures
- hotter and more frequent hot days
- harsher fire weather
- fewer frosts
- reduced rainfall in the south-east
- more intense downpours
- less frequent but more intense tropical cyclones in the north
- rising sea level
- more frequent sea-level extremes
- warmer and more acidic seas

Figure 45: Long-term Temperature and Rainfall Predictions under Low and High Emissions Scenarios.[74]

Under a climate change scenario, the major impacts shown in Figure 46 are predicted for SEQ.

Figure 46: Climate Change impacts in the South East Queensland region.[75]

Sector	Climate risks ↑ = increase, ↓ = decrease	Impacts	Potential responses
	↑ sea level ↑ fire weather ↑ heatwaves	• Erosion and infrastructure damage along the coastline • Increased maintenance costs • Increased disruption to services • Increased energy and water usage	• Consider future climate and sea-level rise when locating and constructing new developments and infrastructure • Increase road heights • Insure public assets • Design buildings to accommodate changing climate
	↑ temperature ↑ fire weather ↑ sea level ↑ sea temperature	• Increased threats to tourism infrastructure • Damage to popular environmental sites • Risks to tourists unfamiliar with conditions	• Consider climate risks in emergency planning for tourist sites • Adopt appropriate cancellation policies for extreme weather • Prepare for changing seasonal demand
	↑ inundation and flooding ↑ fire weather ↑ heatwaves ↑ tropical cyclone intensity	• Disruption to supply chains • Disruption to workplaces and infrastructure • Loss of customers during emergency recovery • Increased costs (e.g. energy for cooling people or products)	• Business continuity planning • Shifting critical infrastructure out of hazard zones • Enable flexible working arrangements • Diversify customer base and products
	↑ temperature ↑ hot days ↑ fire weather ↑ sea temperature ↓ rainfall ↑ drought risk	• Changed distribution of pests and diseases • Heat stress on livestock and crops • Farms affected by bushfire • Reduced water security	• Consider diversifying outputs or business • Consider different crop varieties and sowing times • Improve water efficiency
	↑ sea level ↑ fire weather ↑ temperature ↑ ocean acidification ↓ rainfall ↑ drought risk	• Existing threats to flora and fauna are exacerbated • Changes to habitat • Altered disturbance regimes • Changing dynamics of invasive species	• Develop strategies to respond to new and emerging diseases and pests • Increase green urban infrastructure and urban biodiversity • Link habitats to allow species to move • Consider moving selected vulnerable populations to new areas
	↑ heatwaves ↑ fire weather ↑ solar radiation	• More stress on health and emergency services • More heat-related deaths, particularly among the elderly and disadvantaged • Mental health effects • Changes in disease occurrence	• Use existing social networks to support vulnerable community members • Implement rural mental health care programs • Undertake emergency planning for schools, hospitals, services • Increase green spaces and cool zones for heat stress
	↑ inundation and flooding ↑ fire weather ↑ heatwaves ↑ rainfall intensity	• Increased fire season duration and fire intensity will affect urban fringe communities • Increased sea level and storm intensity will affect coastal communities and increase inland flooding risk	• Improve bushfire safety standards for urban development • Increase focus on community preparedness and prevention • Update risk management standards to account for increased risk from climate change

The following impacts are specifically predicted for agriculture in the region:

- Increased heat damage to horticultural crops.
- Difficulties in accessing sufficient water to meet demand, and stress on livestock.
- Possible increase in plant diseases, weeds and pests.
- Lower rainfall and increasing evaporation will cause more frequent depletion of soil moisture, reduced ground cover and lower livestock carrying capacity.
- There will be increased risk of storm damage and erosion, leading to greater nutrient runoff and loss of soil.

Analysis of future drought impacts

An analysis of future drought impacts (under a climate change scenario) on People, Economies, Landscapes and Infrastructure has been carried out. The Risk Rating Matrix used in the First Pass Assessment has been developed to provide generalised meaning to the way the risks are characterised.

The three risk categories reflecting increasing severity of consequence are:

Management risk
Anticipates management within Business as Usual or ecological natural variation. For example, adjusted hot weather working patterns, local business downturn, or supplementary feeding of stock.

Disturbance risk
Anticipates a significant adjustment to established operational responses or ecological function. For example, infrastructure damage, local business hardship, crop loss, or destocking to core breeder herd/flock.

Disruption risk
Anticipates the transformation of established patterns of activity, settlement or ecological function. For example, infrastructure loss, local business failures, repeated or unreplaceable crop or stock loss.

The Assessment's Risk Rating Matrix uses three levels of likelihood of occurrence during the next 10–year risk horizon (~2030): 'Unlikely', 'As likely as not', or 'Likely'. They also use three categories of consequence: 'Recovery', 'Adjustment', and 'Transformation'. This produces a suite of nine risk sub-categories – high, medium and low within each of the three categories.

For the first pass of risk rating, all risks have been assigned a default rating of 'Management risk- medium'. By default, all identified risks are assumed to be as likely as they are unlikely. It is also assumed that recovery from consequential harm/ impact can be achieved within established management responses, or within ecological natural variation. The risk rating is adjusted where there is material evidence or supported reasoning that the likelihood or consequence of an identified risk occurring is greater than the default. Management risks that are unlikely to occur in the 10-year risk outlook are not included.

In Table 10, the level of confidence attributed to each risk rating reflects the type of knowledge applied. Published knowledge is information published in the public domain, primarily on authoritative websites (generally Government). Expert knowledge is the view of a person or persons who have recognised specialist knowledge of the subject being risk rated. Practitioner knowledge is the view of a person or persons (who may not also have expert knowledge personally) who is/ are recognised as integrating specialist, or has strategic and experiential knowledge of the subject being risk rated.

Figure 47: Risk rating matrix.[76]

	PROBABILITY OR LIKELIHOOD		
	Unlikely	As likely as not	Likely
RECOVERY	MANAGEMENT RISK LOW	MANAGEMENT RISK MEDIUM	MANAGEMENT RISK HIGH
ADJUSTMENT	DISTURBANCE RISK LOW	DISTURBANCE RISK MEDIUM	DISTURBANCE RISK HIGH
TRANSFORMATION	DISRUPTION RISK LOW	DISRUPTION RISK MEDIUM	DISRUPTION RISK HIGH

Table 10: Assessment of risks from future droughts

At-risk asset (component or process)	Risks		Confidence (Practitioner/ Expert/ Published)
People, Culture and Community			
Local community and networks (including vulnerable groups and individuals)	**Prolonged drought:** Local out migration.	MEDIUM	Practitioner/ Expert
	Prolonged drought: Exacerbated local issues.	MEDIUM	Practitioner/ Expert
	Prolonged drought: Mental health issues and suicide.	MEDIUM	Published
Agricultural knowledge and practice	**Prolonged drought:** Loss of expertise and experience	MEDIUM	Practitioner
Landscape care knowledge and practice	**Prolonged drought:** Loss of expertise and experience	MEDIUM	Practitioner/ Expert
Community events	**Dry Years and Prolonged drought:** Loss of volunteers and desire to attend	MEDIUM	Practitioner/ Expert
Economy			
Jobs and employment	**Dry years and prolonged droughts:** Reduced availability/ diversity of local employment	MEDIUM	Practitioner
Equity – Business, assets, capital and cashflow	**Dry years and prolonged droughts:** Decreased investment	MEDIUM	Published
Borrowing capacity	**Dry years and prolonged droughts:** Diminished borrowing capacity	MEDIUM	Published
Environmental Credits – payments and accrued liabilities	**Prolonged drought and bushfires:** Loss of sequestered carbon stock	MEDIUM	Published
Insurance	**Dry years and prolonged droughts:** Increased premiums	MEDIUM	Published
Landscapes and Natural Environment			
Crops	**Heavy rain ending drought (overland flood):** Damage or loss	MEDIUM	Practitioner/ Expert
	Increasing evapotranspiration: Permanent wilting point exceedance	MEDIUM	Published
	Flash drought: Crop failure	MEDIUM	Published
	Dry years and prolonged drought: Crop failure	MEDIUM	Published
Improved pastures	**Flash drought:** Reduced pasture condition	MEDIUM	Published
	Dry years and prolonged droughts: Reduced pasture condition	MEDIUM	Practitioner/ Expert
	Increasing evapotranspiration: Permanent wilting point exceedance	MEDIUM	Published

At-risk asset (component or process)	Risks		Confidence (Practitioner/ Expert/ Published)
Livestock	**Heavy rain (overland flood):** Damage or loss	MEDIUM	Practitioner/ Expert
	Flash drought: Reduced stock condition and losses	MEDIUM	Published
	Dry years and prolonged drought: Reduced stock condition and losses	MEDIUM	Practitioner/ Expert
Landscape hydration/ dehydration	**Aridity:** Drying trend	MEDIUM	Published
Soil and surface waters oxygenation	**Flash drought:** Reduced dissolved oxygen and fish kills	HIGH	Expert
Soil erosion	**Heavy rain ending drought (overland flood):** Damage or loss	MEDIUM	Published
Carbon sequestration	**Bushfires:** Loss of carbon stock	MEDIUM	Published
Habitat cycles - ecological structure, function, stability and connectivity	**Bushfires:** Changed fire regime favouring exotic pioneers	MEDIUM	Published
	Increasing mean temps: Loss of key links or species	LOW	Published
	River flood: In-stream habitat sedimentation	MEDIUM	Published
Ecological resilience to impact and recovery capability/capacity	**Increasing mean temps:** Reduced adaptive capacity eg. fish, amphibians & Reduced extent or effectiveness of refugia	LOW	Published
Groundcover (dust storm and erosion)	**Dry years and prolonged drought:** Reduced condition or loss of living material/all surface material	MEDIUM	Published
Floodplains, riparian areas & wetlands - soils & vegetation (flooding)	**Prolonged drought:** Reduced condition or loss/dieback of vegetation	MEDIUM	Published
	Dry years and prolonged drought: Increased vulnerability to flood	MEDIUM	Practitioner/ Expert
Vegetation types and condition - fuel loads (bushfire)	**Dry years and prolonged drought:** Increased vulnerability to bushfire	MEDIUM	Published
Infrastructure and Built Environment			
Information and communication technology and data	**Drought (all):** Increased load on services	MEDIUM	Expert
Water infrastructure and security	**Dry years and prolonged drought:** Increased demand	MEDIUM	Published

Building drought resilience in our region

Lessons learnt from the past – stories of resilience

The Millenium Drought was the worst drought in a hundred years, and the region quickly learnt that solely relying on rain to supply the region with drinking water was no longer feasible.

Drought is understood in complex ways and shows variability across the SEQ region.

In response to the drought, educational campaigns were developed to promote awareness of drought, and teach communities how to reduce their household water usage. Initiatives in the campaign included providing households with shower timers to help reduce shower time and providing monetary incentives for households to upgrade their appliances to higher water rated products. The campaign saw the average water usage drop from 300 litres of water per person per day, to as low as 120 litres of water per person per day by being waterwise around their homes, gardens and businesses. Some of these behavioural aspects continue today.

In addition to this, the region invested in the development of the Gold Coast Desalination Plan and purified recycled water treatment plants, to reduce the risks of reliance on precipitation.

Existing vulnerabilities may be compounded by the severity of drought impacts including social, economic, and environmental risks. Understanding the weaknesses and building preventative strategies based on strengths is of critical importance. Recovery in the aftermath of drought is integrally linked to how well the vulnerabilities are addressed and needs to be supported by best practice transition programs and activities.

There is a need for an integrated approach to drought resilience from the micro enterprise level to regional and macro level strategies. Effective use and resourcing of existing planning and coordination mechanisms at the local level is a game changer and leads to quicker recovery.

Alignment is 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, mental health resilience activities need to be proactive and not just reactive. Recognising the need for appropriate outreach and services is critical. People in remote parts of the region are particularly disadvantaged in terms of accessing vital services. Community connectedness on all levels is critical from neighbours to service provider – client, to integrated planning across agencies and building social capital and cohesion.

Community led initiatives led to successful outcomes – building capacity of and resourcing local organisations, businesses and service providers and empowering the local leaders produced better drought outcomes.

A vision of our drought resilient region

Strong and healthy people living in a more climate and drought resilient region.

The key aspects of our vision are:

- We are informed of the potential risk of drought and climate change
- We recognise the diverse impacts of drought across the SEQ region.
- We seek opportunities to better manage and reduce the risks.
- We have strong coordination and partnerships in place to prepare and respond.
- We build resilience to adapt and recover quickly from the impacts of drought and climate change.

In examining a range of possible futures, we have contemplated three scenarios:

- **Do Nothing** – where we make little change and we continue on thinking, behaving, and making decisions in the region, much the same as we have in the past.
- **Do More** – where we learn, adapt and modify; where we increase the intensity, scope, size or frequency of our actions. This could mean more people; more money, more often, etc.
- **Do Things Differently** – where we undertake transformative change and where we move towards making systemic changes.

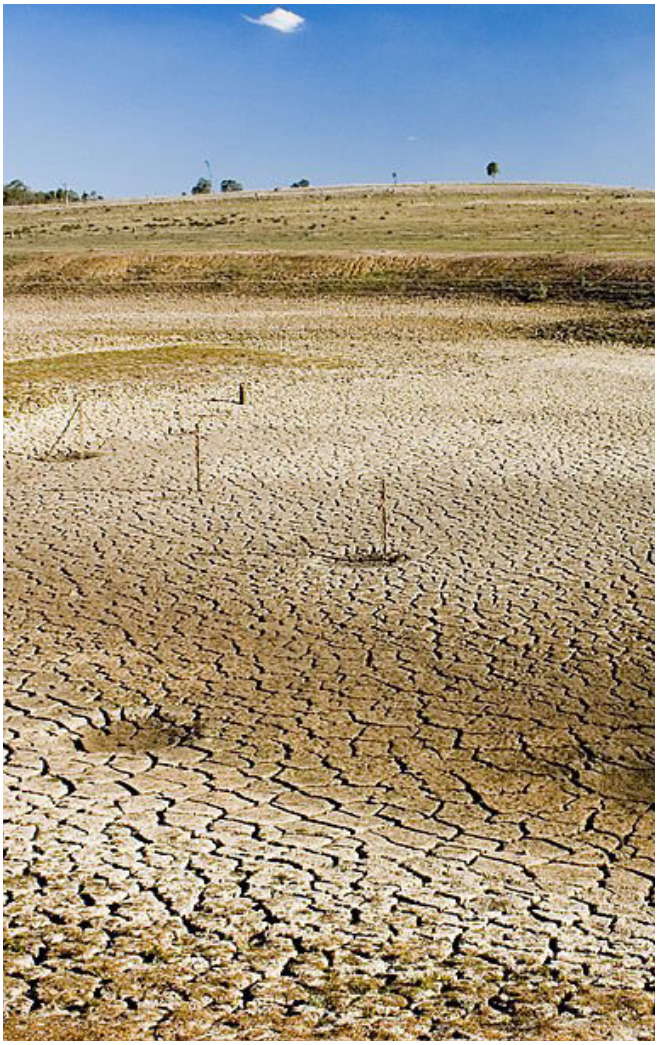


Image: Wivenhoe Dam in 2008, Queensland.

Key aims and objectives

The objectives guide a set of strategic actions for which investment cases will be developed. Development of both the objectives and priorities have been informed by community feedback and tested with stakeholders.

Figure 48: Key pillars and actions of the Drought Resilience, Adaptation and Management Policy (DRAMP) framework.[79]

Figure 49: Three pillars for the SEQ Regional Drought Resilience Plan.

Image: Purling Brook falls, Springbrook National Park, Queensland.

Establishing priorities and pathways

After reviewing and reflecting on the ideas and issues generated through the analysis from the initial engagements, stakeholders were asked to prioritise the issues from two perspectives:

1. the priority of the issue in terms of its relative importance to the region
2. the priority in terms of the importance of taking action to increase drought resilience.

Later, as part of a deliberative and reflective model of co-design, regional stakeholders further prioritised and sequenced pathways and actions prior to development of the final draft of this RDRP. This final review process was informed by additional information requested by stakeholders.

The engagement and co-designed planning processes of SEQ urban communities and stakeholders highlighted two significant and overarching issues requiring ongoing priority and attention. The need to:

- develop more effective governance structures and arrangements to develop and deliver sustainable drought resilience initiatives – this includes resolving the issue of 'ownership' of the RDRPs.
- ensure all drought support programs utilise a 'tiered support' approach that requires – at its foundation – both enterprises and communities to develop a multi-faceted drought resilience plan in order to be eligible for further support.

Through consultations with stakeholders in the region, priorities and pathways were identified aligning with existing local and regional climate-resilient strategies including some from the Queensland Reconstruction Authority's *South East Queensland Resilience Plan 2022-2024*. These priorities and pathway actions aim to mitigate and adapt to the unique drought impacts in the region. Actions aim to facilitate transformational change and increase resilience in the region. The actions aim to impact on quadruple bottom lines of economic, cultural, environmental and social outcomes.

Table 11 summarises the suggested pathways.

Table 11: Pathways and rationale

Pathway	Rationale
Pathway 1: Take a whole of region, multi-stakeholder approach to water security planning in SEQ.	Increased temperatures, seasonal rainfall variability, and increased evaporation require long term water security planning. Incorporating climate change considerations into water planning requires a whole of region multi-stakeholder approach. In the context of SEQ, climate impacts are likely to be coupled with water demand pressures arising from increased population projections. The challenges for water security include water sources, water capture/storage and levels of service (managing demand) across different SEQ areas. Three levers exist to secure water during drought including reducing demand, contingency supply and augmenting and diversifying water supply sources. Land use planning and land management as well as energy sources are critical to water security. Consultations identified that water security was a priority concern relating to drought and climate change and that more engaged coordination and planning mechanisms were needed. Working together was identified as being a critical factor in assessing, planning and taking action for long term water security for SEQ region.
Pathway 2: Build economic resilience by supporting economic diversification and adaptation to drought conditions in SEQ.	The SEQ region is the economic centre for Queensland and is an integral part of the supply chain of many regions across the State. The SEQ region generates two-thirds of the State's GRP. Consultations identified that drought impacts on the local businesses in SEQ both directly and indirectly (flow on from other region's drought events). The consultations identified the impacts of drought on diverse industries including businesses such as car wash, recreational and sporting businesses, agribusinesses and tourism. Supporting the SEQ region to thrive and be economically resilient requires significant effort for diversification, recovery and adaptation.
Pathway 3: Improve community and industry understanding and awareness of drought in SEQ.	Drought awareness and understanding is a critical first step in drought resilience. While many residents and businesses have experience of past droughts, the SEQ region has had significant population growth from other parts of Australia and overseas. Additionally, in 2021/2022, there were approximately 26,000-day trips from domestic tourists and 42,000 visitor nights from international and domestic tourists into the SEQ urban region[32]. These population groups are often unaware of the climatic conditions in SEQ and ways to mitigate the impacts of drought conditions such as heatwaves. In addition, Traditional Owner groups raised concerns that cultural considerations and generational knowledge are not well understood or considered in drought and risk mitigation policy and planning. Consultations also revealed that there was a degree of complacency in relation to drought with factors such as frequent floods leading to perceptions that there is no risk of drought. Effective communication, awareness and information strategies are needed to ensure appropriate knowledge and preparedness for drought conditions at individual, household, business and community levels.

Pathway	Rationale
Pathway 4: Improve social and wellbeing outcomes for community drought resilience.	Drought and multi-hazard stress is experienced at multiple levels including at a personal and community level. The impacts of drought are environmental, social, cultural and psychological. Mental health and wellbeing during drought emerged strongly as a theme during the consultation and was articulated by the majority of stakeholders consulted. Water scarcity, bushfire threats and heatwaves stress compound the effects of other disasters such as floods. The social impacts of drought in the SEQ urban region that have been identified include financial hardship; social cohesion impacts including conflict; relationship strains; mental health impacts; and physical health challenges. At the community level the depletion of social capital, volunteering decline and pressures on services were identified. The increase in migration from interstate also meant the level of cohesion did not exist at neighbourhood level. A strong community was seen to be an essential ingredient for mitigating the psychosocial impacts of drought and other disasters. Access to appropriate support services was outlined as being very challenging, often with limited-service options for vulnerable communities. The need for more preventative and acute health care arrangements were identified. Collaborative, place-based health and community resilience planning were seen as priorities. Supporting the capacity of community organisations and service providers in the SEQ region to ensure accessibility of support and services is fundamental to being drought resilient into the future.
Pathway 5: Manage land and natural assets for drought impacts to conserve ecosystems and vulnerable species in SEQ.	The SEQ region is one of the most diverse bioregions in Australia and contains unique urban, peri-urban and rural ecosystems which face threats and challenges. Landscape connectivity and ecosystem conservation is critical for the protection of wildlife and flora. First Nations peoples have ongoing connection to land and water and have custodianship of country. Sites of cultural significance for Indigenous communities are negatively impacted by climate events. Soil conditions, water quality and oceans are impacted by cycles of drought and floods, and compounds the impacts on the overall environment. The built-up environment in the SEQ urban region contains numerous natural systems of creeks, reserves, lakes, and wetlands which struggle during drought. The peri-urban areas of major cities in the SEQ urban region are surrounded by small-scale farming and agriculture. Consultations have shown that these farmers are often neglected in receiving support and information about factors such as drought, land management (including weeds and pests, fire management) and animal welfare (domestic animals and wildlife).
Pathway 6: Support regional governance capacity to deliver drought resilience in SEQ.	Achieving drought resilience in a complex SEQ urban and rural region demands coordinated efforts across diverse organisational sectors. Essential governance actions include aligning with established climate-resilient strategies and plans, and strategically placing drought resilience within broader regional climate resilience goals. This means building long term capacity in the region and at local government, community service, institutional and property/business levels to enhance drought resilience. In fostering collaboration and strategic governance, the region can effectively address the multifaceted challenges posed by drought, ensuring sustained environmental, social, and economic well-being.

Image: Farm land near Darlington, Queensland ©Megan O'Neill, 2020.

The Regional Strategy

ACTION PLAN

People, culture and communities

Pillar 1 – Planning and monitoring

Projected outcomes:

- Plan for drought responses, implement drought monitoring and early warning systems.
- Equitable access to water and reducing risk to vulnerable communities.
- Improved coordination and collaboration across sectors and improved monitoring and reporting for regional resilience.

Priority	Resilience activity
Take a whole of region, multi-stakeholder approach to water security planning in SEQ region *(Pathway 1).*	Establish a multi-sector stakeholder reference group that includes Traditional Owner and First Nations stakeholders to provide oversight and advice on water security planning, including water demand, decision making frameworks for use of water in drought conditions, land use planning, and water and energy infrastructure development for the SEQ urban region.
	Formally identify vulnerable communities at risk during drought and ensure availability of water to reduce the number of people exposed to drought impacts.
Effective drought impact monitoring and early warning systems are built and maintained.	Design and maintain effective drought monitoring and early warning systems, integrating climate, soil, water and socioeconomic indicators, along with real time drought assessment products that provide timely information to support decisions. Undertake an analysis of what is needed, what is existing, what are the gaps in community/social monitoring and early warning systems.

Priority	Resilience activity
Improve social and wellbeing outcomes for community drought resilience *(Pathway 4)* by effectively measuring and managing drought impacts on communities	Identify and develop key drought resilience indicators – e.g. mental health indicators of individuals, groups and communities including well-being, population trends and health service provision for the region. Carry out a literature review of existing indicators and test these with focus groups and industry groups. Develop indicators for community wellbeing during various stages of drought. Develop methods for monitoring and reporting.
	Develop drought risk profiles of vulnerable groups, including women, children, the elderly, farmers, pastoralists, marginalized communities and Indigenous groups. Identify the hardships and vulnerabilities of drought vulnerable demographic groups. Conduct project to develop drought vulnerability indicators for the identified priority groups. Promote use amongst government and social service providers.
	Identify and incentivise opportunities to upgrade and/or develop community shared spaces, including community pools, water parks, and green spaces, to support the reduction in household water usage and increase community connectedness within the SEQ urban region.

Image: Glass House Mountains National Park, Queensland.

Priority	Resilience activity
There is local capacity to identify understand and use drought management tools and services and manage drought resilience activities more effectively.	A comprehensive framework of Drought Resilience education programs – including school education programs, vocational and tertiary programs, 'professional' training programs, training for agricultural enterprises and local businesses, academic programs and research – is further developed and implemented. Carry out a review of existing available 'drought-related' education. Identify successes, gaps and key lessons learned. Develop a draft framework and develop and pilot various education programs and resources in the region.
	Form and build ongoing capacity of local climate resilience officers (CROs) and networks/teams (particularly in existing organisations) in the SEQ rural region to provide training/ information on topics such as: effective interpretation and usage of drought monitoring, early warning and short time forecasting products. Identify most relevant and effective tools with stakeholder groups. Train and build the capacity of climate resilience officers (CROs) and where possible embed these in existing support providers. Place more CROs– similar to the successful Climate Mates model – in the region by 2025 to deliver capacity building activities with local stakeholders. Identify and/or establish 'one-stop-shops' for ease of accessing support and information.
	Develop or build on existing programs to identify 'expert' 'drought partners' and support educational field visits/exchanges. Identify organisations and agencies that could be considered as 'drought partners'. Conduct pilot activities involving various drought partners (community, economy, landscape, infrastructure). Develop and share case studies (through field days, written and web-based information). Establish peer to peer learning networks inviting credible local and respected stakeholders supported by knowledge experts as required. Acquire resources to ensure ongoing extension/adoption staff to provide follow-up support after droughts have ended.
Producers and Communities are aware of available services and resources.	Promote/pilot a strategy between state and national government agencies to maximise awareness of, and coordination between, drought/climate/disaster resilience programs in order to facilitate better uptake. Map drought/climate resilience support programs available in SEQ. Establish and maintain an up-to-data website. Develop and pilot a coordination strategy for all of the SEQ region between state and national drought/climate/disaster resilient programs.
Support regional governance capacity to deliver drought resilience in the SEQ urban region *(Pathway 6).*	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, disaster management agencies.

Pillar 2 – Respond to drought events

Projected outcomes:

- Manage responses during drought by dealing with impacts, vulnerability and risk.
- Improved community mental and physical health during drought events by increasing individual and community capacity to respond.

Priority	Resilience activity
Utilise partnerships more effectively for drought resilience.	Develop a program to encourage and implement drought partnerships and exchanges. Identify organisations and agencies which could be considered as drought partners. Develop a database of these partners. Conduct pilot activities involving various drought partners (community, economy, landscape, infrastructure) – develop and share case studies (through field days, written and web-based information).
Local Communities plan for and respond to drought effectively through a structured framework.	Local communities plan for and respond to drought effectively through a structured framework. Project to produce a model drought response plan. Consult key stakeholders and include design elements from processes such as Queensland Disaster Management Arrangements (QDMA) where applicable. Investigate the value/operational design for Drought Resilience Committees. Pilot model in three local government areas of the SEQ rural region. Develop framework and model plan template.
Improve community and industry understanding and awareness of drought in the SEQ region *(Pathway 3).*	Develop inclusive and proactive consultation and communication strategies, including educational campaigns, First Nations inputs, information about impacts of drought and consistent messaging about drought preparedness relevant to the SEQ region.
	Assess the information and support needs of vulnerable communities within the SEQ region and tailor appropriate communication content and delivery strategies (e.g. multi-lingual, culturally appropriate, delivered in multi-mode channels).
	Develop support pathways for new residents moving from interstate, or overseas into SEQ region, to assist with understanding how to best manage their property, and the risk of drought to the region.
Improve social and wellbeing outcomes for community drought resilience *(Pathway 4)*.	Provide consistent and sustainable mental health and wellbeing support to the region during drought through relevant strategies in the SEQ region (e.g. accessible mental health services, subsidised water costs, food vouchers, household support for cost of living).

Pillar 3 – Build future resilience

Projected outcomes:

- Implement resilience measures to limit future impacts of drought and better respond to drought.
- Viable communities linked and resilient to stressors and shock periods.
- Improved collaboration across sectors for regional resilience.
- Improved health and wellbeing outcomes from healthy country and waterways.
- Preservation of indigenous cultural sites.

Priority	Resilience activity
Create drought policy change.	Review and analyse common themes from collective RDRPs and use these insights to develop recommendations for policy change, and better design and management of drought resilience initiative. Develop a core group of key stakeholders to advocate for change.
Drought vulnerable communities have access to a sustainable workforce.	Continue to identify and advocate for employment incentives and opportunities targeting drought vulnerable communities. In collaboration with key stakeholders, run 'think tank' forums around the region to identify potential employment opportunities and programs – prioritizing drought-vulnerable areas.
Local support services continue to develop their capacity.	Build capacity of local community not for profit, service, volunteer organisations, local disaster groups and outreach agencies, who already have formed relationships within drought impacted/ at risk communities, and empower them with resources, knowledge and information to support wellbeing of the community in response to drought and climate shocks and stresses. Develop business case for locally based support workers and services in rural areas. Develop and fund programs to educate people on how to access local support services. Look for opportunities for strengthening local regional alliances- especially between rural support services (NFP, government agencies).

Priority	Resilience activity
More effective engagement between drought affected communities and government/decision makers.	Understand barriers and/or incentives for improving engagement with government/decision makers and drought affected communities. Engage with project partners to scope and deliver a research program about the impact of government in rural and regional communities, with a focus on: • local barriers/incentives to engaging with government/decision makers. • Engagement and local decision making. • Community empowerment to influence change. • Emerging trends (e.g impact on drought communities when there is change imposed on them) Recommendations and learnings which can be used to build capacity in communities. Seek funding to conduct the project (FRRR, RDA, other sources). Consultation completed and report delivered. Outcomes to inform further RDRP projects.
	Develop and trial engagement protocols between drought affected communities and relevant governments/decision makers. Develop and deliver two pilot workshops within the region specifically working with rural communities experiencing changes imposed by government e.g. regional energy transition. Establish steering committee. Co-design engagement process in conjunction with steering committee. Develop engagement plan. Deliver pilot capacity building workshops/activities identified in design phase. Evaluate and report.
Community benefits from mixed agricultural/ renewables land use are maximised.	Develop model community benefit agreements (CBAs) for use between communities and large-scale renewables projects. Develop and promote mixed land use where agriculture and renewables co-exist. Undertake study (Australian and world best practice) on the viability of implementing community benefit agreements (e.g. the mining industry) to encourage better outcomes for local rural/regional communities from mixed land-use and large-scale renewables projects. Produce discussion paper to advocate for necessary changes. Seek projects/partners to pilot in Queensland.
Improve social and wellbeing outcomes for community drought resilience *(Pathway 4)*.	Increase the level of resources in the SEQ region for activities that support health/wellbeing and social connection/cohesion in communities before, during and after drought to support the community with change management and the transition to enhanced strategies for resilience.
	Support the development of capacity and long partnerships for place-based approaches for preventative health, health servicing, community outreach and responding to disasters in the SEQ region.
	Provide reliable air and water quality information under drought conditions and support mechanisms in place to manage arising health concerns in the SEQ region.

Priority	Resilience activity
Support regional governance capacity to deliver drought resilience in SEQ *(Pathway 6)*.	Enable mechanisms for a voice of the region platform to facilitate appropriate management of stakeholder advocacy, funding and other responses to enhance the region's drought resilience. Include drought considerations in SEQ disaster and multi-hazard management planning processes and advocate for the inclusion of drought-related risk/vulnerabilities within Queensland disaster management arrangements. Work with governments (Queensland and Australia) to identify owners of the RDRPs in Queensland. Work with local owners to identify what support they need/want to further implement the RDRP.

Image: Bli Bli, Sunshine Coast Region, Queensland.

ACTION PLAN

Economy

Pillar 1 – Planning and monitoring

Projected outcomes:

- Plan for drought responses, implement drought monitoring and early warning systems.
- Improved resilience of local businesses to the impacts of drought and compounding events including bushfires and heatwaves.
- Reduced risk to local businesses and cost risk to local Councils.

Priority	Resilience activity
Effective drought impact monitoring and early warning systems are built and maintained.	Design effective drought monitoring and early warning systems, integrating climate, soil, water and socioeconomic indicators, along with real time drought assessment products that provide timely information to support decisions. Undertake an analysis of what is needed, what is here, what are the gaps of economic monitoring of drought and early warning systems.
Drought resilience planning is integrated into everyday business planning.	Develop models of drought resilience planning, education and capacity building that can be main-streamed into business education, awareness and training programs. Work with small business groups, industry groups and 'drought experts' to identify and/or develop learning content to be integrated into new/existing training and education programs and to be made available through one-stop-shops. Develop and resource new programs with partners and trial.
Promote and adequately resource enterprise drought resilience planning.	Continue to promote drought resilience planning and increase the resources available for planning support. Promote drought resilience planning through existing delivery agencies/organisations. Increase the delivery network and funding to those networks.
Better community and regional input into management and design of drought support/relief programs.	Seek opportunities to provide input into the review and management of current and future drought support/relief programs. Seek opportunities to pursue the following initiatives: • Definitions of primary producers amongst government programs need reviews and revision. • Review current eligibility for drought support e.g. farm incomes and sub categories, small rural landholder, off farm incomes and debt thresholds. • Promote farm business resilience planning as a minimum requirement for all drought support (apart from emergency) for all enterprise types and sizes.

Priority	Resilience activity
Build economic resilience by supporting economic diversification and adaptation to drought conditions *(Pathway 2)*.	Develop plans within LGAs to build regional business development by initiating community/ business led programs to overcome business level vulnerabilities to drought. Carry out a desk top analysis of existing monitoring and forecasting frameworks that support business viability. Carry out an assessment of frameworks for appropriateness and currency for this region. Engage stakeholders and develop baselines, draft framework and pilot with three locations in the SEQ region.
	Audit and cost place-based labour market challenges facing key industries affected by drought and develop workforce plans for an adaptable and skilled workforce ready for the jobs of the future.
On-farm and local/regional businesses can better monitor and manage the impacts of drought.	Agreed vulnerability and risk profiles for agricultural/supply chain enterprises are known and used. Identify key issues and vulnerability factors. Establish stakeholder group at LGA level with local knowledge and expert advisors – develop model responses, test models and record results. Analyse rural and agricultural enterprise types under medium- and long-term climate change, land condition and market prediction scenarios to establish viability risk profiles and develop appropriate responses.

Pillar 2 – Respond to drought events

Projected outcomes:

- Manage responses during drought by dealing with impacts, vulnerability, and risk.
- Viable communities linked with thriving economies through stressors and shock periods.

Priority	Resilience activity
Build economic resilience by supporting economic diversification and adaptation to drought conditions *(Pathway 2)*.	Include drought de-risking measures in economic development strategies at LGA level and in the SEQ regional plan.
Reduce the impact of fluctuating market prices during drought.	Review and explore ways to reduce the impact of market price fluctuation during drought: cattle, vegetable, cropping and horticulture. Conduct a review and study to explore solutions to reduce the impacts of market price fluctuations, e.g. building economies of scale. Develop and implement awareness program.

Pillar 3 – Build future resilience

Projected outcomes:

- Implement resilience measures to limit future impacts of drought and better respond to drought.
- Improved coordination and regional governance of economic diversification development for drought resilience.
- Reduced risk of human impacts on landscapes and improved productivity and flow on economic impacts.
- Improved resilience of local businesses to the impacts of drought and compounding events including bushfires and heatwaves.

Priority	Resilience activity
Business diversification opportunities are maximised in drought affected areas.	Recognise drought as a major risk factor and include drought resilience in industry development and support programs for the SEQ region.
	Investigate and identify business diversification opportunities (on and off farm and town businesses) to support drought resilience in rural/regional areas. Carry out or build on existing research to examine determinants of successful on farm and rural/regional diversification. Develop model 'ecosystem' to support diversification in rural and regional communities. Review existing work and analysis of gaps, opportunities, risks, blockers to uptake and establishment costs associated with diversification opportunities. Develop set of core competencies for farm business diversification and develop training/capacity building program. Hold three business stakeholder forums in rural areas across the region to explore business diversification options. Develop and disseminate case studies of successful diversification within drought impacted areas.
The value of environmental markets is better understood.	Facilitate improved understanding of environmental markets and how they can be integrated into existing farm business frameworks and rural/regional economies in SEQ. Research and produce an independent discussion paper with a number of diverse stakeholders to reflect a variety of perspectives and approaches.
The value of drought resilient businesses is known and promoted.	Rural financial counselling operations and charter to be reviewed to offer services that aim to support new farmers who are more drought resilient. Proactive education program delivered by RFCs to producers prior to hardship. Additional RFCs to be appointed to 2 rural/regional towns in in SEQ..
Regional investment is targeted to prioritise critical projects that enhance drought resilience.	Design *build back better* approach that reduces risk, enhances preparedness and allows better recovery from future droughts by utilizing effective and targeted long-term (3-5 years) investments during the recovery, rehabilitation and reconstruction phases. Identify, design and fund priority projects in the region that focus on drought/climate resilience, e.g. improving digital connectivity across the region, improved transport connectivity, community connectivity or product storage. Ready to go business cases and plans for projects need to be developed and funding sought from both government and non-government sources.

Priority	Resilience activity
Protect SEQ's sustainable agriculture, food supply and maintain regional drought resilience.	Conduct research to understand how urban expansion is impacting on the region's sustainable agriculture, food supply and also drought resilience. Undertake a review of the extent and rate of urban expansion in the region and how this may impact on the region's food supply and drought resilience. As a priority, develop a strategy for regional agriculture to support/supply the Olympics. Develop a *Sustainable Agriculture and Food Security Strategy* for the SEQ region – see UNEP 2022 for guidance. Lobby local, state and federal government(s) to ensure that appropriate actions are included in relevant policies, strategies and local planning schemes.

Image: Surfers Paradise, Gold Coast, Queensland.

ACTION PLAN

Landscape and natural environment

Pillar 1 – Planning and monitoring

Projected outcomes:

- Plan for drought responses, implement drought monitoring and early warning systems.
- Improved environmental resilience through coordination, collaboration and actions across sectors.

Priority	Resilience activity
Effective drought impact, monitoring and early warning systems, are built, widely used and maintained.	Design effective drought monitoring and early warning systems, integrating climate, soil, water and socioeconomic indicators, along with real time drought assessment products that provide timely information to support decisions. Undertake an analysis of what is needed, how it can be extended, what is here, what are the gaps in landscapes and natural environment monitoring and early warning systems.
	Agreed environmental/landscape drought vulnerability and risk indicators are identified and utilised widely. Review current environmental/landscape indicators and work with experts and stakeholders to develop appropriate indicators (locally relevant) for drought response and management.
	Continue the development of existing, and design of new environmental/landscape monitoring and early drought warning systems. Conduct a review and stock take of existing drought monitoring and early warning systems (including technology), and identify where opportunities exist to improve coverage and uptake, integrating multi-scale climate, soil and water information.
Building drought and climate resilience and better landscape management into everyday farm management.	Develop model systems that are appropriate at enterprise and regional levels to encourage sustainable land and water use in drought-prone areas. Identify what parts of the region are considered highly drought prone. Develop and promote agricultural production systems that are drought resistant and include expert as well as traditional First Nations peoples' knowledge. Develop drought resilience land management model(s) that are customised for various landscapes across the region. Extend *Farm Business Resilience Plan* program to include sustainable natural resource management and include training.
	Education programs for existing and new landowners/landholders of all categories to build better land management knowledge and skills levels. Review of current education programs (government and non-government) available for landowners/landholders. Research with representative groups to determine what works well and what is needed. Work with experts to design model curriculum.

Pillar 2 – Respond to drought events

Projected outcome:

- Manage responses during drought by dealing with impacts, vulnerability and risk.

Priority	Resilience activity
Manage land and natural assets for drought impacts to conserve ecosystems and vulnerable species in SEQ *(Pathway 5)*.	Develop programs to support animal welfare organisations to reduce the impact on both native wildlife and domestic animals during drought, including access to veterinary services in the SEQ urban region. Develop a regional water access program for vulnerable native/migrating wildlife, including birds, kangaroos and koalas in the SEQ urban region. Develop a program for peri-urban communities to assist with/educate on appropriate land management practices, water usage, management of native flora and fauna and fire management in the SEQ urban region to enhance their property's resilience to drought.
Threatened species habitats that are affected by drought are identified and protected.	Continue to identify and monitor critical habitats for threatened species and develop actions required to protect and enhance them. Map and study critical species habitats in each region and develop strategies for protection. Monitor and identify the critical habitat changes and behavioural responses of threatened species to drought. Establish five projects that enhance critical habitats that are most threatened by the impacts of drought.
Local and Indigenous knowledge is valued and used.	Historical local wisdom and First Nations traditional skills and knowledge are incorporated into a range of practical landcare/land management education and skills programs and provide adequate resources to First Nations organisations in order to build capacity to share this knowledge. Conduct an audit of currently offered programs/courses that include traditional wisdom and First Nations skills and knowledge and widely distribute. A pilot research program identifies gaps and areas for improvement through engagement with Elders, educators and key stakeholders – design for improved overall program and specific inclusions in capacity-building programs is developed and widely distributed. Funding is sought to trial new education initiatives that include traditional wisdom and First Nations skills and knowledge in the SEQ region. Develop and trial specific programs that address the cultural effects of drought impacts on landscapes and country for Indigenous/First Nations people. Native plants/foods and traditional Landcare practices are incorporated in land regulation programs.

Pillar 3 – Build future resilience

Projected outcomes:

- Implement resilience measures to limit future impacts of drought and better respond to drought.
- Improved water quality across the region and increased protection of water through sustainable water practices.
- More efficient use of water and natural resources in the urban environment.

Priority	Resilience activity
Take a whole of region, multi-stakeholder approach to water security planning in SEQ *(Pathway 1)*	Invest in the resilience of SEQ's rivers, creeks, waterways and wetlands through supporting the implementation of Resilient Rivers initiatives: SEQ Waterways and Wetlands Investment Strategy.
Reduce the biosecurity impacts of drought.	Establish protocols to minimise/mitigate the biosecurity risk from drought. Review existing pest and weed management control plans, targeting transport of fodder as a vehicle for spreading weeds.
	Continue to monitor impacts of pest/weeds during drought periods and develop and incorporate elements into biosecurity management plans. Review biosecurity plans for currency and appropriateness and develop drought resilience actions/elements to integrate into relevant biosecurity plans.
Improve drought resilience land and water management in SEQ.	Research and design activities that minimise the cost of water management and disposal of waste products from farm water management. Commence study on farm waste recycling – with a focus on domestic, on-farm, industrial, business opportunities: economic value, cost of implementing, expected outcomes for community, business and agriculture. Pilot the implementation of the findings.
	Further develop initiatives that support and promote the recycling of dripper tape and other plastic waste material. Encourage communities in SEQ region to be ecologically drought resilient through information, education and incentives on protecting and managing environments and supporting native and drought resilient flora.
	Provide incentives for private land owners to provide refuge for wildlife and protect flora on their properties in the SEQ urban region.
	Capacity building program to build skills in better land management/sediment control practices. Map groundcover and sediment load across the SEQ region. Access LiDAR data (and fund where not available) to assess and map groundcover and sediment load in the SEQ rural region. Analyse and produce plain English discussion paper. Develop practical model course (on/line, in-person and field visit) on best-practice on-farm sediment control. Pilot and test in three rural locations in the SEQ region.

ACTION PLAN

Infrastructure and built environment

Pillar 1 – Planning and monitoring

Projected outcomes:

- Plan for drought responses, implement drought monitoring and early warning systems.
- Reduced cost of water and flow on benefits from water security.

Priority	Resilience activity
Take a whole of region, multi-stakeholder approach to water security planning in SEQ *(Pathway 1)*.	Establish a multi-sector stakeholder reference group that includes Traditional Owner and First Nations stakeholders to provide oversight and advice on water security planning, including water demand, decision making frameworks for use of water in drought conditions, land use planning, and water and energy infrastructure development for the SEQ region.
Effective drought impact monitoring and early warning systems are built and maintained.	Design effective drought monitoring and early warning systems, integrating climate, soil, water and socioeconomic indicators – along with infrastructure condition assessments (e.g. AAS27), along with real time drought assessment products that provide timely information to support decisions. Undertake an analysis of what is needed, what is here, what are the gaps of infrastructure monitoring and early warning systems. Work with BOM to develop anticipatory capacity, data and knowledge systems and resources for drought resilience.
	Invest in developing and maintaining weather and other early warning infrastructure to ensure there is coverage for all if the SEQ rural region at a local scale. Establish new A-pan evaporation measurement stations in the SEQ region. Enable aggregation of data from different sources that take into account soil types and local climatic influences.
Community awareness/ public knowledge of water use efficiency measures is improved.	Identify areas for improvement in both content and awareness/public knowledge of water use efficiency measures and encourage investment in water efficiency infrastructure. Conduct a review of current building codes and development approval processes for drought outcomes such as water tank requirements for new buildings and providing incentives for older housing stock to install tanks. Undertake research to identify ways to improve awareness, knowledge and uptake of water efficiency measures and practices including education regarding recycled water. Undertake further research and develop appropriate incentive for regional businesses to use recycled water.
Manage land and natural assets for drought impacts to conserve ecosystems and vulnerable species in SEQ *(Pathway 5)*.	Increase monitoring and regulation of environmental impacts on new building developments, such as water accessibility for wildlife whose habitats are becoming smaller in the SEQ urban region.

Pillar 2 – Respond to drought events

Projected outcome:

- Manage responses during drought by dealing with impacts, vulnerability and risk.

Priority	Resilience activity
Take a whole of region, multi-stakeholder approach to water security planning in SEQ *(Pathway 1)*.	Improve water demand management for ensuring water security and water infrastructure planning. Develop and include water infrastructure plans in the Queensland Government's infrastructure planning programs and outputs. Explore both cultural practices and new technologies that might deliver innovative water security solutions.
Adequate physical infrastructure for community drought resilience is planned, built and maintained.	Research and understand what physical infrastructure is needed to: effectively provide critical response and relief (including community relief) during times of drought, support recovery after times of drought. Undertake an analysis of what infrastructure is needed, what is currently available (and its condition), what are the gaps and/or shortcomings, and what additional infrastructure is needed. Develop a critical drought/climate infrastructure inventory and integrated map for the region. Develop a drought infrastructure maintenance and capital development plan: e.g.AAS27 which interacts with other relevant regional/state strategies. Lobby for funding and resources.

Pillar 3 – Build future resilience

Projected outcomes:

- Implement resilience measures to limit future impacts of drought and better respond to drought.
- Improved coordination and collaboration across governments to achieve water security.
- More efficient use of water and natural resources and investment into new sustainable industries.

Priority	Resilience activity
Take a whole of region, multi-stakeholder approach to water security planning in SEQ *(Pathway 1)*.	Continue to plan for and implement programs that improve water conservation behaviours by supporting existing education initiatives, developing regional waterwise messaging, and conducting campaigns to educate the community, new populations to SEQ and visitors.
	Conduct feasibility studies for more diverse water supply options, including use of recycled and storm water for potable water.
	Assess and address the challenges between water security and drought resilient infrastructure including energy, digital connectivity and housing.

Priority	Resilience activity
Regional water security is increased through development of improved technology, assets, infrastructure and governance arrangements.	Increase regional water supply options through more investment in sustainable approaches to water harvesting, locating new potential resources, building new storages, recycling, storm water for portable supply and groundwater recharge. Identify key stakeholders (government and industry) in water efficiency, recycling and re-use etc. Incentivise/promote investment in new technologies and approaches. Develop a discussion paper that explores and describes fair and transparent policies relating to water trading.
	Support water management initiatives and a review of aquifer regulations in SEQ to enhance ground water management practices across the region, to include the region's primary water authorities and retailers.
Improve Water Supply security and water efficiency in all households, businesses and public buildings in the region.	Advocate for the importance of the region's water security needs in order to support water infrastructure development.
	Implement a program to improve potable water supply connectivity to as many households as possible—where feasible and in line with water supplier's broader policies, goals and objectives. Develop a business case to improve potable water supply connectivity to as many households as possible. Work with utilities to identify and propose recycled water networks in the SEQ region.
	Implement a program to support/fund on-site water harvesting, recycling and water efficiency for as many users as possible. Implement a program that: provides and/or subsidises water harvesting/recycling for a variety of purposes and users.
	Target unconnected households and buildings first but also connected public buildings (including sporting clubs, churches etc), businesses, and households. Map unconnected households and develop a program and program to prioritise connection where appropriate.
	Build water efficiency and drought resilience into regulatory and planning systems in Queensland. Work with expert groups- universities, LGAQ, professional bodies, government agencies and others – to review current inclusion of water efficiency into planning schemes.
	Build financial capacity in farm enterprises through tax incentives to allow for the maintenance of property infrastructure during drought and increase water use efficiency. Continue the water infrastructure related subsidy schemes.
Adequate digital connectivity is available throughout drought affected communities.	Prioritise projects that improve digital connectivity in drought affected communities. Undertake two priority projects in the region that focus on improving digital connectivity in rural/ regional areas of SEQ and evaluate its impact on drought resilience.

Image: D’Aguilar National Park, Brisbane, Queensland. © Megan O'Neill, 2018.

Community partnerships and communication strategy

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.

Council of Mayors, SEQ

Council of Mayors (SEQ) represents the collective interests of local governments in South East Queensland, supporting collaborative and coordinated efforts to deliver outcomes which protect and enhance the prosperity of SEQ. With the wealth of local government knowledge and institutional frameworks, they are in a position to foster collaboration towards the implementation of the RDRP.

Partnerships

Key regional institutions

Active coordination is increasingly being developed in the region which is intersectoral. These include:

- Healthy Land and Water,
- Chambers of Commerce,
- Industry groups,
- Bureau of Meteorology,
- First Nations peoples organisations, land trusts and prescribed bodies,
- Disaster management groups,
- Health and social assistance services,
- Not for profit organisations,
- Environmental agencies, and
- Universities.

As the key DPI 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.

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 DPI 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:

- Department of Local Government, Water and Volunteers;
- Department of Natural Resources and Mines, Manufacturing and Regional and Rural Development;
- Department of State Development, Infrastructure and Planning;
- Department of Trade, Employment and Training;
- Department of the Environment, Tourism, Science and Innovation;
- Department of Transport and Main Roads; and
- Department of Housing and Public Works.

Table 12: Key engagement activities

Communication event(s)	Timing	Key audience
Ministerial announcements	Within 2 months of sign-off	General Public
Media releases – National, State, Regional and Local	As required	General Public
Plan – inclusion on websites (PDF and/or links)	Within 3 months of sign-off	General Public
Community/Sector engagement	As required	General public, business representatives, agriculture representatives, community representatives
Project implementation/MER reports	As per MER Plan, as agreed with funders	Regional partner, funding bodies
Project updates – media releases	As required	General public, DPI
Annual Report – general distribution	Annually at end of year	General public, DAFF, DPI, government agencies, non-government agencies
Annual Report – inclusion on websites (PDF and/or links)	Annually at end of year	General public, DAFF, DPI, government agencies, non-government agencies
Project completion reports	At completion of project	Regional partner, DPI, funding bodies

Monitoring, Evaluation and Learning (MEL)

Key Evaluation Questions

The Key Evaluation Questions for the Regional Drought Resilience Plan (the Plan) are:

- To what extent has the Plan been implemented and has impacted on the regional stakeholders' capacity and resources to better plan, manage and recover from climate change?
- What changes/support are/is needed to ensure that the Plan best provides an effective framework for action and stakeholders can effectively work together towards implementing those actions?

Assumptions underpinning the implementation of the RDR Plan

The Future Drought Fund Monitoring, Evaluating and Reporting Plan identified the following assumptions for the plan to be effectively implemented.

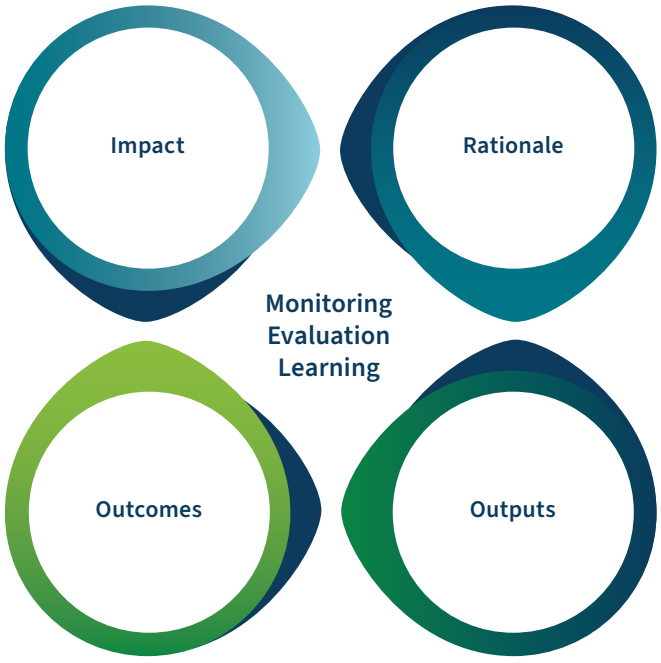
Key assumptions affecting outputs to 1–2 year outcomes

- Regional stakeholders have the capacity and capability to participate in strategic planning.
- Regional stakeholders are willing to cooperate with each other on regional planning.
- Program design is sufficient to give regional stakeholders opportunities to identify and communicate regional drought resilience needs.
- Relevant planning at other scales can be aligned.
- Regional communities are motivated to take ownership of completed plans and actively seek to implement them.
- Communities are willing to share learnings with other regions.
- There are sufficient learnings to inform future program design.

Figure 50: 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?

Key assumptions affecting outcomes from 2+ years

- Supporting consortia of local governments/stakeholders representing a region will result in changes in practice through those regions.
- There are sufficient opportunities for regions to implement elements of plans.
- Plans contain implementable activities to build drought resilience across Australia.
- Regions continue to review, update and implement their plans.
- These assumptions will need to be monitored during the implementation phase to provide feedback and highlight areas that require further intervention.

Monitoring progress and evaluating outcomes

Table 13 is based on the relevant Future Drought Fund Monitoring, Evaluation and Reporting Framework indicators and the actions developed in this Regional Drought Resilience Plan. The Plan includes a number of indicators against identified actions.

Table 13: Key monitoring indicators

FDF Standard Indicators	Specific Regional Indicators	Evaluation Approach
Outcome level: Impacts 4+ years		
• Agricultural landscapes are functional and sustainable, with healthy natural capital (environmental resilience). • Agricultural businesses are self-reliant, productive, and profitable (economic resilience). • Agricultural communities are resourceful, adaptable, and thriving (social resilience).	**Strong and healthy people living in a more climate and drought resilient region.** • **People, culture and communities:** Communities' drought resilience has improved. • **Economy:** Business owners are pursuing opportunities to increase financial security of their business before, during and after drought. • **Landscape and natural environment:** Land managers are implementing land management practice change to improve the resilience of the landscape and the natural environment to drought. • **Infrastructure and built environment:** Investing in building, maintaining and improving infrastructure has contributed to increasing the communities' drought resilience.	These longer-term impacts are best captured at a national level by the federal Government through ABARES surveys and other national statistics based on a benchmark and taking into account climate, market and other influences impacting on this outcome.

FDF Standard Indicators	Specific Regional Indicators	Evaluation Approach
Outcome level: Long-term outcomes 4+ years		
• Stronger connectedness and greater social capital within communities, contributing to wellbeing and security. • Communities implement transformative activities that improve their resilience to drought. • More primary producers preserve natural capital while also improving productivity and profitability.	**Key Aims and Objectives** • A regional drought surveillance program is in place that monitors and analyses key indicators of current and emerging environmental (meteorological and landscape), social and economic conditions, which are markers of drought. • There is widely shared and well-informed regional engagement with managing drought risk for long-term community resilience. • The region comes together to build drought resilience. • Widespread enterprise level drought risk management is established across the region. • Measures are implemented to limit impacts of drought and better respond to drought. • Adequate and appropriate drought risk management essential infrastructure in place and stress tested for times of drought.	*Critical to regional-level monitoring of, and improvement to, the Plan will be an on-going regional oversight group (ROG) – to be nominated, and comprising of the Plan owner(s) and key stakeholder representatives. This group would have the role of initiating actions in line with the plan, reviewing progress against the plan objectives and making changes to the Plan as needed to maintain its relevance and usefulness.* While some of these indicators will be captured in national surveys and statistics as above, monitoring actions that should be taken at regional level by the ROG would include: • Monitoring and reporting of regional level indicators that are captured as part of Local Government surveillance, surveys and annual reporting. • Liaising with the regional Drought and Innovation Hub to ensure that key indicators for the region are captured and provided over time. • Recording case studies of changes made and benefits evident as a result of actions taken from the implementation of the Plan.
Outcome level: Success measures and intermediate outcomes 2–4 years		
Actions have been taken based on the plans • The majority of plans have had elements implemented. • Primary producers and businesses supported to improve their sustainability and resilience. **Decisions have been made to implement** • Regional representatives have considered and planned incremental, transitional and transformational opportunities to strengthen resilience. • Identified actions, pathways and opportunities (including innovative and transformative) to improve regional drought resilience, mitigate risks and adapt to change.	**The achievement of Key Pillars to underpin the achievement of objectives are:** a) Drought monitoring, early warning systems and plans for responses are being developed and refined. b) Those most vulnerable and at risk of droughts have been identified and steps taken to address their vulnerability. c) Measures have been initiated to limit the impacts of and respond better to drought. **Action steps have been taken in line with the Action Plan tables around the key outcome areas of:** • People, culture and community • Economy • Landscape and natural environment • Infrastructure and built environment	**Monitoring actions that should be taken at a regional level by the ROG include:** • Recording of steps taken, actions initiated, and resources gained that have been triggered by the Plan framework, strategies and planned actions. • Annual reporting and review of plan implementation, engagement, participation, actions, barriers and opportunities to regional stakeholder organisations and government – and changes to the Plan made as needed to best meet regional needs. Should external evaluation be undertaken, as well as taking the national data, above information and annual review into account (against planned actions), a range of regional stakeholders should be interviewed/surveyed to gauge their understanding, engagement and actions they have taken as a result of Plan guidance and initiatives.

FDF Standard Indicators	Specific Regional Indicators	Evaluation Approach
Outcome level: Success measures and intermediate outcomes 2–4 years *continued*		
• Communities use relevant data and information to better understand their resilience to plan for drought. • **Capacity has been developed** • Regional leaders are in a stronger position to implement strategic actions, adapt to change and take advantage of opportunities to build economic resilience as they arise. • Partnerships, networks and engagement are built between stakeholders managing natural resources. • Increased community understanding of the region's current and future drought resilience, considering the region's unique economic, environmental and social characteristics. • Natural resource management capability is improved across region. **Regional Stakeholders are involved** • Plans have buy-in from key stakeholders in the region. • The number of, and participation in, local networks and programs to enhance drought resilience increases. • Communities share knowledge, collaborate and partner with government more often to build drought resilience. • Greater sharing of learnings related to drought resilience between communities.	Implementation steps have been undertaken as per the Communication engagement table (Table 12).	**Types of questions should include:** • Their level of awareness and understanding of the Plan – and how aware they think others are. • How invested they are in engaging with other stakeholders around the Plan implementation. • How confident they are that they have the skills and resources to make changes highlighted. • What decisions and/actions they have taken – or aware of – that have been initiated as a result of the Plan. • How the Plan has impacted on extra resourcing or support to the region to improve drought resilience. • How they think the Plan has added value and made a difference in increasing drought resilience in the region. • What is working and what needs to change with respect to the Plan and its effective on-going implementation. • Organisations nominated for actions in the Plan including for the communication engagement activities, should also be interviewed to review what was undertaken, how it was done, what response was gained and, if not, why not. • Case studies should be further captured/ developed to understand/demonstrate the program logic/the theory of change and inform recommendations for changes/support needed to maximise the Plan effectiveness. A critical part of an external review would be find an on-going ROG who were invested in using the Plan as a framework towards improved resilience, outputs and actions arising and how well this was working towards the Plan's objective. Such external reviewing should be taken annually for the first three years (pilot regions) to provide lessons for plan development and implementation in other regions, then every three years.

Endnotes

1 Irvine, S. A. (2021), '*Mapping drought declaration areas from 1936 to 1964 for Queensland, Australia*', The Rangeland Journal 3(3)

2 Red Cross Queensland, '*Not If…but When… Helping Queensland communities plan for the Challenges of Drought*' (2021)

3 Queensland Reconstruction Authority, '*Drought Resilience Strategies*' (2021) and Resilient Queensland in Action (2020)

4 Commonwealth Scientific and Industrial Research Organisation (CSIRO), '*Resilience Adaptation Pathways and Transformation Approach*' version 2 (2019)

5 World Bank (2013) *Building Resilience: Integrating Climate and Disaster Risk into Development*, Manila.

6 UNDDR, '*GAR special report on Drought*' (2021)

7 Bureau of Meteorology, '*Climate Change Glossary*' (2022)

8 Department of Primary Industries, '*Local Drought Committee Guidelines*' (2021)

9 World Bank, '*Building Resilience: Integrating Climate and Disaster Risk into Development*' (2013)

10 CSIRO, '*Drought Resilience Mission -Impact*', https://www.csiro.au/en/about/challenges-missions/drought-resilience (2021)

11 CSIRO, Australia's changing climate, State of the Climate 2018 (2018)

12 Queensland Government (Department of SDI, 2023)

13 HLW, 2024

14 Bureau of Meteorology, 2019

15 Extracted from the 'Regional Weather and Climate Guides produced by BoM, CSIRO and FarmLink 2019

16 Long Paddock

17 https://www.tatsipca.qld.gov.au/_media/documents/our-work/multicultural/communities/diversity/diversity-figures-report-2021.pdf

18 Multiple sources:

- Economy.id. (2022). Brisbane economy profile. Economy.id. https://economy.id.com.au/
- Economy.id. (2022). Gold Coast economy profile. Economy.id. https://economy.id.com.au/
- Economy.id. (2022). South East Queensland economy profile. Economy.id. https://economy.id.com.au/
- Committee on Electronic Information Communication. (2022). Australia GDP. Committee on Electronic Information Communication.
- CEIC Data. (2021). Australia GDP: Queensland. CEIC Data. https://www.ceicdata.com/en/australia/sna08-gross-domestic-product-and-gross-domestic-product-per-capita-by-state/gdp-queensland#:~:text=Australia%20GDP%3A%20Queensland%20data%20was,368%2C192.000%20AUD%20mn%20for%202021
- World Economics. (2022). Australia's gross domestic product. World Economics. https://www.worldeconomics.com/Country-Size/Australia.aspx#:~:text=The%20official%20estimate%20for%20Australia's,date%20GDP%20base%20year%20data.

19 Multiple sources:

- Profile.id. (2022). South East Queensland economy profile. Profile.id. https://profile.id.com.au//
- Economy.id. (2022). Logan economy profile; Sunshine Coast economy profile; Redland economy profile. Economy.id. https://economy.id.com.au/
- ACT Government, Treasury. (2022). Gross state product (GSP). ACT Government, Treasury. https://www.treasury.act.gov.au/__data/assets/word_doc/0018/416214/GSP.doc/_recache

**Resource document was published under this department name. Department names may have since changed.*
For more information, please refer to A summary of changes to departments of government *.*

20 Seqwater. (2025). *SEQ Water Grid.* https://www.seqwater.com.au/seq-water-grid

21 Seqwater. (2023). *South East Queensland Water Security Program 2023.* https://www.seqwater.com.au/sites/default/files/2023-10/J018969%20Seqwater%20Water%20Security%20Program%20FINAL%201-3_0.pdf

22 Multiple sources:

- Seqwater. (2025). *SEQ Water Grid.* https://www.seqwater.com.au/seq-water-grid
- Seqwater. (2023). *South East Queensland Water Security Program 2023*. https://www.seqwater.com.au/sites/default/files/2023-10/J018969%20Seqwater%20Water%20Security%20Program%20FINAL%201-3_0.pdf
- Seqwater. (2023). *2023 Water Security Program Annual Report.* https://www.seqwater.com.au/sites/default/files/2024-04/2023%20Water%20Security%20Program%20Annual%20Report_0.pdf

23 HLW,2024

24 IPCC 2022

25 CSIRO (2023)

26 Boult and Jackson 2019; Jackson et al. 2020

27 Healthy Land and Water (2021), South East Queensland Natural Resource Management Plan (2009–2031) – 2021 Update, Healthy Land & Water.

28 HLW 2019

29 Seqwater

30 Water Service Providers Partnership: Drought Response Plan 2023 Seqwater)

31 Seqwater, 2023

32 Economy.id. (2022). Brisbane, Gold Coast, South East Queensland economy profile. Economy.id. https://economy.id.com.au/

33 Queensland Reconstruction Authority

34 Adapted from Mellor, 2022.

35 Queensland Reconstruction Authority

36 Queensland Regional Drought Resilience Planning

37 Queensland Reconstruction Authority

38 Department of Primary Industries, Queensland Government

39 Australian Bureau of Statistics (2021)

40 Department of Primary Industries, Queensland Government

41 Long Paddock

42 Economy.id. (2022). Brisbane, Gold Coast, South East Queensland economy profile. Economy.id. https://economy.id.com.au/

43 Economy.id. (2022). Brisbane, Gold Coast, South East Queensland economy profile. Economy.id. https://economy.id.com.au/

44 Economy.id. (2022). Logan economy profile; Sunshine Coast economy profile; Redland economy profile. Economy.id. https://economy.id.com.au/

45 Economy.id. (2022). Logan economy profile; Sunshine Coast economy profile; Redland economy profile. Economy.id. https://economy.id.com.au/

46 https://www.seqwater.com.au/sites/default/files/2025-03/DCS1197%20Seqwater%20SEQ%20Water%20Grid%20Map%20MASTER%20as%20at%2006%2003%202025%20final_0.pdf

47 Graph adapted from Seqwater. (2025) https://www.seqwater.com.au/sites/default/files/2025-06/J023017%20Water%20Security%20Update%20MAY%2025_02.pdf

48 Multiple sources:

Seqwater. (2018). Planning for your water future – Brisbane. Seqwater. https://ehq-production-australia.s3.ap-southeast-2.amazonaws.com/91c3ec6b9c1bd7b68a941b28e5c31efffd19d071/documents/attachments/000/107/173/original/Brochure_-_Realities_of_Rain_-_Planning_your_water_future_-_Brisbane.pdf

Seqwater. (2018). Planning for your water future – Gold Coast. Seqwater. https://ehq-production-australia.s3.ap-southeast-2.amazonaws.com/6181e298752e12eb9ef635f5b7fec5f60226b599/documents/attachments/000/100/542/original/Brochure_-_Realities_of_Rain_-_Planning_your_water_future_-_Gold_Coast.pdf

Unitywater. (2018). Where your water comes from. Unitywater. https://www.unitywater.com/where-our-water-comes-from

Seqwater. (2023). Water security status report November 2023. Seqwater. https://www.seqwater.com.au/sites/default/files/2023-12/Water%20Security%20Status%20Report%20November%202023%20Final.pdf

Seqwater. (2018). Planning for your water future – Logan. Seqwater. https://ehq-production-australia.s3.ap-southeast-2.amazonaws.com/2fa6a3f5ddc41df8fed61f66d01332f241d64d92/documents/attachments/000/098/099/original/Brochure_-_Realities_of_Rain_-_Planning_your_water_future_-_Logan.pdf

49 Seqwater. (2023). S*outh East Queensland Water Security Program 2023.* https://www.seqwater.com.au/sites/default/files/2023-10/J018969%20Seqwater%20Water%20Security%20Program%20FINAL%201-3_0.pdf

50 idcommunity (using ABS data)

51 Queensland regions data (Department of Agriculture and Fisheries)

52 *Shaping SEQ - Regional plan 2023*, Queensland Government)

53 BoM, 2023

54 Earth Systems and Climate Change Hub, National Environmental Science Program.

55 Adapted from: Parker, T. and Gallant, A. (2021). *'Flash droughts' can dry out soil in weeks. New research shows what they look like in Australia.* https://theconversation.com/flash-droughts-can-dry-out-soil-in-weeks-new-research-shows-what-they-look-like-in-australia-161286

56 Pers com David Coburn Centre for Applied Climate Science (USQ)

57 The Long Paddock

58 Adapted from source: Allen Consulting Group, based on Schröter and ATEAM consortium 2004

59 University of Canberra Regional Wellbeing Survey

60 ABS Regional Data

61 Adapted from CSIRO.

62 idcommunity (using ABS data)

63 Water for the Lockyer Detailed Business Case, Jacobs Australia (2020).

64 Water for the Lockyer Detailed Business Case, Jacobs Australia (2020).

65 Long Paddock

66 DES (WetlandInfo)

67 Seqwater (historic dam levels)

68 Lockyer Valley and Somerset Water Security Scheme Detailed Business Case (2020 Jacobs)

69 Water for Warrell Irrigation Project Feasibility Study Report (Jacobs 2021)

70 Lockyer Valley and Somerset Water Security Scheme Detailed Business Case (2020 Jacobs)

71 Seqwater

72 Seqwater

73 Queensland Government (Department of Environment and Science). (2019). *Climate change in the South East Queensland region.* https://www.qld.gov.au/__data/assets/pdf_file/0023/68126/queensland-climate-change-impact-summary.pdf

74 Long Paddock

75 Queensland Government (Department of Environment and Science). (2019). *Climate change in the South East Queensland region.* https://www.qld.gov.au/__data/assets/pdf_file/0023/68126/queensland-climate-change-impact-summary.pdf)

76 Adapted from the Burnett Mary Regional Group

77 Fisher, O. J., McGrath, K., Grogan, C., Cockshaw, W. and Leggatt-Cook, C. (2024). *Care navigation addresses issues of telemental health acceptability and uptake in rural and remote Australian communities.* Plos one, 19(4), e0298655

78 Fisher, O. J., McGrath, K., Grogan, C., Cockshaw, W. and Leggatt-Cook, C. (2024). Care navigation addresses issues of tele-mental health acceptability and uptake in rural and remote Australian communities. Plos one, 19(4), e0298655

79 Adapted from Crossman, 2018