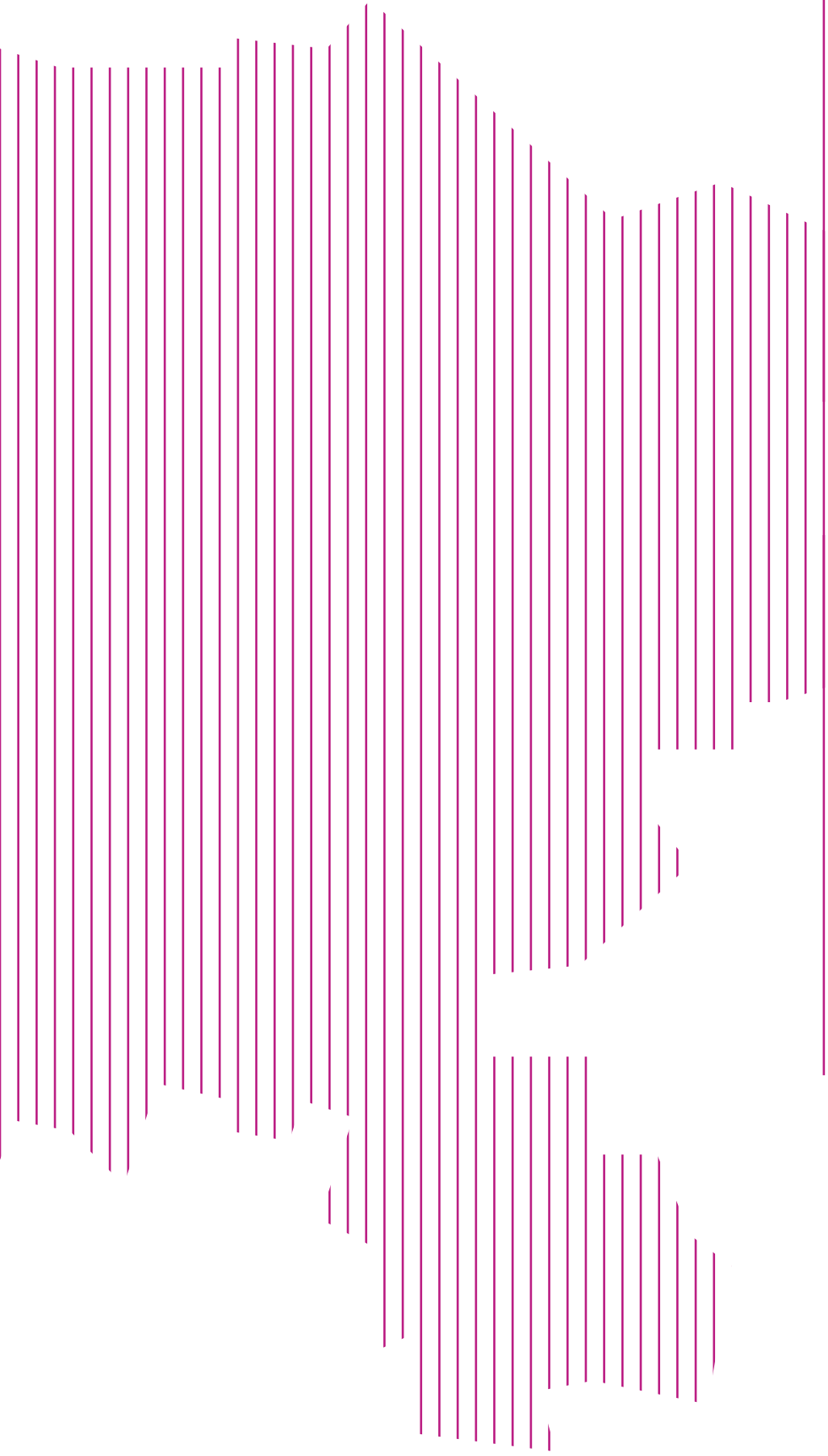


LODDON CAMPASPE DROUGHT RESILIENCE PLAN

Acknowledgement of Country

We acknowledge and respect Victorian Traditional Owners as the original custodians of Victoria's land and waters, their unique ability to care for Country and deep spiritual connection to it.

The recognised Traditional Owners of the Loddon Campaspe region include the Dja Dja Wurrung, Taungurung, Wurundjeri Woi Wurrung, Baraba Baraba and Yorta Yorta Peoples.

We honour Elders past and present, whose knowledge and wisdom have ensured the continuation of culture and traditional practices.

We are committed to genuinely partner, and meaningfully engage, with Victoria's Traditional Owners and Aboriginal communities to support the protections of Country, the maintenance of spiritual and cultural practices and their broader aspirations in the 21st century and beyond.

This Plan was jointly funded by the Victorian and Commonwealth Government under the Future Drought Fund.

Preface

Drought causes significant financial, social and environmental impact on people, communities and the region. The Loddon Campaspe region is committed to taking steps now to ensure well considered strategies are in place to prepare for and manage through future dry periods.

The Loddon Campaspe Drought Resilience Plan (the Plan) is one of 9 regional drought plans developed in Victoria, as part of the Regional Drought Resilience Planning (RDRP) Program, under the Future Drought Fund. Loddon Campaspe communities are committed to taking steps now to prepare for and respond to dry seasonal conditions and droughts.

The aim of the Plan is to empower and enable communities to collectively identify and address their needs, so that they can be better prepared for and able to manage future dry seasonal conditions and droughts. The Plan may also inform future investments in building regional drought resilience.

The $5 billion Future Drought Fund (FDF) invests in a wide range of drought resilience initiatives to help Australian farms and communities prepare for the impacts of drought. These are implemented through a suite of programs under 4 focus areas:

1. Better climate information
2. Better planning
3. Better practices
4. Better prepared communities

The RDRP Program is included under 'better planning' focus area. However, regional drought resilience includes elements that cover all focal areas. The Loddon Campaspe Plan therefore bridges all FDF categories, informing future investment in actions that build regional drought resilience.

This Plan is founded on historic and recent experiences of drought within the region, as well as relevant existing regional strategies, programs and activities that aim to manage, mitigate or adapt to a drier climate. All 9 plans were developed using a consistent methodology across Victoria:

- **Drought impact analysis** to understand the prevalence, severity and frequency of past, present and future drought impacts
- **Stakeholder engagement** to identify and collate issues and develop actions to build drought resilience.

Photo: Coliban Water

Contents

Collaboration

The Plan is the culmination of a co-design process led by the Loddon Campaspe Regional Reference Group, with wider community engagement sought through stakeholder interviews and the open online platform, Engage Victoria. Members of the Reference Group and other stakeholders were drawn from a broad range of organisations and sectors within the region that have responsibilities for, or interests in, agriculture, water, liveability, regional and local communities, and regional development. Consultation with a broad range of regional stakeholders was critical to the development and aggregation of themes and actions that will achieve the overall vision for the region.

Organisational members of the Reference Group:

Adapt Loddon-Mallee

Agriculture Victoria

Bendigo Youth Council

Birchip Cropping Group

Campaspe Shire Council

Central Goldfields Shire Council

Coliban Water

Department of Energy, Environment and Climate Action

Department of Families, Fairness & Housing

Department of Health

Djaara (Dja Dja Wurrung Aboriginal Corporation)

Emergency Recovery Victoria

Goulburn Murray Water

Greater Bendigo Council

Loddon Campaspe Regional Partnership

Loddon Shire Council

Macedon Ranges Shire Council

Mount Alexander Shire Council

North Central CMA

Rural Financial Counselling Service

The Reference Group met several times between July 2022 and December 2023. The members guided the RDRP development approach, identified key regional strategies and plans containing existing public participation summaries and actions related to drought resilience building, provided input on past regional drought impacts, identified stakeholder groups to be engaged, and contributed to the contents of the Plan.

Individual meetings with key stakeholders were also held in person or using online tools, and input from these meetings was used to populate the initial thematic framework. This framework was then used in a series of online workshops, inviting representatives of stakeholder groups identified by the Reference Group to provide feedback. The improved regional thematic framework was then opened for broad public engagement using the Engage Victoria online platform.

The process was paused from October 2022 to April 2023 due to major flooding in the region, which shifted the focus of Reference Group members and stakeholder groups to flood relief and recovery.

Development of the Plan was facilitated by Agriculture Victoria and jointly funded by the Victorian and Commonwealth Government under the FDF.

Summary

The long-term objectives of the Plan are to build regional, community and individual resilience to drought through recognising and mitigating risks, strengthening preparedness, and recognising opportunities for change that will improve the economic, environmental and social opportunities in the Loddon Campaspe region.

A list of actions was developed and agreed by the Loddon Campaspe Reference Group. The actions were grouped in themes and contribute to specific outcomes that together build regional drought resilience.

The **key themes** and corresponding **outcomes** that emerged through the Plan's development are:

- **Collaboration, knowledge gathering and sharing:** Regional networks are maintained to ensure open channels of communication, knowledge sharing and promotion of engagement from a diverse representation of sectors, communities and industries.
- **People and community wellbeing:** Drought resilience at the individual and community level is strengthened by supporting physical and mental wealth, peer-support and informal support groups, grassroots initiatives, and initiatives and actions by regional organisations and agencies.
- **Empowered communities:** Communities are empowered to act and are supported where requested. Communities have local and regional leadership and are connected to regional and state networks to ensure a shared responsibility for improved drought resilience.
- **Rural economy:** The rural economy remains vibrant during droughts and drought impacts are minimised through resilience building before droughts.
- **Infrastructure:** Infrastructure at an individual, community and regional level is sufficient to support increased drought resilience.
- **Farm management:** Primary producers are supported to maintain production systems during drought that are environmentally and financially sustainable and resilient.
- **Environment and natural resources management:** Best management principles and practices are recognised and adopted by land managers to minimise drought impacts and ensure the natural environment can rebound effectively.

INTRODUCTION

Drought is a recurring feature in the Australian landscape, and has been for thousands of years. However, the impacts of climate change are increasing the frequency and severity of drought.

The Commonwealth and Victorian governments have partnered to support regional areas to ensure they are better prepared to manage and build resilience to future droughts, with an increasing focus on adaption and change. The Commonwealth Drought Response, Resilience and Preparedness Program's vision is to have farm businesses and rural communities that are prepared for, and capable of managing, drought in pursuit of a prosperous and sustainable future.

This Loddon Campaspe Drought Resilience Plan seeks to facilitate a cohesive and coordinated approach to building community drought resilience. The Plan aims to build:

- economic resilience for an innovative and profitable agricultural sector
- environmental resilience for sustainable and improved functioning of landscapes
- social resilience for resourceful and adaptable communities

Given the existing work related to drought and water management in the region, one of the main objectives of the Plan is to align, strengthen and coordinate existing drought-related strategies, plans, actions and aspirations to increase overall drought resilience in the region.

The Plan was developed through engagement with regional organisational stakeholders and local community groups. The Plan aligns with Commonwealth and Victorian government principles and approaches to drought preparedness and response. The Plan supports communities of the Loddon Campaspe region to be better prepared and more responsive to future drought events. The Plan leverages regional strengths and address vulnerabilities in the region's ability to prosper during dry seasons and droughts.

Agriculture Victoria coordinated the development of the Plan, utilising a Reference Group comprised of representatives from community (including Traditional Owners), industry and government. Consultation with other community groups with an interest in drought resilience was also undertaken. Reference Group members and their affiliated organisations guided drought resilience thinking to ensure that the Plan will accommodate changes through adaptive planning and community engagement processes. Workshop-style meetings were also held by the Reference Group to guide development of Plan content and actions. The Group also provided access to local reports, regional priorities, organisational strategies and ensured coordination of place-based strategies. Additional regional stakeholders were engaged to inform development of the Plan, and public consultation was completed through an online platform.

This Plan considers the broad need for the regional community, environment and economy to be resilient to drought.

Regional Vision

The vision for this Plan is to support the Loddon Campaspe region to maintain productive and healthy communities during times of drought, through preparedness and anticipation of regional changes.

Regional principles, drivers of change and goals

The Plan's goal of building drought resilience is based on a set of guiding principles. These principles guide actions for the Loddon Campaspe region and are:

Self-reliance and risk mitigation: drought is not an exceptional circumstance, but a risk to be managed along with other business threats. Primary producers and other small businesses mitigate the impacts of drought by understanding and reducing risk and impacts.

Encourage preparedness: investment should focus on encouraging preparedness in good years and support community connectedness and wellbeing in times of drought.

Collaboration and co-design: drought preparedness and resilience programs should be co-designed with Local Government Authorities (LGAs), Traditional Owners and other relevant stakeholders to ensure they effectively address local community priorities. Co-design means that the programs are developed *with* local stakeholders –not by an external party for local stakeholders.

Improved decision-making: business skills and improved access to timely drought-related information is essential to support evidence-based decision-making for businesses and communities.

Integration: foster collaboration between organisations to deliver timely, place-based, integrated services which simplify processes for, and access by, users and reduce stress.

Leadership and community networks: the Loddon Campaspe region has a strong record of collaboration and community leadership. Drought programs should be designed and delivered in partnership with those established networks.

Traditional Owner Self-Determination: Traditional Owners will be provided opportunities to be involved in, and have their self-determined goals reflected in, drought preparedness and resilience activities.

The Loddon Campaspe is a region in constant flux and development. Drivers of change identified for the region include:

- More lifestyle and hobby farms in the southern and central area of the region
- An influx of new populations from other urban areas of Victoria with less experience of drought
- Competition in water markets and trading with changing intensity of water demand and use across the region
- Climate change and different greenhouse gas profiles impacting plant growth
- Emerging carbon markets and opportunities for land managers to participate in them, including in carbon sequestration through revegetation and land management practices
- Employment demographics, with:
  - expected growth in food product manufacturing (key export for the region)
  - an expected decline in employment in agriculture
  - strong employment growth in health care, accommodation, food services and construction.

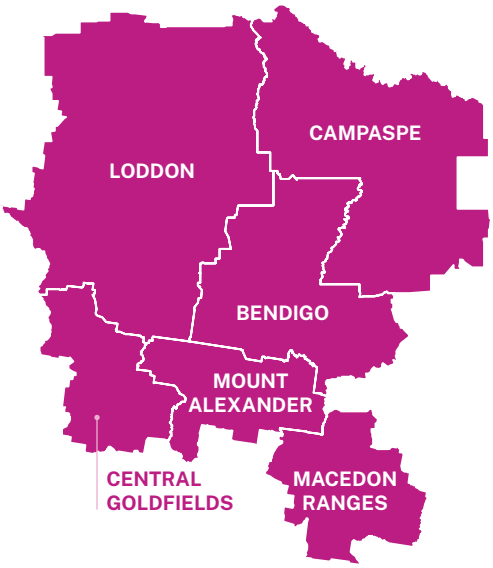
A SNAPSHOT OF THE LODDON CAMPASPE

In this plan, the Loddon Campaspe region is defined by the Loddon Campaspe Regional Partnership boundary and includes the 6 LGAs of Loddon, Campaspe, Central Goldfields, Mount Alexander, Macedon Ranges, and Greater Bendigo.

The Loddon Campaspe region covers 19,100 square kilometres (8%) of Victoria and is characterised by several distinct areas. The southern part of the region extends to the Macedon Ranges and incorporates towns such as Macedon, Kyneton and Gisborne. The northern part forms part of the New South Wales-Victorian border along the Murray River, with Echuca being the main regional centre in the far north-east of the region. The western reaches of the region border the Mallee and Wimmera and are primarily rural. The regional hub of Bendigo is in the centre of the region, with several moderately sized towns such as Castlemaine, Gisborne and Maryborough spread throughout the surrounding LGAs (Aither, 2019).

The Loddon Campaspe region has a diverse population and a strong economy based on agriculture, retail, health and manufacturing. Many migrant and refugee communities have settled nearby, with 1 in 10 people born overseas (EY, 2019).

LOCAL GOVERNMENT AREA	SHIRE SERVICE CENTRES	AREA (KM^2)	POPULATION (2020)	ECONOMIC OUTPUT ($ MILLION)
Bendigo	Bendigo, Heathcote, Huntly, Marong	3,000	119,000	18,646
Macedon Ranges	Kyneton, Gisborne, Romsey, Woodend	1,748	50,000	5,139
Campaspe	Echuca, Kyabram, Rochester, Rushworth, Tongala	4,519	36,500	5,479
Mt Alexander	Castlemaine, Maldon, Newstead	1,530	20,000	2,614
Central Goldfields	Maryborough, Talbot	1,533	13,000	1,261
Loddon	Wedderburn, Serpentine	6,696	7,500	984



POPULATION
(2020)

249,200

POPULATION GROWTH
(2011–20)

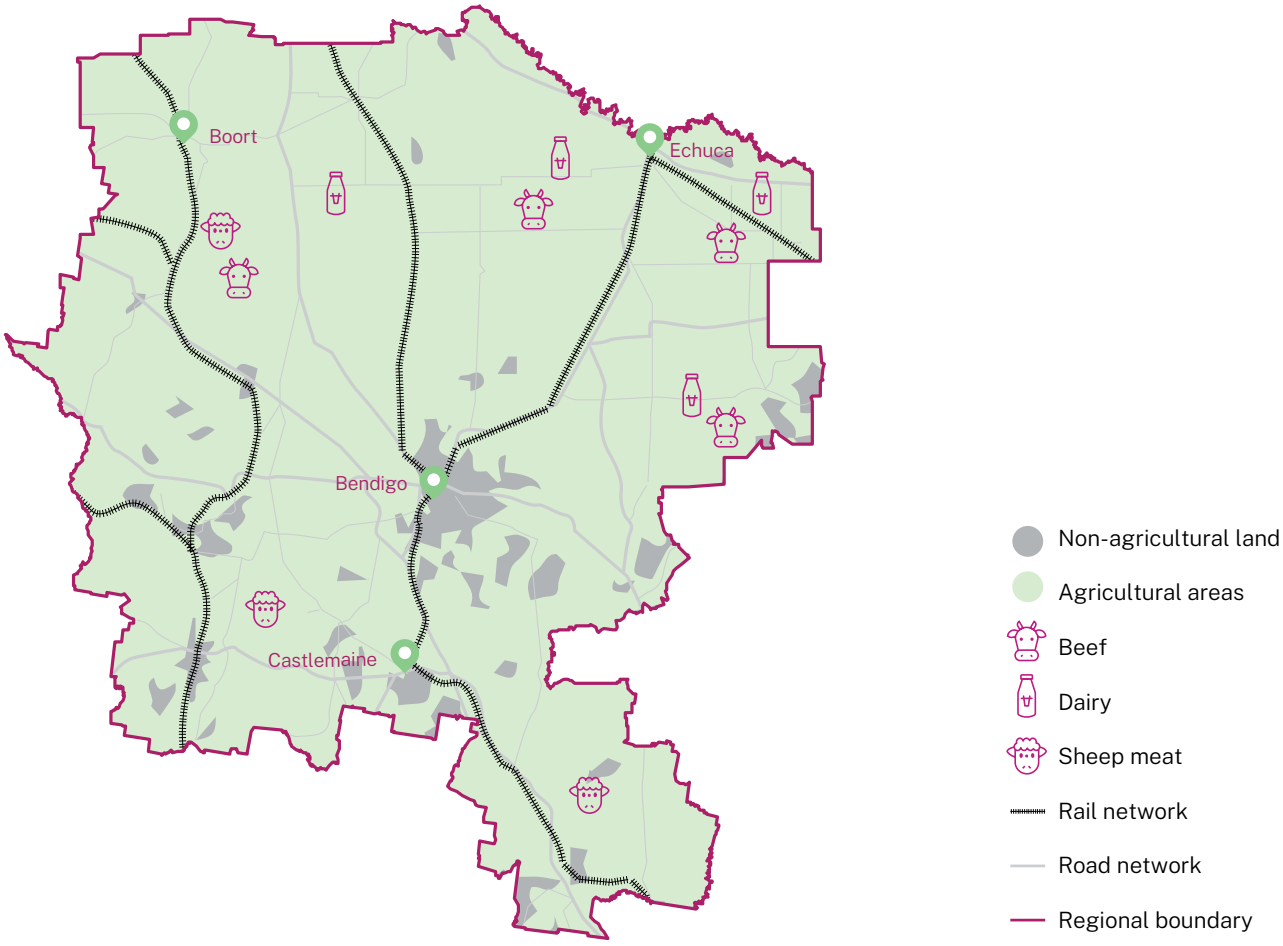
13.4%

GROSS REGIONAL PRODUCT
(2020)

$11.7 billion

Source: Loddon Campaspe Regional Economic Development Strategy (2022)

Agricultural systems in the Loddon Campaspe have been developed in the context of a highly variable climate and many farmers have lived experience of coping through drought. Broadacre cropping, irrigated crops, extensive grazing and forestry are important land uses in the Loddon Campaspe region. Dryland cropping in the region is highly dependent on the timing and quantity of rainfall, while irrigated cropping is highly dependent on external water supply.



Environment

The Loddon Campaspe region is home to an extensive network of public land that protects important environmental, social and economic values. The terrestrial environmental assets are diverse, including River Red Gum forests, Box-Ironbark, Black Box forest communities, grasslands, grassy woodlands and various lakes, rivers and wetlands. The region contains five national parks (Gunbower National Park and State Forest, Castlemaine Diggings National Heritage Park, Heathcote-Graytown National Park, Greater Bendigo National Park, Terrick Terrick National Park) and six state forests and parks (Kooyoora State Park, Paddys Ranges State Park, Mount Alexander Regional Park, Macedon Regional Park, Rushworth-Heathcote State Forest, Leaghur State Park) (Aither, 2019).

The Loddon Campaspe region is also part of the Murray-Darling Basin. Hydrological features include multiple waterways, lakes, floodplains and wetlands as well as important drinking water catchments and reservoirs.

To the north-west, the Loddon system flows towards the Murray River. Part of the Gunbower Forest Ramsar site is also located there, as well as Lake Boort and the Mid Loddon Wetlands. To the west, the Avoca River straddles the border of the Loddon Campaspe region. To the south, there are large storages at Tullaroop Reservoir and Cairn Curran Reservoir, and also in the south east within the Macedon Ranges. In the south east, the Campaspe and Coliban rivers flow into Lake Eppalock. To the east, Waranga Basin is situated outside Rushworth. In the north east, the Campaspe system joins the Murray River near Echuca (VEWH, 2022).

Climate trends

Climate projections based on climate change scenarios indicate that the regional climate will change with:

- Average maximum temperature increase of 3.0°C
- Twice as many days above 38°C
- Annual rainfall decreasing by as much as 20 mm
- Extreme rainfall and flooding expected to be more intense
- Longer fire seasons and 62% more "very high" fire rating days
- Bendigo's climate trending towards the current climate at Shepparton.

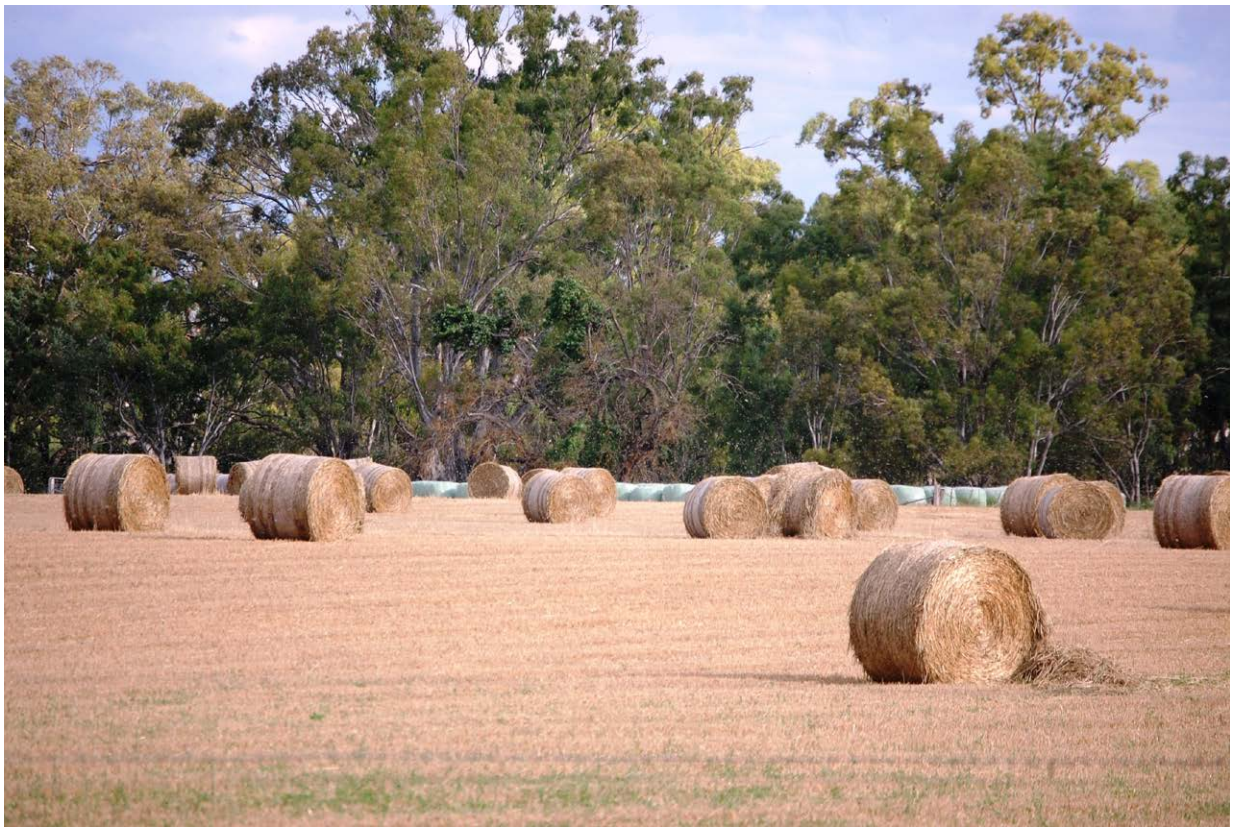
These projected climate scenarios will have implications for agriculture in the region.

Communities and Culture

The region has been home to the Dja Dja Wurrung, Yorta Yorta, Taungurung and Wurundjeri Peoples who have lived, worked and cared for their people and resources for many thousands of years.

Over 250,000 people call the Loddon Campaspe home. Almost half the population live in the City of Greater Bendigo, which is one of the fastest growing LGAs in regional Victoria. Macedon Ranges and Mount Alexander shires are attracting significant numbers of tree-changers. Population growth and associated development is putting increasing pressure on the region's natural resources, which is a key challenge for those areas. In the north and west of the region, an ageing population and continuing trend toward larger/corporate farms is contributing to further population decline and associated socio-economic impacts, including a reduced volunteer base (DJPR, 2022).

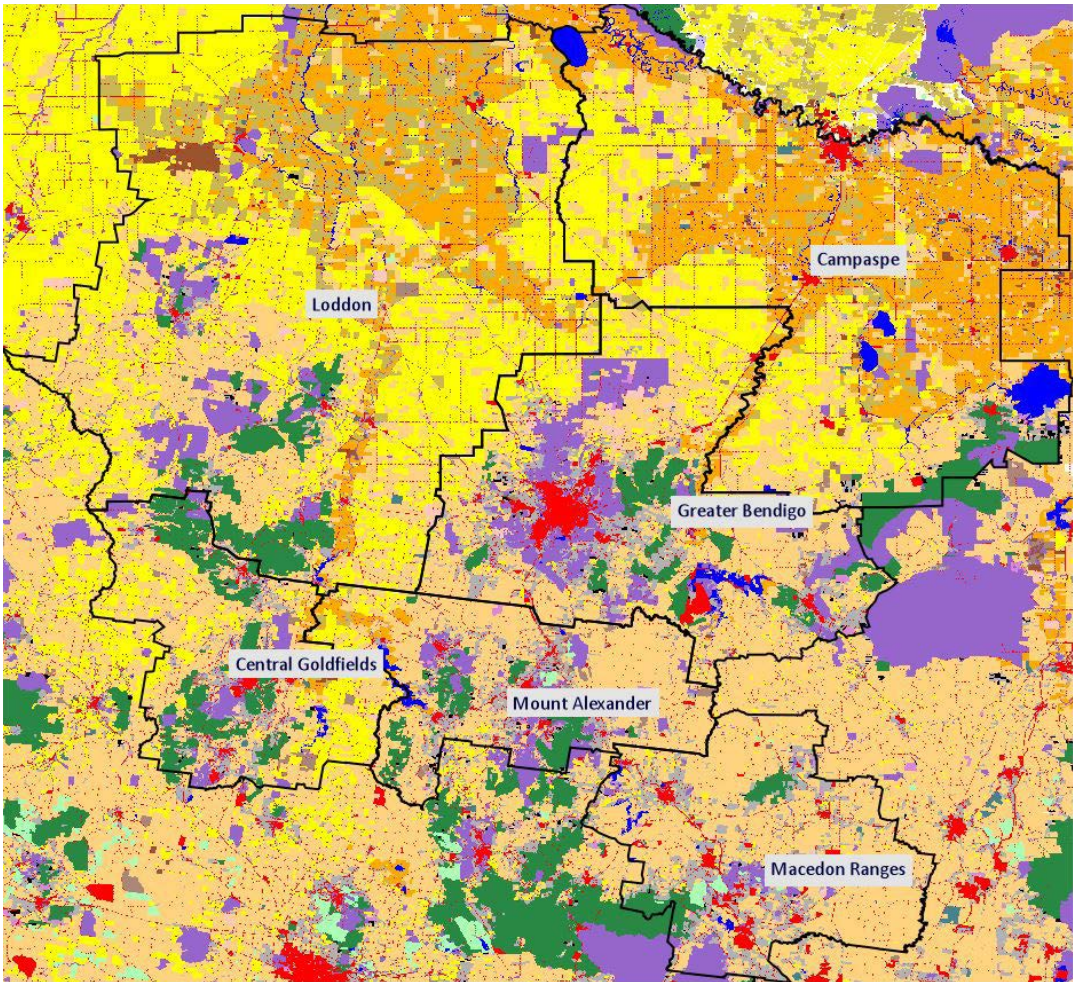
Loddon Campaspe's population grew by 13.4% between 2011 and 2020. Much of this growth has been driven by Bendigo, the third largest city in regional Victoria, and the Macedon Ranges, a peri-urban region with close proximity to Melbourne. While the region's total population is projected to continue increasing, this growth will not be evenly distributed across the region, with higher growth rates expected in Bendigo and in the southern shires (reflecting proximity to metropolitan Melbourne's employment and education centres) (DJPR, 2022).



Industry and employment trends

Employment growth in Loddon Campaspe over the last decade has been slower than regional Victoria and metropolitan Melbourne. Industry output has grown most rapidly in population-driven sectors such as health care and social assistance, construction, and education and training.

The traditional industries of manufacturing and agriculture, forestry and fishing have declined in output since 2001. Manufacturing has rebounded over the past 5 years but agriculture, forestry and fishing has continued to decline to almost half the output of 2001. Financial and insurance services are the second largest contributor to regional output. This reflects the position of Bendigo as the headquarters of Bendigo and Adelaide Bank, one of Australia's largest banks. Output growth has been uneven across the region, with growth largely occurring in Greater Bendigo, the Macedon Ranges and Mount Alexander. The Campaspe, Loddon and Central Goldfields areas have experienced declines in output since 2001 (DJPR, 2022).



- Nature conservation
- Managed resource protection
- Other minimal use
- Grazing native vegetation
- Production native forests
- Grazing modified pastures
- Plantation forests (commercial and other)
- Dryland cropping
- Dryland horticulture
- Land in transition
- Irrigated pastures
- Irrigated cropping
- Irrigated horticulture
- Urban intensive uses
- Intensive horticulture and animal production
- Rural residential and farm infrastructure
- Mining and waste
- Water

Catchment Scale Land Use of the Loddon Campaspe
(ABARES 2021)

DROUGHT IMPACTS IN THE REGION

Many definitions of drought exist, generally depending on what indicators are used to describe it.

- Meteorological drought relates to a lack of rainfall, or at least below expected rainfall.
- Hydrological drought relates to a lack of runoff, measured by river and creek flow volumes, a lack of groundwater availability, and a lack of water storage in catchments.
- Agricultural drought can be defined by reduced productivity on-farm resulting from a lack of water.
- Institutional drought occurs when decisions on water allocation have induced a water shortage.
- Economic drought can be defined as an economic downturn resulting from a lack of water availability.
- Green droughts exist where limited rainfall shows the appearance of green paddocks, but insufficient water is available for agricultural crop production.

Definitions of drought are important because they help define the issues to be addressed. No single definition will be used for this Plan, as every individual, business, organisation and community will have their own unique drought experience. For example, the impact of drought is felt differently in broadacre cropping than in livestock farming, while the health care sector requires a different approach to the educational sector to cope with drought.

Droughts also pose a key threat for Traditional Owners, impacting the health of Country, and affecting their rights and responsibilities in caring for Country. For Traditional Owners and Aboriginal Victorians, caring for Country extends beyond physical landscapes and involves the natural waters, animals and resources and how they influence and impact each other. Healing Country in the wake of drought events is essential to ensuring positive health and wellbeing outcomes for Aboriginal Victorians.

While this Plan aims to build resilience across communities, businesses and sectors, each experiences the impact of drought differently and a range of different resilience-building actions is required.

It is important to note that duration and intensity of drought have an impact on how resilient a community can be. While on-farm drought management can be effective for a seasonal drought, it may be less effective for a 5 year drought. A meteorological drought with “only” low rainfall may have less impact than a hydrological drought combined with heatwaves, dust storms and fires.

In developing this Plan, organisations and individuals came together to discuss drought and chart a course for a smarter, more resilient future. The Plan was not developed to deal with an emergency, or an acute drought. It was developed to assist the Loddon Campaspe community to proactively prepare for drought across a range of future scenarios. The Plan proposes actions that individuals, communities, industry and government can take to achieve this.

Given the region’s extensive use of irrigated agriculture in the north, production and profitability decreased significantly during the Millennium Drought. Irrigated agriculture faced a high “cost” of water, given the opportunities to sell or the requirements to purchase water from the water market.

Dryland productivity also declined significantly during the Millennium Drought, and from 2017 to 2019, due to lack of rainfall. Dryland production was significantly affected; for example, the harvest of cereal crops in 2018–19 was half the (individually) recorded tonnage of 2015–16 and 2016–17.

Water restrictions during the Millennium Drought commenced early in the Loddon Campaspe region, with some towns entering Stage 3 in 2003 and many in Stage 4 by 2004.[1]

After a slight reprieve, many towns were again on Stage 4 water restrictions from 2006, lasting until 2009 or 2010. Stage 4 prohibits the watering of any outdoor space, amongst other restrictions, which had profound impacts on communities' liveability.

The Millennium Drought significantly reduced the level of water tourism in the area, taking with it the additional income that enters the region from these activities.

Culturally significant sites, particularly those located on flood plains and/or are water dependent, were exposed and became vulnerable to damage. Additionally, the movement of stock to areas with feed reserves meant stock were occasionally placed in areas of cultural significance.

The decreases in agricultural production caused by drought created significant flow-on community impacts. This included reduced income and employment, especially in on-farm labour and agricultural services. The impacts to irrigated and non-irrigated agriculture flowed through to impact the wider community through reduced overall spending in the community.

Overall, the cumulative effect of drought both on-farm and in the community led to significant impacts on the Loddon Campaspe community during the Millennium Drought and the dry seasonal conditions experienced between 2017–19. This also led to an increase in demand for services such as mental health and rural financial counselling (Frontier Economics, 2022).

[1] Water restrictions can be implemented in 4 stages from 1 – Mild to 4 – Severe. Stage 4 water restrictions prohibit the watering of public, residential and commercial gardens, lawns and playing surfaces at all times.

Stage 3 restrictions prohibit types of urban water use outside of set days and times (e.g. watering of residential gardens is only permitted on alternate days, from 6 to 8 am, using a hand-held hose fitted with a trigger nozzle). Source: www.water.vic.gov.au/for-households/water-restrictions-and-rules/stage-3-water-restrictions

RESILIENCE IN THE REGION

Drought resilience in the Loddon Campaspe is described for this Plan as communities that are able to adapt, modify and transform their practices, knowledge and attitudes to overcome climatic adversity or the ”new normal” of a drier climate.

Resilience is used in this Plan to shape intended outcomes and actions, with an understanding that resilience to climatic challenges and uncertainties is an opportunity to *strengthen* communities, rather than simply maintain systems, processes and culture.

There is no one-size-fits-all route to becoming a resilient community. However, certain community characteristics are known to contribute to resilience. These characteristics have been used to build the suite of outcomes and actions documented in the Plan.

Similarly, it is acknowledged that for many Traditional Owners, connection to Country is more holistic and not bound by the region and constructs of the Plan. Drought impacts are also likely to be broader than what can be addressed by the actions identified in the Plan.

Resilient regions have:

- a common vision and goal
- cooperative and interconnected leadership and governance
- strong connections and relationships through formal and informal networks
- genuine collaboration

Resilient communities have:

- local leadership and initiative
- governance that embraces change
- willingness to work together in the pursuit of common goals
- drive for self-responsibility
- a willingness to be adaptable and learn lessons from change
- the skills needed to anticipate issues and effectively manage risk
- foresight to consider different perspectives and options to solve complex problems

CONCEPTS CONSIDERED IN THE PLAN

Cultural and Environmental Flow

Cultural flow is a concept in water management that recognises the importance of water to First Nations peoples for cultural, economic, customary, and spiritual purposes. It refers to the quantity, quality, timing, and variability of water flows that are required to maintain and enhance First Nations cultural values.

First Nations people in the Murray–Darling Basin have a strong spiritual connection to water, and a moral obligation to care for it, as they have done for many thousands of years.

Cultural flows benefit practical activities like fishing, hunting, ceremonies and harvesting medicinal plants and herbs. They also preserve and protect important assets including burial mounds, scarred trees, and campsites which help maintain connections to Country. Identity, wellbeing, capacity building and inter-generational teaching are also key components of cultural flows.

The Victorian Government is committed to working with First Nations peoples to recognise and protect cultural flows. This includes developing and implementing water management plans that incorporate cultural flow considerations.

While cultural flows can also be used to improve the health of the rivers, that is not their only purpose – cultural flows are therefore different from environmental flows.

Environmental flows are used to improve the health of our rivers, wetlands and floodplains. Water is allocated to federal and state environmental water holders across the Basin. In Victoria this is managed by the Victorian Environmental Water Holder, who make decisions about when, where and how much water is released for the environment.

Mental Wealth and Mental Health

Mental health is a state of wellbeing in which an individual realises their own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to contribute to their community.

Mental wealth is a term used to describe the emotional, psychological, and social well-being of an individual or community. It goes beyond the absence of mental illness to encompass the positive aspects of mental health, such as resilience, coping skills, and a sense of purpose.

Another way to think about the difference between mental health and mental wealth is that mental health is about managing symptoms and conditions, while mental wealth is about thriving and flourishing.

While mental health and mental wealth are related, they are not the same thing. It is possible to have good mental health but not great mental wealth. For example, someone with a chronic mental illness may be able to manage their symptoms and live a fulfilling life, but they may still experience some challenges that impact their mental wealth.

Mental wealth is important because it can help people to live happier and more fulfilling lives. It can also help in terms of individuals being more resilient in the face of adversity. Good mental wealth supports a better ability to cope with stress, manage our emotions, and build positive relationships.

Climate Anxiety

For most young people, the awareness and concern about the impact of climate change is a healthy response to a serious problem and doesn't impact their mental health. This awareness can motivate young people to be actively involved in positive change. Examples of young people's contribution to positive change include attending public marches, raising awareness through conversations, and reducing their 'carbon footprint' through changes in lifestyle.

'Climate anxiety' and 'eco-anxiety' are terms being used to describe feelings of helplessness, stress, worry and frustration about the effects of climate change. There is growing research in this area to understand how concerns about climate change can significantly interfere with some people's daily lives. Young people may experience 'climate anxiety' because they are aware that it is their generation and future generations that will be most affected by climate change. They can feel a sense of urgency to create immediate change and make a difference to future generations.

Green-Blue Infrastructure

'Green' infrastructure refers to living vegetation such as gardens, nature strips, trees, parks and green open spaces. 'Blue' infrastructure are the assets associated with managing stormwater, such as gutters, pits, pipes and drains, ponds, wetlands and waterways. Green-blue infrastructure (GBI) is a term designed to help explain that these green and blue infrastructure assets are as critical to a town's liveability and resilience as are roads, buildings and carparks. GBI principles aim to protect and enhance a town's natural assets, combined with better retention, treatment and use of rainwater where it falls. By improving the way urban stormwater is conveyed, stored and used, a town can make the most of the water that falls within its boundaries. The combination of GBI provides the space to retain stormwater close to where it falls and use it to irrigate the living assets valued for liveability while improving downstream water quality. This in turn supports strengthening drought resilience.

The principles of GBI can be applied at 4 scales: lot, streetscape, precinct and township. At the lot scale, these techniques include gardens, green roofs, green walls, water tanks and raingardens. At the streetscape scale, techniques include nature strips, footpaths, roadside raingardens, street trees and swales, shallow channels that convey and treat stormwater. Techniques at the precinct scale include parks, green links, open drains, wetlands, detention basins and sport grounds. The township scale techniques include urban forests, expansive open spaces, waterways and lakes.

Social, environmental and economic benefits include improving township amenities and liveability, reducing urban heat for cooler streets, and contributing to improved community physical and mental health. GBI also enhances urban and aquatic biodiversity, increases tree canopy and decreases air pollution, and increases stormwater and rainwater infiltration and improves soil water retention. The economic benefits include an improved township entrance to make it attractive for visitors, better and more significant use of open spaces, and increased use of alternative water, freeing up domestic water.

THEMES, OUTCOMES AND ACTIONS FOR A DROUGHT RESILIENT COMMUNITY

The Plan's themes and outcomes were designed and agreed by the Loddon Campaspe Reference Group. Themes reflect the broad areas of interest of regional stakeholders related to building drought resilience. The outcome for each theme reflects the overall goal for a set of actions that have a common purpose, beneficiary or instigator.

The actions listed under each theme should not be seen in isolation. Each action is designed to help drive the region towards its overall vision of maintaining productive and healthy communities during times of drought.

Some actions are the responsibility of an individual agency or organisation; however, most actions will require a collaborative approach by several organisations, businesses and communities.

For some actions, a partnership approach will be needed with Traditional Owners. This is consistent with the Victorian Government's policy and legal commitments, which include the Victorian Aboriginal Affairs Framework and the Department of Energy, Environment and Climate Action's *Pupangarli Marnmarnepu 'Owning Our Future' 2020–2025* self-determination reform strategy.

The outcomes and actions in the Plan draw on the local experiences of people who live in the community. They also draw on existing plans and strategies, which drive the actions and priorities of the organisational members of the Loddon Campaspe Reference Group.

The seven themes of the Loddon Campaspe Plan are:

- Collaboration, knowledge gathering and sharing
- People and community wellbeing
- Empowered communities
- Rural economy
- Infrastructure
- Farm management
- Environment and natural resources management

Theme 1

COLLABORATION, KNOWLEDGE GATHERING AND SHARING

Before, during and after drought, collaboration between sectors and organisations is critical to ensuring an integrated approach to drought resilience building and response. This includes information gathering and sharing between agencies and organisations and within the broader community. The use of existing policies and strategies, and raising awareness of these, as well as the roles played by different agencies and organisations were identified as important to reducing uncertainties during droughts.

Outcome:

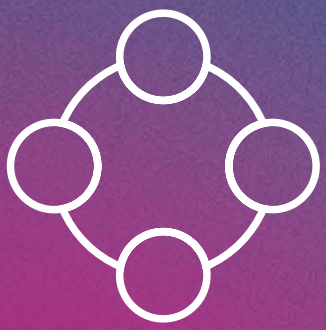
Regional networks are maintained to ensure open channels of communication, knowledge sharing and promotion of engagement from a diverse representation of sectors, communities and industries.

Actions

1.1	Take actions aligned with polices developed by Traditional Owners that build and strengthen drought resilience in local communities.
1.2	Increase support for existing networks to identify and support the needs of local communities by generating transformational change.
1.3	Increase support for networks that gather and share technical knowledge and translate this information in tangible ways.
1.4	Proactively communicate region-specific elements from policies and strategies on drought resilience and response and associated materials, such as the roles and responsibilities of water management authorities during drought.
1.5	Support bush fire prevention and raise awareness within local communities to prepare properties before heat and drought periods.
1.6	Support research into the development and use of trigger points to enhance proactive decision making associated with drought response.
1.7	Communicate and support region-specific actions in Sustainable Water Strategies.
1.8	Provide climate outlook information, specific to the Loddon Campaspe region, to support better informed land management planning and decision making, such as plant selection for revegetation programs.

Theme 2

PEOPLE AND COMMUNITY WELLBEING



Connectivity and preventing isolation was listed as important to maintaining community wellbeing. Key to this is the role of regional events and face-to-face interaction. Initiatives focusing on mental health support, and mental wealth upkeep, contribute to drought resilience.

Outcome:

Drought resilience at the individual and community level is strengthened by supporting physical and mental wealth, peer-support and informal support groups, grassroots initiatives, and initiatives and actions by regional organisations and agencies.

Actions	
2.1	Support mental wealth initiatives before, during and after droughts (and other extreme weather events).
2.2	Ensure infrastructure that supports local sport and cultural events is sufficient to allow continuation of these activities during drought.
2.3	Collect and publish stories and experiences from previous drought experiences to inform new residents and next generations.
2.4	Support opportunities to stay connected at community events, to prevent isolation and maintain motivation.
2.5	Promote Mental Health First Aid training for interested communities.
2.6	Support existing community initiatives and organisations that provide spaces and activities which generate lasting public benefits by creating healthy, vibrant and resilient communities, such as Landcare groups, schools, men's and women's sheds, and community houses.
2.7	Provide networking and training opportunities for existing community groups to connect with each other and identify key contacts from groups; for example, provide cultural awareness and inclusivity training opportunities for community groups, to encourage inclusiveness and cross group interactions and the sharing of resources.
2.8	Partner with Traditional Owners to support culturally appropriate practices in emergency events.

Theme 3

EMPOWERED COMMUNITIES

Empowered communities are created by providing the opportunities and support to co-design initiatives and programs. Information should be made available in a structured, accessible way, preferably by having single information points that cover the wide range of services and activities provided by agencies and organisations. Recognition that communities are diverse, and tailoring information and services to that diversity, is also a priority for the Loddon Campaspe.

Outcome:

Communities are empowered to act and are supported where requested. Communities have local and regional leadership and are connected to regional and state networks to ensure a shared responsibility for improved drought resilience.

Actions	
3.1	Ensure that Traditional Owners are incorporated into decision-making forums that relate to drought resilience.
3.2	Provide support to local communities, to assist them to co-design programs that build drought resilience, by adopting a place-based approach.
3.3	Improve awareness of drought services by providing a single information portal and point of contact for multiple services.
3.4	Establish or use existing networks, committees or forums to ensure continuing, broad, sector drought resilience building.
3.5	Ensure that new residents in the region have access to information that supports them to be drought resilient.
3.6	Advocate for support to be provided to all the diverse elements that make up local communities; for example, the youth sector, gender specific groups and culturally diverse groups.

Photo: Coliban Water

Theme 4

RURAL ECONOMY

A diverse economy provides more opportunities to absorb shocks. The Loddon Campaspe has areas with a strong emphasis on tourism. A broad sector of businesses in the region benefits from informed decision making in relation to drought resilience. These businesses may also provide opportunities for alternative incomes for people who are drought impacted. Regional land use initiatives have been ongoing, to find sustainable approaches in agriculture and to continue to support more climate resilient systems.

Outcome:

The rural economy remains vibrant during droughts and drought impacts are minimised through resilience building before droughts.

Actions

4.1	Continue promotion of the region to attract tourists and visitors from outside the region.
4.2	Promote and retain local business leadership/management within the region, for better informed decision making and early detection of drought impact.
4.3	Support networking of industry, businesses, and the financial sector to focus on drought preparedness.
4.4	Explore options to strengthen programs, to support and retain farm workers in their communities during drought (either on country, in alternative local employment, paid skill development or other education programs).
4.5	Partner with local governments to support and expand diversified agricultural industries.
4.6	Promote economic diversification as a way to build resilience for local businesses and economies.
4.7	Explore opportunities to diversify and modify land use and production systems based on future climates.

Theme 5

INFRASTRUCTURE

Regional infrastructure provides the tools required to build and strengthen drought resilience in the Loddon Campaspe. Improved water conveyance, and transport, energy and communication infrastructure, and uninterrupted operation of infrastructure during droughts and heat events supports people and community wellbeing. It also empowers communities, farming sectors and the rural economy and aids the management of natural resources.

Outcome:

Infrastructure at an individual, community and regional level is sufficient to support increased drought resilience.

Actions

5.1	Support water corporations and catchment agencies in their continuing efforts to upgrade infrastructure for efficient and reliable water delivery.
5.2	Advocate for electricity and telecommunication infrastructure to be maintained or expanded, so that the impact of drought on communities is minimised.
5.3	Encourage priority infrastructure projects in regional transport strategies to consider droughts during the planning and design phases.
5.4	Advocate for adequate transport infrastructure so disruptions due to heat are minimised.
5.5	Support climate-ready planning, to provide urban cooling and connect residents with community spaces.
5.6	Support opportunities for social interaction for isolated and vulnerable groups, by advocating for the expansion of mobility options and public transportation.
5.7	Advocate for consideration of drought resilience in local infrastructure initiatives and funding programs.

Photo: Coliban Water

Theme 6

FARM MANAGEMENT

Well-informed decision making in different farming systems in the Loddon Campaspe is critical to building drought resilience, and to adapting to changing environmental conditions.

Education, awareness raising, learning from each other and support in planning are all important aspects that build decision making capabilities.

Outcome:

Primary producers are supported to maintain production systems during drought that are environmentally and financially sustainable and resilient.

Actions

6.1	Co-design (with Traditional Owners and local communities) educational programs aimed at primary producers that incorporate Traditional Owners' knowledge into production system design.
6.2	Support future-proofing of existing agricultural systems, while also exploring new systems that may be more resilient.
6.3	Assist farm businesses with whole-of-farm planning, including drought preparedness, treatment of drought as a business risk, system and income diversification, and alternative income streams, especially in periods of non-drought.
6.4	Support youth to pursue careers in agriculture through workshops, career days, meet and greets and on-farm traineeships.
6.5	Review and improve on-farm infrastructure, particularly in relation to livestock management, water and transport.
6.6	Support and promote activities which encourage increased water retention on farms, such as building biomass and improving pasture and dam management.
6.7	Review opportunities to diversify income streams and/or generate off-farm income.
6.8	Support the inclusion of shelterbelts in whole-farm planning, to protect stock and soil from heat and wind erosion and provide wildlife corridors through farmland.
6.9	Support landholders to improve soil health and biomass to build resilience to drought.

Theme 7

ENVIRONMENT AND NATURAL RESOURCES MANAGEMENT

Initiatives by Traditional Owners and Landcare groups to support more climate resilient landscapes result in best management practices – specific to the Loddon Campaspe. Habitat restoration and interconnected wildlife corridors support landscape resilience, and environmental flow and waterway management contributes to drought resilience. Use of green-blue infrastructure supports improved urban water management and maximises benefit of green spaces.

Outcome:

Best management principles and practices are recognised and adopted by land managers to minimise drought impacts and ensure the natural environment can rebound effectively.

Actions

7.1	In partnership with Traditional Owners, ensure Traditional Owner land management principles are incorporated into best practice land management practices utilised by private and public land managers.
7.2	Support Landcare and Caring for Country practices based on traditional land management approaches.
7.3	Support an interconnected network of diverse habitat types, which will support an ecologically healthy community during drought.
7.4	Develop and support habitat restoration programs to enhance ecosystem function and conserve threatened species.
7.5	Plan for and build more green-blue infrastructure in urban developments, to support native flora and fauna populations and provide urban cooling benefits.
7.6	Ensure waterways have sufficient environmental flows and connectivity to support culturally important species.
7.7	Support and promote activities which encourage increased water retention in the landscape, both at property and landscape scale.

Photo: Coliban Water

CASE STUDIES

Prioritising green spaces during drought

Water supports the wellbeing of rural and regional communities. It makes towns more liveable and provides places to relax, unwind and reconnect with nature. Water is fundamental to creating greener, cooler and more attractive urban spaces.

Water restrictions and periods of extreme heat place stress on many gardens and green assets in public spaces. Coliban Water supplies water to maintain the condition of home gardens, sports fields, parks, green spaces, water bodies and public trees. Because customers expect to be able to maintain green assets during dry periods, they need to work with communities and land managers to ensure our urban landscapes are green and water sensitive.

The Victorian Government expects water authorities to plan for, and provide, water services that consider recreational values. Some Coliban Water storages have the potential to be used for recreational purposes. Considering recreational values in water management will ensure that they can provide water services that improve the recreational value of public spaces. Working in partnership with other organisations will be crucial to ensuring communities have access to water for relaxation, play and adventure.

Eight local councils in the Coliban Water region have collectively saved almost $250,000, thanks to discounted water for public parks, gardens and recreation reserves. The councils include City of Greater Bendigo, and the shires of Campaspe, Central Goldfields, Gannawarra, Hepburn, Loddon, Macedon Ranges and Mount Alexander.

Coliban Water Managing Director Damian Wells said the Recreational Water Discount Program saw water offered at half the normal consumption fee for the 2022–23 financial year. “As we continue to navigate the challenges of climate change, rainfall variability and population growth, we want to work with councils to improve water efficiency and the

Photo: City of Greater Bendigo

liveability of our region. It's important we maintain these green spaces, which are vital community assets, providing places for people to relax, exercise and connect with nature."

In 2022-23, the fourth year of the program, councils were collectively offered up to 300 megalitres of discounted water, with around 241 megalitres being awarded the discounted rate.

The program aimed to reward councils who had optimised their water use or used alternative fit-for-purpose water supplies. "It's important to manage these green spaces in the most water-efficient way, including watering at certain times of the day, selecting appropriate grass types, eliminating leaks, installing water saving devices, applying the right amount of water and carrying out infrastructure improvements to reduce water usage. We need to ensure green spaces are always available during periods of extreme heat and times of water scarcity. We hope councils have been encouraged by this program to further improve how they use water, and that money saved will go towards water saving initiatives and more green spaces."

The strategically important actions to achieve these outcomes are:

- Optimise water use and ensure urban landscapes are green and water sensitive;
- Improve access to water by connecting to walking and cycling amenities in the region;
- Identify key assets with recreational value and maintain and promote their use;
- Work with other organisations to assess and plan for recreational water use;
- Ensure assets support recreational objectives.

Based on information from Coliban Water (2023a), Coliban Water (2023b).

Multicultural diversity and multi-language programs

Bendigo Community Health Services (BCHS) has a very inclusive approach, with multi language support in videos, easy translations, and is locally known and trusted. BCHS has received awards for projects that apply innovative solutions for the benefit of a community, and which improve understanding of a culture with a wider audience.

In 2020, BCHS was recognised with a Victorian Multicultural Award of Excellence, for its outstanding care in looking after the health and wellbeing of refugee and multicultural communities.

BCHS Cultural Diversity and Relationships manager Kaye Graves said:

"We recognise this is a long journey and we are committed to supporting people of refugee background all the way. That care has never been more important than in 2020. The Coronavirus has been a tough time for all and we have worked tirelessly to keep our community informed and safe through initiatives such as client welfare checks and videos and information sheets translated in Karen, Dari and Dinka that feature in our online Coronavirus Refugee Resource Hub. We have kept talking with the community right through this time to ensure their needs are met and they understand the ever-changing Coronavirus landscape. That's why we started a free Coronavirus Telephone Hotline - people told us they wanted someone to talk to so we provided that link to our Karen speaking staff. We have worked with businesses like Hazeldene's Chicken Farm and KR Castlemaine to help manage outbreaks and organisations such as Bendigo Health to promote COVID-19 testing and explain complex things such as close contact and contract tracing in simple terms.

"Our partnership with Victoria Police and Believe in Bendigo generated a community campaign to call out Coronavirus-related racism aimed at our refugee communities. The award is recognition for the amazing amount of work and care our staff have put into the health and wellbeing of refugee and multicultural communities. It's been inspiring for us to see their work. How much some of our Karen and Afghan staff have grown in learning so many new skills through this time and the dedication they have shown to keeping their communities safe".

Recognizing cultural diversity and including the diverse population through ongoing programs help in building communities, and strengthening resilience for periods of stress, like droughts.

Based on information from BCHS (2017), BCHS (2020).

Djaara focus on Care for Country

Djaara (Dja Dja Wurrung People) have lived on traditional lands and cared for Djandak (Country) over many thousands of years. For Djaara, Djandak is more than just a landscape, it is more than what is visible to the eye – it is a living entity, which holds the stories of creation and histories that cannot be erased. Djaara's ancestors looked after this Country and tie Djaara to Djandak culture and knowledge.

DJANDAK are land management services devoted to revitalising Dja Dja Wurrung Country for community benefit, blending economic development for Dja Dja Wurrung People. The program embeds Djaara values into infrastructure, and the environment. A professional team collaborates on diverse projects, working with government bodies, local industries, and the broader community. Services encompass design, natural resource management, waterways, forestry, fire management, bio-culture, and land management.

Djaara's Land Management team does 'end to end' place based design and construction projects. These include JMP (Joint Management Plan) projects, VGO (Victorian Great Outdoors) projects and standalone projects (such as Goldfields Track). They are often multi-disciplinary projects that draw on DJAARA member input and other DJANDAK departments to provide specialist skills, knowledge and experience. The team does major construction of mayim-mayim (DJAARA shelters) and amenity blocks, as well as minor construction projects (fencing, stone walls, park furniture, signage) and work in collaboration with our Djaara Design Centred team. The team also delivers a range of civil works that major projects may require such as concreting, brickwork, carparks, roadworks.

There are six sites with Djaara title managed in partnership with Parks Victoria. These are: Greater Bendigo National Park, Paddy's Ranges State Park, Hepburn Ranges National Park, Kara Kara National Park, Kooyoora State Park and Wehla Nature Conservation Reserve.

Based on information from Djaara (2014), Djaara (2023a), Djaara (2023b).

Rural schools providing more than education

One thousand schools in Victoria participate in the School Breakfast Club Program, with more than 50 schools located in the Loddon Campaspe region. While it is a year-round program and not bound to drought, the program itself supports the resilience of communities with opportunities for equal access to nutrition, socialising, and education. The program is one of several roles that the Department of Education supports in addition to their core mission. Interaction in schools and through extra-curricular events provides opportunities for socialising with peers for students and parents, thus reducing the risk of isolation and loneliness; feelings that are often increasing during periods of droughts.

It is common for rural properties throughout the Loddon Campaspe region to not be connected to mains water supply, remaining fully dependent on rain water storages. While years with average rainfall usually provide sufficient water to run a normal household, during dry years with limited rainfall, households will need to reduce their water consumption. This may result in families taking less showers or baths. During previous droughts, some schools have been able to open up their shower facilities to those students affected by limited water availability at their home, thus providing safe access to maintain personal hygiene, lifting spirits of students and parents.

Schools and the communities they support, have formal and informal ways to come together to strengthen their region's resilience to climate shocks, including droughts. With grassroots initiatives, access to support programs, and a safe space to use as an organisational centre, schools provide more than education alone.

Lessons for resilience building from flood recovery

In the spring of 2022, excessive rainfall resulted in severe floods in parts of Victoria, with a strong impact in the Loddon Campaspe region. An immediate emergency response was initiated to prevent loss of life, followed by a phase of relief to support those that were affected and help manage acute flood impacts. In the following months, a recovery stage focused on rebuilding.

Many themes that contribute to building drought resilience are also important in flood response and recovery. Reliable forecasting helps to prepare for impact. With floods, this has focused on predicted rainfall amounts, expected maximum river levels and extent of flooded regions. For droughts, seasonal forecasting of below-average rainfall helps with decision making on livestock management (for example, reducing number of heads before expected droughts) and cropping choices.

Flood and drought both impact individual and community mental health. This is a result of property loss, as well as uncertainty about when the event will end and how long it will take to recover. Clear communication during and after the flood was found to be important in limiting uncertainty for those impacted. The community expected clear communication on relief and recovery opportunities, which was provided by a range of agencies. Impacted people and businesses preferred to access information from a single point, rather than from a wide range of programs.

While droughts have a slower onset and longer duration than floods, the same desire for coordinated support was expressed in discussions leading to this Drought Resilience Plan. A difference between floods and droughts is that action is often triggered quickly for immediate, relatively short-duration, events like floods. In contrast, droughts are less acute and steps to action are less well defined.

A lesson from the flood relief and recovery phase was that short-term, non-local, recovery support was less lasting than long-term local support. Community familiarity with programs and program providers helped to obtain more situation specific help. As one community member said: "we don't need a mono-culture approach towards support; we need the diverse approach like a tropical rain forest instead."

NEXT STEPS FOR THE LODDON CAMPASPE

This Plan identifies and communicates the actions and outcomes needed for communities and businesses in the region to be resilient to future droughts and a drier climate.

A handful actions in the Plan can be implemented by individual entities. However, most actions, related outcomes and the regional vision will only be realised through concerted and continuous collaboration that is driven by regional communities and organisations. The communities and organisations within the Loddon Campaspe region therefore have a critical role in implementing this Plan.

Some actions in the Plan will need regional stakeholders to reach out for broader collaboration and partnership with other governments, agencies, statutory bodies, not-for-profit organisations, Traditional Owners and the private sector.

The actions in this Plan represent a point in time. As economic, social and environmental conditions change, the community will need to adapt the actions in this Plan – and introduce new actions – to maintain the path towards the overall outcomes and vision for the region.

This Plan provides the pathway for the region to move towards drought resilience with:

- an understanding of the regional impacts of drought
- a common regional vision and common goals
- desired outcomes and actions agreed by the community
- a common picture of how existing and new investments are related to each other
- a basis for developing new actions and programs to achieve the regional vision
- a framework to monitor progress towards building resilience to future droughts

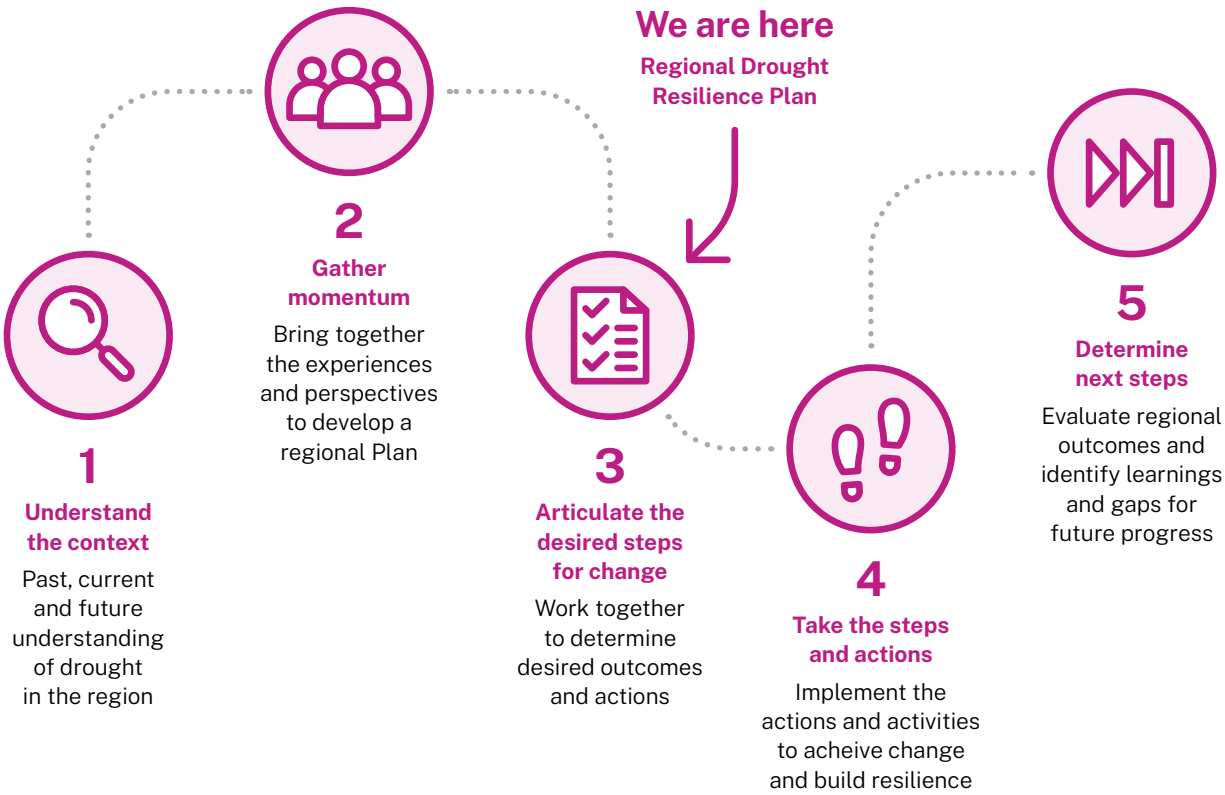
Next steps to support the implementation of the Plan include:

- identifying a lead organisation to oversee and coordinate the delivery of activities that align with the region's Plan
- establishing a fit-for-purpose Advisory Group to guide delivery and ensure regional representation
- detailing priority actions, budgets and timelines
- monitoring and evaluation
- reviewing the progress of the Plan and making any necessary updates

MONITORING, EVALUATION AND LEARNING

The collaborative effort and shared expertise used to prepare the Plan is the important first step in building drought resilience in the Loddon Campaspe. Work has been done by the region to articulate the actions needed to achieve desired regional outcomes. The next step is for the actions and activities identified in the Plan to be implemented, evaluated and adapted as needed to achieve the longer-term outcomes for drought resilience.

Monitoring, evaluation and learning (MEL) is a key element of the RDRP program. Program objectives, outcomes and measures of success are clearly articulated at all levels of program delivery (national, state and regional) and are a range of short, medium and long timeframes.



Measuring success

The outcomes identified in this Plan are community and region wide, and dependent on the fourth step of implementation identified in the pathway of program delivery. Given the long-term outcomes of the Plan, the MEL framework below outlines how progress toward success will be measured.

Management and Reporting

The organisation awarded as the lead organisation to coordinate the delivery of the Plan will work with Agriculture Victoria to provide up-to-date data and information to support program implementation and planning. Monitoring and reporting will enable: key learnings to be identified, effective reporting, and adaptive program management.

A range of assessment tools will be used to indicate progress including, but not limited to, surveys, case studies, stakeholder interviews and engagement data analysis. Data and information will be collected at various intervals across implementation planning, and during and after activities are being implemented.

Assumptions underpinning success of the RDRP

Measuring success and reporting on progress toward regionally specific outcomes is dependent on several key assumptions.

Key assumptions affecting short-term outcomes (1–2 years)

- Regional stakeholders have the capacity 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
- Regional communities are motivated to take ownership of completed plans and actively seek to implement them
- There are sufficient learnings to continuously improve program implementation

Key assumptions affecting medium term outcomes (2–4 years)

- Supporting regional stakeholders through program implementation will result in changes in practice in Loddon Campaspe
- There are sufficient opportunities and funding for the region to implement elements of the Plan
- Plans contain implementable activities to build drought resilience
- The Loddon Campaspe Plan Coordinator and regional stakeholders continue to review, update and implement the Plan

MEL Framework

Key regional themes and outcomes are matched with relevant Future Drought Fund (FDF) strategic priorities, regional progress measures (2–4 years) and indicators.

The Framework is aligned with previously developed Program and Fund level MEL Frameworks, to ensure consistency and so that data collection tools provide information across a range of learning and reporting requirements.

MEL Framework for the Mallee

FDF[1] Strategic priority	Progress measures (2–4 years)	Indicators
Collaboration, knowledge gathering and sharing Regional networks are maintained to ensure open channels of communication, knowledge sharing and promotion of engagement from a diverse representation of sectors, communities and industries.		
Social resilience for resourceful and adaptable communities	Improved collaboration and coordination between governments, industry, community, Traditional Owners and primary producers. Communities are coming together to prepare for and respond to drought. Communities are learning and building capability, capacity and expertise through sharing ways to build social resilience.	Implementation/planning groups and networks function well together. Communities have an improved understanding of drought resilience specific to their region. Stakeholders are working together to plan and deliver on actions across the region. Traditional Owners are increasingly involved in drought programs and activities.
People and community wellbeing Drought resilience at the individual and community level is strengthened by supporting physical and mental wealth, peer-support and informal support groups, grassroots initiatives, and initiatives and actions by regional organisations and agencies.		
Social resilience for resourceful and adaptable communities	Communities and individuals are coping with the physical and mental stresses of drought.	Improved community awareness of and access to health and wellbeing services.
Empowered communities Communities are empowered to act and are supported where requested. Communities have local and regional leadership and are connected to regional and state networks to ensure a shared responsibility for improved drought resilience.		
Social resilience for resourceful and adaptable communities	Community preparedness to drought has increased. Communities are coming together and have a lead role to response to and prepare for drought. Plan actions and opportunities are incorporated into other strategic planning across the region.	Communities are using their knowledge to plan for drought resilience. Leaders in the region are more confident to implement strategic actions. Stakeholders are working together to plan and deliver on actions across the region.

1. Future Drought Fund

FDF[1] Strategic priority	Progress measures (2–4 years)	Indicators
Rural economy The rural economy remains vibrant during droughts and drought impacts are minimised through resilience building before droughts.		
Social resilience for resourceful and adaptable communities **Economic resilience for an innovative and profitable agricultural sector**	Impacts of drought on the economies of region are known and prepared for. Businesses are identifying, managing and planning for the business risks associated with drought.	Increased community understanding of the region's current and future drought resilience, considering the region's unique economic characteristics. Innovative pathways and opportunities for business diversity are identified.
Infrastructure Infrastructure at an individual, community and regional level is sufficient to support increased drought resilience.		
Economic resilience for an innovative and profitable agricultural sector	Organisations and corporations responsible for infrastructure have drought plans.	Increased sector understanding of the region's current and future drought resilience, considering the region's unique economic, environmental and social characteristics.
Farm management Primary producers are supported to maintain production systems during drought that are environmentally and financially sustainable and resilient.		
Economic resilience for an innovative and profitable agricultural sector **Environmental resilience for sustainable and improved functioning of our natural landscapes**	Primary producers and farm businesses better understand their resilience to drought.	Farmers are learning about and implementing new business strategies and practices. Farmers and agricultural industries have an improved understanding of drought resilience specific to their region.
Environment and natural resources Best management principles and practices are recognised and adopted by land managers to minimise drought impacts and ensure the natural environment can rebound effectively.		
Environmental resilience for sustainable and improved functioning of our natural landscapes	Environmental resilience for sustainable and improved functioning of our natural landscapes.	Partnerships, networks and engagement between stakeholders managing natural resources are ongoing. Stakeholders have increased understanding of natural resource management to build drought resilience.

Appendix 1: Drought resilience insights from the Loddon Campaspe

Drought resilience in context

Across the region there are many issues impacting rural communities. Issues include prices received for farm outputs relative to the cost of farm inputs, challenges accessing international markets and goods, succession planning and business finances. To ask communities to prepare for drought can be difficult, particularly when this region has been significantly impacted by natural disasters in recent years, including the 2022 and 2023–24 storm and flood events.

Drought Policy

Based on experiences in previous droughts, the Loddon Campaspe region would like clarity and transparency around existing drought policies and how they will be implemented during the next drought. The role of government in providing drought support should be clear and key contacts/support networks and information, to support people affected by drought, should be readily accessible.

Many lessons were learned from previous droughts, especially the Millennium Drought. It has been suggested that reviewing the region-specific responses and issues in providing drought support could be documented and used to improve responses when the next drought occurs. As an example, previous support systems used local government boundaries to provide drought support and access to grants. This sometimes resulted in farms next to each other, impacted by the same drought, receiving different levels of support.

A big issue in relation to drought support is the trigger for that support; in other words, when is a drought a drought? What support becomes available? Is the support adequate to meet community's needs? Is it available in a timely manner?

Rural economy

Drought not only impacts on-farm production and productivity; it has an impact on the complete supply and value chain. For a rural economy to operate effectively, the whole value chain needs to be assessed for drought resiliency. This requires both pre-farm gate and post-farm gate considerations.

The impact of drought is experienced differently across the region. More diversified, larger communities can dampen the economic impact of drought, while smaller, agriculture-based communities can be hit very hard economically. Services during droughts are impacted. Especially in smaller shires, the ability of local government to provide support can be challenging – particularly when they have limited rate bases to draw upon and often large infrastructure networks, such as roads, to maintain.

Drought has a flow-through effect on local businesses. Smaller, localised businesses may have more connection with the community and may experience a greater financial impact.

Infrastructure

Good infrastructure, including transport/logistics, water distribution systems and housing, helps to build regional resilience to drought. Infrastructure is linked to regional requirements, which in turn are articulated in regional growth plans. Such plans need to be considered in terms of drought resilience building. Gap assessment is important to ensuring adequate regional coverage of infrastructure services and requires long-term planning. An extension of the Wimmera-Pyrenees pipeline in Central Goldfields, for example, may take up to 5 years to be in place if supported.

Farm management

Farm management in the Loddon Campaspe covers a broad range of sectors and scales, including broad-acre, artisan, horticulture and livestock. Planning farming businesses according to land capabilities, and approaches such as regenerative farming, supports resilience building in farming. Changes in water policy have impacted the distribution of farming systems, and the communities historically built around these systems, impacting the social fabric of the region.

People and community wellbeing

Mental and physical health are placed under pressure during stressful periods triggered by droughts. Droughts are often accompanied by heat waves and generally hotter days. Publicly available places to cool down, including pools and green spaces, help to relieve stress. Pools, public gardens, sporting grounds and other green spaces require urban water strategies to recognise their importance during droughts, and benefit from (irrigation) water supply prioritisation. Sporting grounds not only provide stress relief from drought related stresses; they also facilitate shared community activities, provide an informal place for peer support and help people avoid feeling isolated. Last resort cooled places can be identified for community members to gather when there are no other options to stay cool.

Empowered communities

Communities can be empowered through knowledge sharing, learning and supported decision making. Communities have raised interesting concepts during the RDRP consultation processes, such as empowered communities organising 'all hazard' annual forums to keep people well prepared and to allow planning based on risks. Continuing these forums in non-drought periods allows communities to continue preparedness preparations and share information on expected future events, thus reducing some of the uncertainty associated with drought events.

Another method raised relates to empowering communities by co-designing place-based resilience projects, which focus on story telling. The exchange of experiences and situations can be a powerful tool in terms of peer-to-peer learning. Exchanging knowledge and experience between communities can be created through regional networks.

These concepts will only be effective if they are implemented long-term. This requires investment, including in staff, and continuous effort to ensure success.

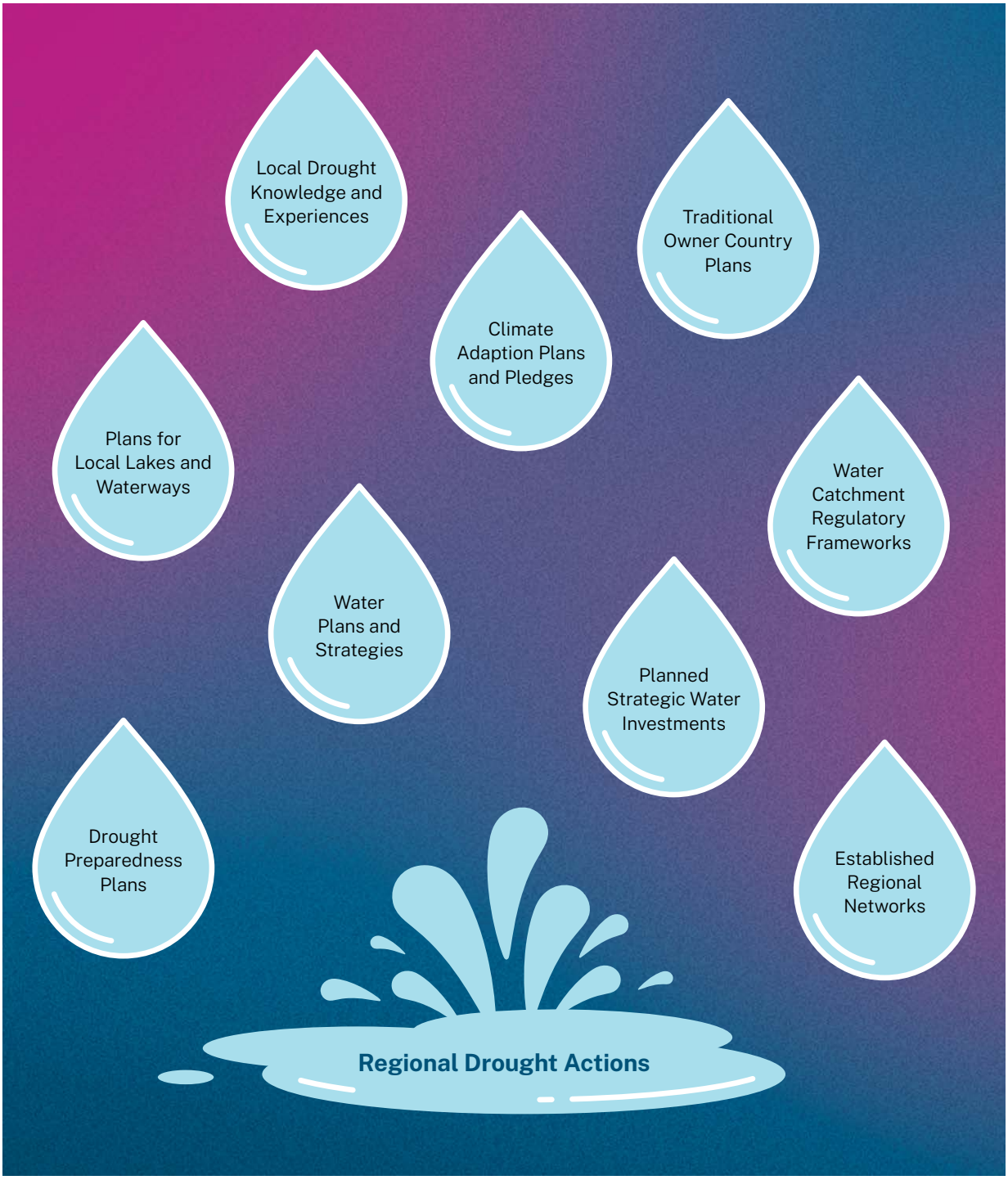
Place focused vs place based

There is a difference between place-focused and place-based approaches. Place-focused is driven from the outside, place-based is driven by local ideas and initiatives. The Loddon Campaspe community have expressed a clear preference for place-based initiatives.

A balance is needed between the capacity and experience of a community, and the responsibility placed on them to deliver services. Under the Plan, communities will consider this to provide a place based approach to implementation with localised activities and initiatives.

Appendix 2: Existing actions and strategies in the Loddon Campaspe

Several region-specific action plans and strategies exist for the Loddon Campaspe. The review in this appendix does not attempt to be a complete overview. However, a select number of documents are reviewed to support the thematic framework and actions listed in the main part of the Loddon Campaspe Plan. The reviews in this appendix are ordered by year of publication, with the most recent documents listed first.



Djaara (Dja Dja Wurrung Clans Aboriginal Corporation), 2023a. Turning 'wrong way' climate 'right way' – Dja Dja Wurrung Climate Change Strategy 2023–2034

The Climate Change Strategy published by Djaara assesses the actions required to reverse negative climate impacts on Djaara Country. It includes a comprehensive review of existing plans and strategies that come together in the Climate Change Strategy. The strategy focuses on 6 themes: Country, Fire, Water, Trees, People and Sky Country. The strategy includes indicators of success and stresses the need for integration of cultural heritage and joint management practises. The strategy also includes the need to work together and identifies partners.

Djaara (Dja Dja Wurrung Clans Aboriginal Corporation), 2023b. Dhelkunyangu Gatjin – Working together to heal water. Djaara Gatjin Strategy

A water economy has evolved that is worth billions of dollars annually, produces food and fibre for Australia and the world, provides drinking water and underpins local and regional communities. This water system is governed by the State resulting in water on Djandak — Djaara's water — being fully allocated to water users. Djaara are excluded from participating and benefiting in these water arrangements. Djaara consider their knowledge to be central to informing sustainable water management. Djaara currently own very little water resources and have very little say on how the water is managed on Djandak.

The Strategy outlines 3 key outcomes which have been summarised here:

1 Make decisions for Gatjin (water): to meet obligations to heal and manage Djandak and enjoy traditional rights, Djaara Culture and Lore must be at the heart of water policy, planning and management.

2 Secure a growing share of water rights and entitlements: increased water entitlement is some restitution of stolen water rights, enables the determination for the best use of water for cultural purposes, and allows direct involvement in the water economy.

3 A Djaara Gatjin Authority: a Djaara water authority is required to manage water and water interests and acknowledges that neighbouring mobs have authority for water on their country.

Integrated Water Management Forums, 2022. Coliban Strategic Directions Statement – 2022

The Coliban Integrated Water Management (IWM) Forum is one of ten regional IWM forums across Victoria that are realising the local implementation of the IWM Framework for Victoria. The Forum's purpose is to work together to create water cycle outcomes that support the future health and resilience of environment and communities. Fifteen opportunities were identified, grouped under 3 themes: Water for people, environment, and healing Country; Making more of water resources in a changing climate; Integrated planning for a sustainable future.

The following projects fall under the theme of 'water for people, environment, and healing Country':

- Implementing the Reimagining Bendigo Creek Plan
- Wanyarram Dhelk – Starting the Healing
- Castlemaine Stormwater Outfall Retrofit Scheme and Pilot Program
- Forest Creek Revitalisation Project
- Echuca Aquatic Reserve

The following projects fall under the theme of 'making more of water resources in a changing climate':

- Improved Drought Resilience for Bendigo with Managed Aquifer Recharge
- Diversifying Water Supply for the Castlemaine Botanical Gardens
- Diversifying Water Supplies for Parks and Gardens
- Increased Flows in the Coliban River for Cultural and Ecological Benefits
- Managing Trentham Stormwater Quality and Quantity for Healthy Waterways
- Recycled Water for a Greener Echuca

The following projects fall under the theme of 'integrated planning for a sustainable future':

- Water Sensitive Urban Design for New or Upgraded Developments (Land and Buildings)
- Bendigo Regional Employment Precinct
- Macedon Ranges North IWM Plan
- Servicing Small Townships

Adapt Loddon Mallee, 2021. Loddon Mallee Climate Ready Plan

The Climate Ready Plan for the Loddon Mallee focuses on People, Places and Sectors, and uses the four themes of Knowledge, Connection, Wellbeing and Security to identify actions required to adapt to climate changes. The global objectives in the plan include:

- Individuals and communities have the knowledge and tools they need to become climate ready;
- People in Loddon Mallee feel connected to their communities and supported to become climate ready;
- Individuals and communities are happy and healthy; Individuals and communities have the housing, food, financial security and access to the services they require;
- Our region is continuously learning about the effects of climate change on our natural and built environments;
- Places in our region are connected by resilient infrastructure and environmental corridors; Our natural and built environments are healthy and sustainable;
- Our natural and built environments are protected from the impacts of climate change;
- Businesses have the knowledge and resources they need to make confident decisions for operational continuity and competitive advantage;
- Local businesses feel connected, incentivised and rewarded to become climate ready;
- The health and safety of local workforces is protected;
- Local businesses have secure access to climate resilient markets, technologies, financing, and transport channels.

In addition to 111 actions defined under these themes, the plan contains several stories of how people, places and sectors are getting ready for climate impacts.

North Central Catchment Management Authority, 2021. North Central Regional Catchment Strategy

The North Central Regional Catchment Strategy (RCS) is the overarching strategy for all involved in land, water and biodiversity management within the north central region. Through its vision – 'working in partnership for a healthy catchment' – it provides a roadmap for collective efforts to care for the catchments.

The RCS identifies likely climate change impacts on natural resources and provides direction that will support their protection in a hotter and drier future. Partnerships are essential in delivering it.

The RCS shows how it fits within the context of existing land, water, biodiversity, community, Traditional Owners and Aboriginal Victorians, and climate change policies. The first 5 listed also cover the themes that the RCS is setup around. Climate change is evaluated for each of these themes, and opportunities and threats are highlighted.

Department of Agriculture, Australian Government, 2019. Drought in Australia - Australian Government Drought Response, Resilience and Preparedness Plan

The 2019 Commonwealth Drought Response, Resilience and Preparedness Plan focuses on 3 areas:

- Immediate action for those who are in drought
- Support for the wider community affected by drought
- Long term resilience and preparedness.

The Commonwealth sets out their vision: to shift away from direct drought support and focus on preparedness and resilience building instead. The plan sets out the responsibilities the Commonwealth sees for different levels of government (Commonwealth and states and territories) and identifies a strong responsibility for industry. This includes industry organisations and leaders and also the individual farm business level. The vision of the plan is to have farm businesses and rural communities that are prepared for, and capable of managing, drought in pursuit of a prosperous and sustainable future.

Of the 6 foundations of the plan, 2 describe the expectation of more frequent drought occurrences and note that drought is not a natural disaster. The other 4 focus on responsibilities at the farm and community level, and include:

- Farming is a business and drought is one of many business risks that should be managed;
- Drought preparations must continue during times of no drought;
- Policies and programs should focus on planning and preparation for future droughts and be developed with industry and communities;
- Information (social, economic and environmental) about drought conditions and impacts should be collected and understood at the local level so that governments, communities, businesses and farmers can tailor their preparation, plans and responses.

North Central Catchment Management Authority, 2016. North Central Victoria Regional Sustainable Agriculture Strategy

In 2016 the North Central Victoria Regional Sustainable Agriculture Strategy was published, with the aim of supporting productive farming while protecting the region's natural resources base. Two farming zones are identified that overlap with the Central Highlands region: a mixed farming zone in the west, covering Marnoo, St Arnaud, Avoca and Clunes, and a diverse farming zone around Creswick, Daylesford, Kyneton and Woodend. The characteristics of each zone are presented. Three scenarios for sustainable agriculture are discussed:

- A paradigm shift, where agriculture is shifted to be fully adapted to Australian conditions, e.g. moving towards a low input grazing system based on native grasses;
- A mid-level change, where farming aims for sustainability, such as through increasing soil carbon through sub-soil manuring;
- An incremental change, making small changes and allowing for adaptation to uncontrollable influences, without fully eliminating the risks to sustainable agriculture.

North Central Catchment Management Authority, 2015. North Central Climate Change and Mitigation Plan

In 2015, the North Central CMA published a Climate Change and Mitigation Plan. The process to develop this plan included climate projections, followed by a vulnerability assessment, community workshops, and the development of a mitigation plan. Mitigation options focus on the topics of vegetation, soil, carbon farming and carbon sequestration for multiple land uses. Community concerns related to climate change and the drought resilience plan include increased fire risk; declining water availability, quality and security; water pricing; and the impact of extreme heat on human and animal health.

The capacity for the community to respond to events is listed as a concern, especially related to service provision, social cohesion and issues faced by smaller rural communities. A set of strategic goals is listed for the Goldfields region, covering the Central Highlands, with a focus on natural revegetation, monitoring of biodiversity, and implementing a large-scale carbon sequestration action across the landscape in the goldfields area.

Djaara (Dja Dja Wurrung Clans Aboriginal Corporation), 2014. Dhelkunya Dja Country Plan 2014–2034

The Dhelkunya Dja - Dja Dja Wurrung Country Plan 2014–2034 describes 9 goals the Djaara aspires to. The Plan provides Country and cultural background, and provides an approach for the implementation of the Plan. The 9 goals and themes are framed around Djaara (our People), Cultural Practises and Customs, Cultural Heritage, Bush Tucker (edible and medicinal plants and animals), River and Waterways, Land, Self-determination, Traditional Owner Economy and Joint management.

87% of Dja Dja Wurrung Country is privately owned and 65% of land is used for agriculture. The other 13% is a combination of parks, forests and reserves. A historical transformation of the natural landscape has been driven by agriculture, urban settlement and mining. The transformation is continuing, both driven by natural and human caused factors. The Vision for Country described in the Plan includes strong health and wellbeing of Dja Dja Wurrung People, underpinned by a living

culture; Lands and water that are in good condition and actively managed to protect Dja Dja Wurrung values; and that Laws, culture and rights of all Dja Dja Wurrung People are promoted.

While there is no specific reference to drought, the themes of Rivers and Waterways, and Land are related to drought management.

The aspirations in the Plan for Rivers and Waterways are to ensure that rivers and waterways are healthy and meet the needs of our people and land. Actions defined under this theme include assuring a meaningful role in the development of water policy frameworks in Victoria and the Murray-Darling Basin, and the establishment of a formal role in regional water management through participation in development and implementation of Regional Water Strategies.

Actions under the Land theme focus on remediation and restoration of mined land, with the objective that our upside-down country is healthy again.

North Central Catchment Management Authority, 2013. Caring for Country – A sustainable land management guide for rural living in north central Victoria

The North Central CMA (2013) published a document for new and existing landholders to support sustainable choices with the available resources. It contains suggestions for land planning, efficient irrigation and sustainable water sourcing.

In the section on water savings, it is suggested to install and use rainwater tanks for domestic water use, as well as several other domestic water savings tips. For gardens, it is suggested to use grey water for irrigation, reduce lawn areas, use native, climate adapted plants, and use mulching to reduce evaporative losses.

This is followed by a section on how to recycle water, and the best practices to manage recycled water. The chapter on biodiversity includes the benefits of native vegetation, and suggestions on how to manage native vegetation on rural properties.

A large section on soils explains the different types of soils landholders may encounter, and the most sustainable ways to use the different soil systems.

The plant and animal sections suggest best management practices for different land uses.

These are followed by a climate section, explaining the drivers of weather systems and climate.

A summary table shows the impact of a changing climate on the environment, the community, primary production, and water. This is concluded by a heading to prepare for weather emergencies, starting with risk assessment, then risk management, and preparation for specific weather-related events like fire, floods and thunderstorms. This document ends with a chapter on the community, and how to be good neighbours to each other.

Victorian Auditor-General, 2008. Goldfields Superpipe

This report was undertaken in recognition that, at the time, the Victorian Government was managing its water resources in unprecedented drought conditions. Water storages that serviced the key regional centres of Bendigo and Ballarat only had water volumes of approximately 10% of capacity – their lowest levels ever recorded. Despite the severe water restrictions introduced by the Coliban and Central Highlands water authorities, Bendigo and Ballarat almost exhausted their drinking water supplies in 2007.

In response to the extreme conditions, the State Government, in conjunction with Coliban and Central Highlands, constructed a major water pipeline, called the 'Goldfields Superpipe' that connects Ballarat and Bendigo to the Goulburn River system. This was finalised in 2008. The Superpipe aims to improve the security of water supplies in the region by allowing both water authorities to access the more reliable supplies in the Goulburn River.

The Superpipe has 3 components: a Bendigo pipeline that draws water from the Waranga Western Channel, delivers it to Bendigo via the Eppalock to Sandhurst pipeline, and supplies Lake Eppalock; a Ballarat pipeline, from Bendigo's Sandhurst Reservoir to Ballarat; an augmentation of the existing Eppalock to Sandhurst pipeline. The 46.5km Bendigo pipeline is being managed by Coliban. The 87km Ballarat pipeline is being managed by Central Highlands. The Commonwealth and Victorian governments part-funded the Bendigo and Ballarat pipelines.

Photo: Macedon Ranges Shire

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For more information on the Future Drought Fund visit:
www.agriculture.gov.au/fdf

For more information on Victoria's Regional Drought Resilience Planning program visit:
www.agriculture.vic.gov.au/futuredroughtfund

frontier economics

Drought in the Loddon Campaspe Region

Information to support the Loddon Campaspe Regional Drought Resilience Plan

November 2022

This research was jointly funded by the Australian Government and Victorian Government under the Future Drought Fund.

Regional summary

Loddon Campaspe is situated in central Victoria with Bendigo, Victoria's fourth largest city, at its heart. The region is a major producer of dairy, sheep and beef and is well known for specialised food and beverage production. The mix of agricultural industries creates an agricultural processing and services hub for central Victoria with the Region having a Gross Regional Product of $11.75 billion. The region had a population of 253,166 people in 2021.

The southern part of the region extends to the Macedon Ranges incorporating towns such as Macedon, Kyneton and Gisborne. The northern part forms part of the New South Wales-Victorian border along the Murray River, with Echuca being the main regional centre in the far north-east of the region. The western reaches of the region border the Mallee and Wimmera and are primarily rural. Other moderately sized towns in the region include Castlemaine and Maryborough.

The Loddon Campaspe region includes the traditional lands of the Dja Dja Wurrung peoples and small sections of the lands of the Taungurung, Wurundjeri and Yorta Yorta people as well as other Traditional Owner groups in Victoria who are not formally recognised.

Key industries for employment in the Loddon Campaspe region in 2021 included health care and social assistance, retail trade, construction, manufacturing and education and training, with agriculture, fishery and forestry contributing 5.7% employment to the region.

Aside from rainfall relied upon for dryland farming, water in the region is sourced predominately from Goulburn-Murray Water irrigation channels, with supplementary water also sourced from groundwater and rivers, creeks and lakes. Water is accessed from the Goulburn system via the Waranga Western Channel, the Murray system as well as the Campaspe, Coliban and Loddon systems.

The region recently experienced drought and dry seasonal conditions during the Millennium drought (1997 to 2010) and 2017 to 2019.

Assessing the impacts of drought

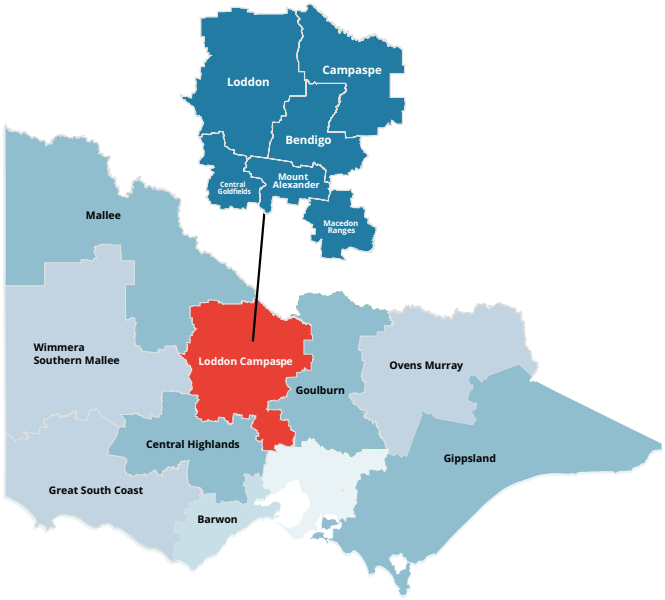
The Regional Drought Resilience Planning Program (RDRP Program) is about planning with communities at the regional level to better prepare for the next drought and forms part of the Commonwealth Government's Future Drought Fund.

Economic analysis, research and stakeholder discussions have been undertaken to consider three questions:

The prevalence, severity and impacts of drought in the past

How this may change in the future

The Loddon Campaspe region's vulnerabilities and gaps in preparedness for drought



Consultation with local stakeholders was undertaken for the analysis, which enabled a better and more localised understanding of how droughts impact the region.

This research was jointly funded by the Australian Government and Victorian Government under the Future Drought Fund.

Drought

The definition of drought varies depending on region, needs and disciplines. Below are 4 ways to measure whether a region is in drought.

1. Meteorological drought: degree of dryness or rainfall deficit

2. Hydrological drought: precipitation shortfalls on surface or subsurface water supply

3. Agricultural drought: links various characteristics of meteorological (or hydrological) drought to agricultural impacts

4. Socioeconomic drought: associates the supply and demand of some economic good with elements of meteorological, hydrological, and agricultural drought.

The first three approaches deal with ways to measure drought as a physical phenomenon. The last deals with drought in terms of supply and demand, tracking the effects of water shortfall as it ripples through socioeconomic systems.

However, there is no one definition that encompasses all factors that bring rise to drought conditions — and the resultant impacts on regions and communities. Drought is complex and dynamic, meaning a universal 'definition' is near impossible. For example, when referring to the Millennium drought in practice it was a combination of the types of drought listed above.

Assessment framework

In order to consider how drought affects farms and the wider community, the following analytical framework distinguishes between agricultural impacts and non-agricultural impacts of drought. The framework is designed to consider the implications of specific drought impacts and what the outcomes of these implications will be. Within the two distinctions, the framework considers the social, economic and environmental impacts, to develop a more complete understanding of how drought impacts flow through the community.

Figure 1 demonstrates how this analytical framework can be applied to agriculture. Drought reduces agricultural productivity, which results in a change in primary production on farm. This impacts farm income, consumption of farm inputs, and production of farm outputs. These on-farm implications of drought flow through to the community to generate a range of outcomes. The existence of agricultural markets (e.g. sheep and cattle prices, crop prices, etc) means the impact of drought on agriculture is easier to quantify than other non-market impacts of drought.

Figure 1 also considers how drought impacts non-agricultural settings. Drought can lead to significant water restrictions and low availability of water in lakes, rivers and dams. A reduction in water availability may mean community greenspace is reduced which will in turn reduce liveability benefits in the community and the amenity values from the green space. Furthermore, there are flow on effects if parks and sportsgrounds cannot be used including impact on community cohesiveness. A lack of water in lakes, rivers and dams could also hurt tourism in the region as there is a reduced ability to boat, water ski or fish. This in turn reduces the income and spending within the regional economy.

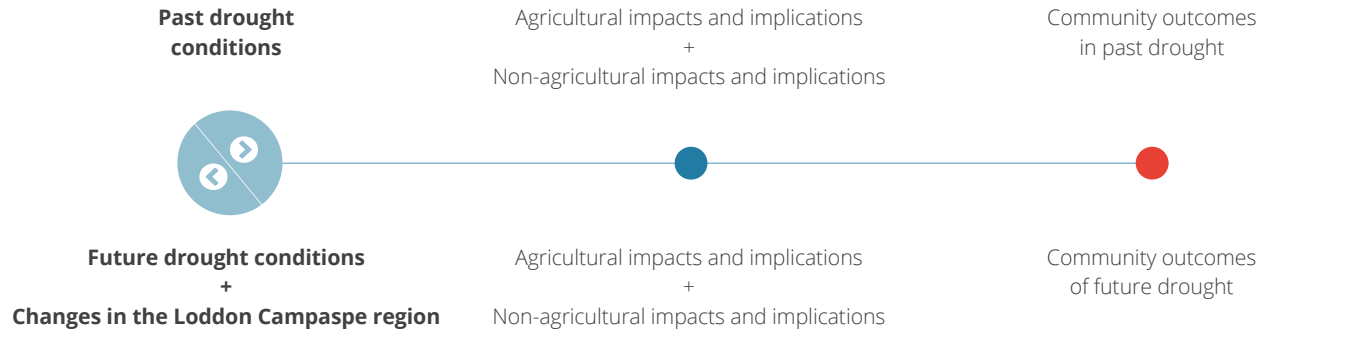
Figure 2 demonstrates the structure of the analysis for both past and future drought periods, with considerations from both agricultural and non-agricultural impacts of drought flowing through to community outcomes.

Figure 1 Impacts of drought and flow on effects

Drought impact	Implications	Outcomes	
Change in agricultural productivity	• Change in primary production • Change in farm income • Change in farm inputs • Change in farm outputs	• Reduced spending in the community • Reduced demand for ag farm services (but could increase in demand for feed) • Reduced output associated	• transport, processing/ manufacturing • Reduced primary production for distribution and value-add • Mental toll (and potential migration)
Water restrictions	• Households: outdoor water use • Community green assets: parklands and sportsgrounds	• Liveability and mental health • Mental toll • Potential migration	• Access to green space and flow on effects (i.e. footy clubs, parent groups etc) • Amenity values from green space
Water availability in lakes, rivers & dams	• Less water available for recreation (boating, water skiing, etc) • Reduced fishing opportunities	• Reduced recreation and tourism	

Note: this summary does not provide an exhaustive list of impacts, but rather is about providing a consistent evidence base across Victoria's nine regions.

Figure 2 Structure of analysis



01 Past drought conditions

Large drought events have had wide effects across Victoria, with each drought being different in its regional severity and distribution. The last 25 years has seen Loddon Campaspe experience extensive drought periods, starting with the Millennium drought from 1997 to 2009 and more recently the dry conditions experienced from 2017 to 2019.

The historical rainfall and temperature charts in **Figure 3**, provides evidence of the severity of these recent drought events, using Castlemaine as an example. The period of 2001 to 2009 was particularly hot and dry , with all of these years except for 2007 receiving less than median rainfall, while 2006 received rainfall below the 10th percentile. At the same time the average maximum temperature was well above the median for the second half of the Millennium drought. Hot and dry periods were also experienced from 2013 to 2015 and again from 2017 to 2019.

The lack of rainfall during the Millennium drought resulted in significant reductions in water availability across the southern Murray-Darling Basin and the regulated surface water systems of Campaspe and Loddon reached 0% for high-reliability water shares in 2008 and 2009.

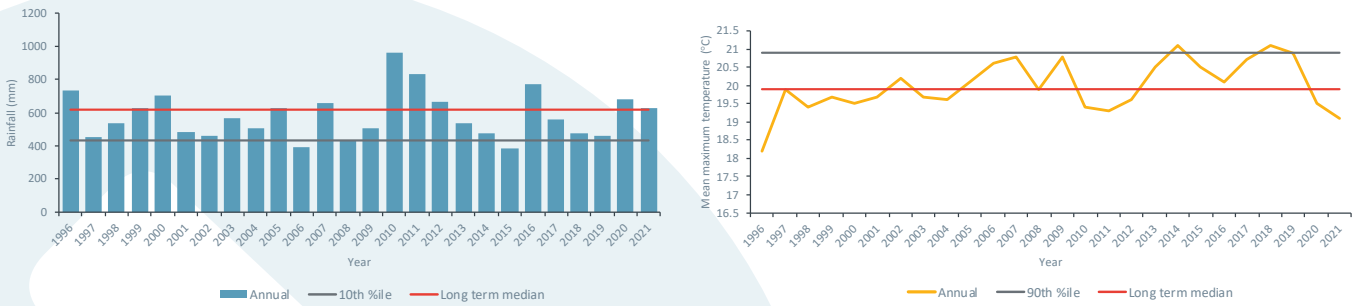
The high levels of irrigation throughout the region is likely to limit the impacts of short periods of drought. Unlike dryland farms which rely on rainfall, farms in irrigation districts have continued access to water that can be drawn upon during dry periods and water storages act as a buffer between years. However, during, extended periods of drought, such as during the Millennium drought, water allocations may not be sufficient to maintain production levels. Further, dry periods in the Loddon Campaspe and connected regions of the southern Murray-Darling Basin result in competition for water and high water prices for those looking to buy additional water.

The period of 2017 to 2019 also saw significant reductions in rainfall and hot temperatures, however the shorter time period led to only a single year of reduced water allocations in 2019-20.

Recently experienced droughts and dry seasonal conditions in the region:

- Millennium drought
- 2013 to 2015
- 2017 to 2019

Figure 3 Annual rainfall and average maximum temperature in Castlemaine



02 Agricultural impacts and implications of drought + Non-agricultural impacts and implications

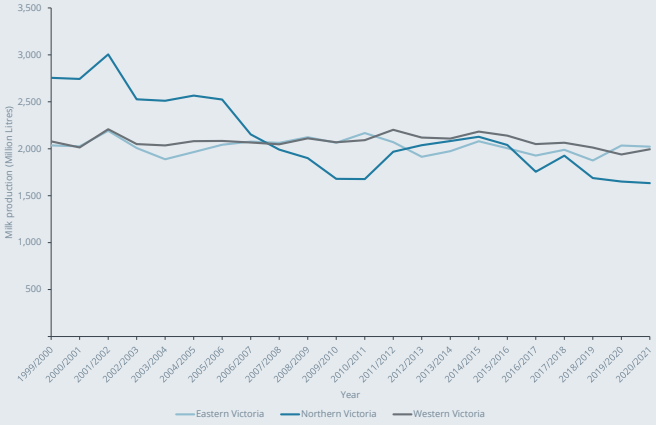
Irrigated agriculture makes up a significant portion of agricultural production in the Loddon Campaspe region (38% of agricultural production by value), primarily dairy and livestock. Dryland production is a mix of livestock grazing, cereal crops, hay and other broadacre crops. There is also a significant intensive livestock production of pigs and poultry. A key input to all livestock farms is reliable and clean stock water.

Given the region's extensive use of irrigated agriculture in the north, production and profitability decreased significantly during the Millennium drought. Irrigated agriculture faced a high 'cost' of water, given the opportunities to sell or the requirements to purchase water from the water market. Water allocation prices reached monthly averages of $600+/ML during 2006 to 2009 (compared to <$100/ML in the wetter conditions of 2021 and 2022). As can be seen from **Table 1**, it is generally not viable for irrigators in the region to pay such high water prices.

Table 1 Threshold water price for Loddon Campaspe irrigation industries

Threshold price for irrigation (above which irrigation becomes unviable) (median $/ML)	
Dairy	200
Cropping	150
Horticulture (orchard)	500
Grazing	170
All irrigators	200

Figure 4 Victorian annual dairy production



Milk production is the single largest agricultural product (by value) in the region. Regional milk production in Northern Victoria, which includes the Loddon Campaspe region, declined from over 3.0 billion litres in 2001-02 to 1.7 billion litres in 2009-10. This decline was significantly larger than the declines in Western and Eastern Victoria, where production remained relatively flat during this same time period (see **Figure 4**). ABARES farm survey data in the period from 1999-00 to 2007-08 shows total cash costs for dairy farms increased from $308,950 to $645,900.

The significant decline in milk production in Northern Victoria created implications for milk processing with reduced factory utilisation, changes in product mixes and retiring of different aspects of processing infrastructure.

Dryland productivity also declined significantly during the Millennium drought and 2017 to 2019 due to the lack of rainfall. Dryland production was significantly affected – for example, the harvest of cereal crops in 2018-19 was half the recorded tonnage of 2015-16 or 2016-17.

Town water

Water restrictions during the Millennium drought commenced early in the Loddon Campaspe region with some towns on Stage 3 in 2003 and many reaching Stage 4 in 2004. After a slight reprieve, many towns were on Stage 4 from 2006 and into 2009 or 2010. Stage 4 water restrictions prohibit the watering of any outdoor space, amongst other restrictions, which had profound impacts on the community's liveability.

Coliban Water purchased water entitlements and water allocations to assist with managing water security during this period, as well as investing in the Goldfields Superpipe Bendigo Link and a class A recycled water facility.

Recreation and Tourism

The Loddon Campaspe region has a number of lakes and rivers that are used for water tourism such as the Waranga basin, Lake Eppalock and the Murray River. These water systems are used for recreational fitness, such as rowing, as well as recreational boating and fishing. The Millennium drought significantly reduced the level of water tourism in the area, taking with it the additional income that enters the region from these activities.

Environment

There were negative impacts on riverbank and in-stream vegetation in the rivers and stream during the Millennium drought. Lack of rainfall causes serious problems for native animals, who moved closer to human life in search of water.

Traditional owners

Culturally significant sites particularly those located on flood plains and/or are water dependent were exposed and became vulnerable to damage. Additionally, the movement of stock to areas where there were feed reserves meant stock was placed in areas of cultural significance. Damage to these sites can lead to distress within the community.

03 Community outcomes in past droughts

Agriculture is an important segment of the regional economy — contributing 49% of the 'value add' in the Loddon SA3 region and 22% in the Campaspe SA3 region. It is also an important employer, with the 'Agriculture, fishery and forestry' industry contributing 5.7% employment to the region. In addition to the significant direct employment in primary production in the Loddon-Campaspe region, slightly more people are directly employed in the up- and down-stream industries that provide services to agriculture and that process agricultural products.

This means that the decreases in agricultural production caused by drought created significant flow-on community impacts through reduced income and employment, especially on-farm labour and agricultural services. The impacts to irrigated and non-irrigated agriculture flowed through to impact the wider community through reduced overall spending in the community.

Economic modelling of the Millennium drought found that the Gross Domestic Product (GDP) of the Loddon Campaspe region declined by an average of nearly $95 million annually in the extended drought of 2006-07 to 2009-10. The modelling accounted for drought impacts on dryland and irrigated production plus negative spending effects in the regions. The modelled production impacts were found to have significant employment impacts (averaging a loss of 367 jobs annually over the same period).

The prolonged dry conditions led to the closure of the Campaspe Irrigation District in 2010. Irrigators could sell their water entitlements to the Commonwealth Government as part of water recovery for the Basin Plan.

The lack of farm income being generated during the Millennium drought meant that farmers needed to seek off-farm income in the community. Off-farm income going into drought improves the drought resilience of a given farm, by supporting income during variable farm returns. Over 75% of farms across the region are likely to already be dependent on off-farm income to be economically resilient and viable.

Many communities in the Loddon Campaspe region had and still have a high proportion of people directly affected by agriculture, with smaller communities heavily reliant on agriculture more impacted by drought. Production impacts also affected the range of down-stream processing facilities in the region. This meant that the negative impacts of drought were concentrated in those communities. Further, businesses in smaller towns generally did not have many options to respond to a decline in the spending and economic activity.

Overall, the cumulative effect of drought both on-farm and in the community led to significant impacts on the Loddon Campaspe community during the Millennium drought and 2017 to 2019 period of dry seasonal conditions. This also led to an increase in demand for services such as mental health and rural financial counselling.

01 **Future drought conditions + Changes in the Loddon Campaspe region**

02 Agricultural impacts and implications of drought + Non-agricultural impacts and implications

03 Community outcomes of future drought

Future Impacts of drought

Future impacts will differ from past impacts depending on the severity of future droughts, and the changes in the characteristics of the Loddon Campaspe region and its communities.

01 Future drought conditions

Climate change is likely to increase the variability of the weather in the Loddon Campaspe Region with future droughts likely to be longer, more frequent and more severe. Climate projections in **Figure 5** show that by 2050 the Loddon Campaspe region will be hotter, drier and be exposed to a growing number of fire danger days. It is important to note that the changes in average measures are expected to have the same or increased variability around them in the future climate.

The high levels of irrigation concentrated in the north of the region is likely to limit the impacts of short periods of drought. Unlike dryland regions which rely heavily on rainfall, irrigated regions have continued access to water that can be drawn upon during dry periods. Although this is unlikely to limit the impact during extended periods of drought where water allocations may not be sufficient to maintain production levels.

Changes in the Loddon Campaspe region

There have been a number of changes in the Loddon Campaspe region that will alter the impacts of drought in the future, including:

- Learnings and adaptations in agriculture since the Millennium drought, with the farming systems in the Loddon Campaspe region now more opportunistic and flexible. For example, dairy farmers and livestock producers can decide to use annual pastures, buy and store fodder and buy or sell water allocations depending on the prevailing conditions. Dryland livestock producers can utilise on-farm feed reserves, reduce stock numbers and purchase supplementary feed to manage periods of low rainfall.
- Competition for water has also significantly increased since the Millennium drought – particularly from Basin Plan water recovery (including water buybacks in the Loddon Campaspe and other regions, and on-farm water savings projects) and horticultural growth in the Lower Murray area.
- Town water security planning and investment has increased in the region. Given the investment in water entitlements, pipelines and alternative water sources, restrictions would be less severe and not as prolonged if there was a repeat of the Millennium Drought.
- Population changes (including an increase in sea/tree-changers due to Covid19) bringing additional water demand to the region.
- Increase in peri-urban development and number of lifestyle/hobby farmers which will change the water demands in the region
- Continuing diversification of the region's economy away from agricultural production.

Figure 5 Climate projections for the Loddon Campaspe region

Future droughts are likely to be longer, more frequent and more severe: By the 2050s

1.7 to 2.4 °C ↑

Average maximum temperatures in spring expected to increase by up to 3.3°C. Number of days over 35°C increasing from 4 days to 5-16 days.

4-14% ↓

Rainfall will continue to be very variable, Average rainfall in spring expected to decrease by 10-22%.

62% ↑

Number of very high fire danger days to increase by 11 days per year

02 Agricultural impacts and implications of drought + Non-agricultural impacts and implications

Agricultural production in dairy and mixed farming operations are likely to be most exposed to the increasing likelihood and severity of future droughts, as they are dependent on certain temperature and rainfall patterns. The adaptiveness of these producers and their ability to maintain sufficient reserves will be critical to their farm profitability, with farmers already having many strategies to manage drought. The prevailing circumstances of a future drought — such as commodity prices, interest rates and fuel and fertiliser costs — will also play a role in resultant impacts.

Further declines in dairy production will have flow on effects to dairy processing facilities, which may need to be rationalised if dairy production levels are not able to recover. A factory closure will have major implications for the town community and will also have a ripple effect through surrounding communities.

The region's response to future drought will be boosted by increases in irrigation network efficiency and reduced network costs and the delivery of water savings to irrigators. However, these effects are expected to be outweighed by the reduced water use in the region due to Basin Plan water recovery and competition for water with horticultural developments in Lower Murray. During future droughts in the Loddon Campaspe and the broader southern Murray-Darling Basin, water trade out of the Loddon Campaspe is expected in response to competing demands from water uses in other regions (as seen in 2017 and 2019).

Town water

Changing attitudes to household water use has reduced per capita water use in the region, and town water security planning has improved — building on lessons from drought. Urban Water Strategies are now required to incorporate future impacts of climate change (including potential droughts). For example, Coliban Water has used the Department of Environment, Land, Water and Planning's 2020 'Guidelines for Assessing the Impact of Climate Change on Water Availability in Victoria' to undertake water demand system forecasts and identify a range of climate scenarios to assess potential impacts on water supply and customer demand. Further, water trade will provide additional flexibility for town water supply in the Loddon Campaspe region.

Recreation and Tourism

Tourism will continue to be exposed to fluctuations in water access under future drought. Initiatives that are not dependent on water availability could boost visitors to the region. COVID-19 has provided a boost to regional travel and relocation, evidenced by an increase in population from 2016 to 2021.

Environment

Inland lakes, rivers and dams are likely to be at lower levels during times of drought which will impact the native biodiversity living in and relying on these water bodies as well as on riverbank condition and in-stream vegetation.

Traditional Owners

Culturally significant sites particularly those located on flood plains and/or are water dependent may be exposed and be vulnerable to damage. Damage to these sites can lead to distress within the community.

03 Community outcomes in future droughts

Economic modelling of potential future drought in Victoria found the Loddon Campaspe region would be significantly affected, with GDP falling by 22% and a reduction of almost 500 jobs in the region (see **Figure 6**). The modelled 3-year drought, while prolonged, is not equivalent to the most severe recorded in Victoria.

Access to local mental health services will be vital as drought conditions become more prevalent. Not only are mental health services important during times of drought, but improved mental health increases a person's ability to adapt. This can improve drought resilience by allowing people to effectively plan for future drought conditions as well as make informed decisions during a drought period.

Greenspace and associated community sport are drivers of community spirit and liveability within local communities in the region. Water Corporations and Councils now have a strong understanding of the importance of greenspace for their communities. Coliban water is working with councils and the community to identify priority green spaces to provide water security during dry periods. However, should town water supply not allow watering of gardens this will have a mental health toll on residents.

The diversity of the Loddon Campaspe region will continue to mean that some areas will be impacted by future droughts more than others. While it is not possible to predict which area within Loddon Campaspe will be more affected than others, smaller communities that are highly dependent on agriculture and more geographically isolated will be most exposed. Declining populations in smaller towns may mean they are more vulnerable to change.

Overall the Loddon Campaspe region's high exposure to agricultural industries creates the potential for significant community impacts from future drought.

Figure 6 CGE Modelling for a future drought

Flow through impacts from agriculture to the community

The increased likelihood and severity of drought in the future and the increased competition for water under these conditions will mean that the drought impacts on the community from agricultural consequences of drought are expected to be larger than have been historically observed.

Impacts on GDP

Economic modelling of potential future drought in Victoria found the Loddon Campaspe region to be significantly affected, with:

- GDP falling by 13.6% from direct drought impacts
- GDP from all impacts in the region falling by 22.4%
- A fall in employment of almost 500 jobs.

This would flow through the region reducing consumption/spending by nearly 10%.

22.4% GDP

500 jobs

Employment and value add impacts

The effects on employment will not be distributed equally across the regions, with the more agriculturally dependent regions likely to experience larger decreases in employment.

The economic modelling finds that the large impact of drought on value-added output of agricultural primary production **has significant impacts on the value-added output of:**

- the agricultural services sector, and food processing (dairy products and meat products),
- construction, wholesale and retail trade.

Vulnerabilities and gaps in preparedness

The Loddon Campaspe region has learned from previous drought conditions and already has many drought resilience measures in place or in development. Previous experiences of drought means that primary producers and communities are highly familiar with the challenges of a serious drought, but they may be 'worn down' by the prospect of another prolonged drought. This fatigue could promote migration in response to another drought, creating a vulnerability to Loddon Campaspe.

Agricultural research, development and extension will remain important to support ongoing adaptation to build preparedness to future drought. Farmer's capacity to adequately prepare for drought differs significantly within the Loddon Campaspe region. Addressing gaps in on-farm business and decision-making skills, such as the skills required to maintain more adaptive farming practices and the ability to maintain buffers of financial assets or feed stocks, will help farmers better prepare for future droughts.

A continued vulnerability to the region is the increasing competition for water. Fodder management is also a continuing challenge and an important drought response given the prevalence of livestock industries.

Water quality in natural waterways that are used for stock drinking water is a particular vulnerability to livestock producers that do not have an alternative water source. More toxic strains of blue green algae have been observed, and a drying climate is expected to increase risks of water quality issues. Stock water access is also a vulnerability in a number of Coliban Water rural systems, with deliverability concerns in high loss systems if water allocations are below 100%.

Diversification is a key mechanism for the regional economy to contain the drought impacts flowing from the agricultural sector. Towns throughout the Loddon Campaspe region have varying degrees of diversification with larger, centrally located towns more likely to experience these benefits. Specifically:

- The major regional centre, Bendigo, will provide somewhat of a buffer to future drought impacts as it has a diverse economy. Bendigo itself will be buffered to some degree from reductions in agricultural output as it has alternative industries (such as health, education, retail). Townships near Bendigo may also benefit from this buffer in the face of agricultural declines during drought. This is especially the case for townships within an approximately 50km radius of Bendigo, which offer the benefits of rural living while also allowing access to employment opportunities in the larger centre.

- Medium sized communities located towards the southern end of the region such as Woodend, Kyneton and Castlemaine are less dependent on irrigated agriculture, with additional buffering capability due to a range of factors, including increased levels of tourism.

- Smaller or more agriculturally reliant communities found in the north-west of the region such as Boort, Pyramid Hill and Serpentine will be more severely affected by drought, as there are limited alternatives that can replace the people and economic activity provided by irrigated agriculture or water-based recreational activities.

The Tri-State Murray Natural Resource Management Drought Resilience Discussion Paper identified: *to make the appropriate decisions farmers need to not only have the analytical and decision-making skills but also adequate mental health. Stress, delayed decision making, not able to spot opportunities and 'giving up' are all significant issues as a drought builds and during a drought.*

Access to services such as mental health and Rural Financial Counselling are particularly important to manage drought. These kinds of health services have long wait times in the region, even outside of drought. Following the onset of a drought there is a general lag in the provision of additional health services. This means that individuals unable to access these services are having to make drought management decisions under significant stress.

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