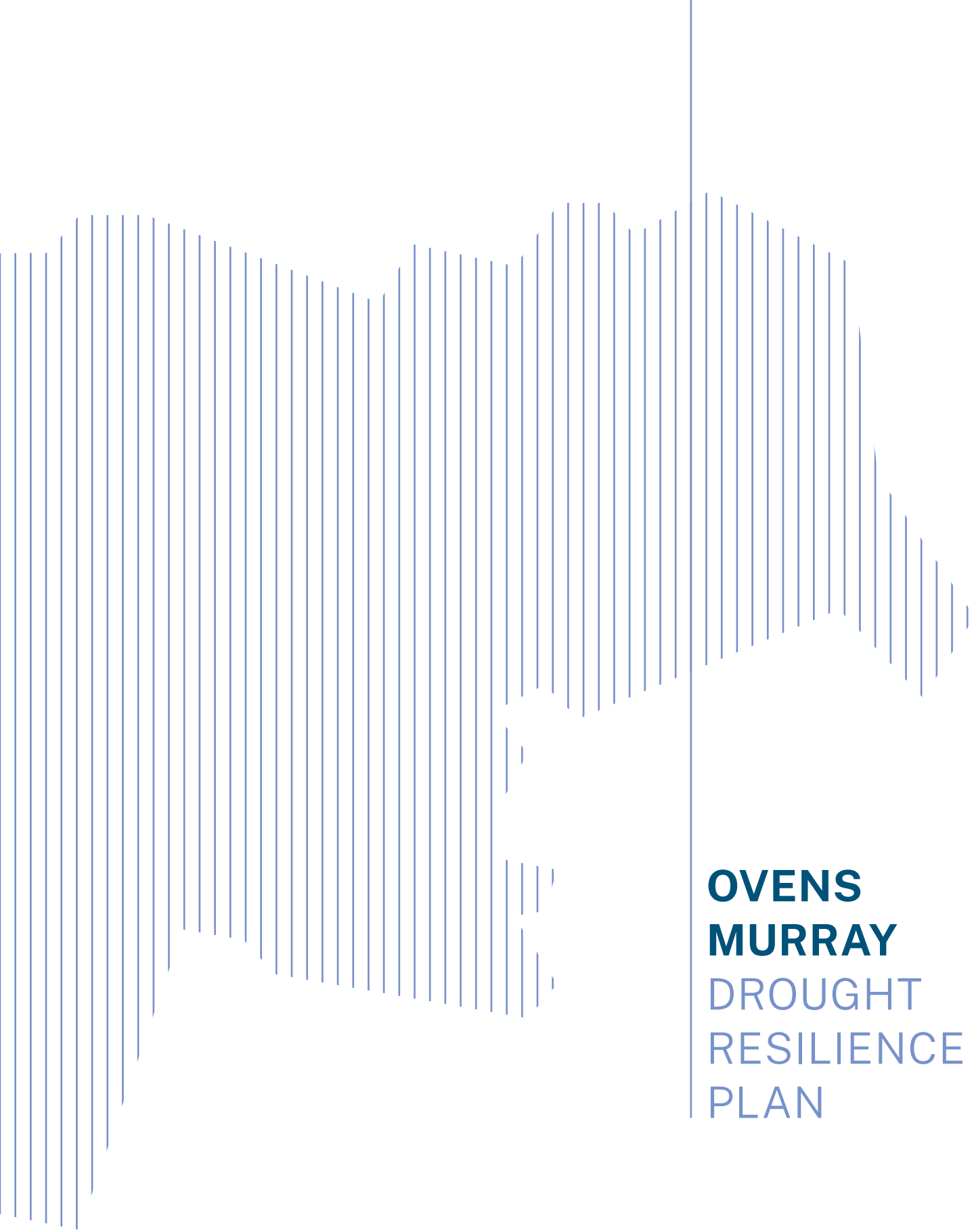


OVENS MURRAY DROUGHT RESILIENCE PLAN

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. We acknowledge that the Ovens Murray region is on traditional lands, including those of the Yorta Yorta, Taungurung and Gunaikurnai Nations, as well as other Traditional Owner groups who are not formally recognised.

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 protection 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 is an enduring, regular feature of the Australian landscape which inflicts major financial, social, and environmental costs on farm businesses and communities.

The Ovens Murray Drought Resilience Plan (the Plan) is one of nine regional plans developed in Victoria, as part of the Regional Drought Resilience Planning (RDRP) Program, under the Future Drought Fund. The region is committed to taking steps now to ensure good strategies are in place to prepare for and manage future drought conditions.

The $5 billion Future Drought Fund 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 four focus areas:

- Better climate information
- Better practices
- Better planning
- Better prepared communities

The RDRP Program is part of the 'better planning' focus area and supports the development of regional drought resilience plans throughout Australia from 2021 to 2025.

The Ovens Murray Plan bridges all Future Drought Fund focus areas and identifies a broad variety of actions for the community in the region to build drought resilience.

The aim of the Plan is to empower and enable communities to collectively identify and address their needs to be better prepared for and able to manage future dry seasonal conditions and droughts. The Plan also draws out regional needs and priorities to inform future investments in drought resilience.

Some of the key programs and documents that informed the development of the Plan are the:

- Goulburn Drought Resilience Plan[1]
- Ovens Murray Regional Skills Demand Profile[2]
- Ovens Murray Coast Digital Plan[3]
- Victorian Primary Production Climate Change Adaptation Plan 2022–2026[4]
- Hume Climate Change Adaptation Strategy[5]
- North East Regional Catchment Strategy[6]
- Future Drought Fund's Farm Business Resilience Program[7]
- Riverine Plains, North East Node of the Victorian Drought Resilience Adoption and Innovation Hub[8]
- Victorian Government's 'Strong, Innovative, Sustainable: A New Strategy for Agriculture in Victoria'[9]

This Plan builds on the Ovens Murray region's historic and recent experiences of drought and related strategies, programs, and activities. It has been developed using the consistent methodology of the RDRP Program across Victoria including:

- **A 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.

Agriculture Victoria facilitated the development of this Plan which is jointly funded by the Victorian and Commonwealth Governments under the Future Drought Fund.

"To enable our farms to be productive, sustainable, and profitable we adapt. We adapt day by day, season to season, and generation to generation. We adapt to many things, but one significant part of our environment that we adapt to is climate and climate change".

— Katie Warner, Chief Executive Officer, North East Catchment Management Authority

Contents

INTRODUCTION

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

Drought is most effectively addressed at the regional level, considering factors like community, geography, economy, and climate. Droughts vary in duration and impact and should be managed as a regional risk, with community members taking the lead, supported by industry and government.

The Ovens Murray Plan provides an opportunity to identify a series of actions aimed at enhancing social, environmental, and economic resilience to dry seasons. Given the substantial body of pre-existing work in relation to drought, a key goal of the Plan is to align with and reinforce existing strategies and activities to bolster the region's drought resilience.

Purpose

There could not be a better time to plan for drought in our region and communities. Development of the Plan has encouraged a collaborative and coordinated approach, and includes a collectively agreed framework for building economic, environmental, and social resilience to drought.

The long-term objectives of the Plan are to:

- Build the social capital of communities through increased connectivity, improved wellbeing, and a greater sense of security,
- Empower communities and businesses to implement activities to build their economic resilience to drought, and
- Support land managers to improve the natural resource base for long-term productivity and landscape health.
- Support Traditional Owners and Aboriginal communities to continue to self-determine and care for Country in the lead up to, and during, times of drought.

A resilience approach has been used to guide this Plan, and focuses on the connections between people and place. With this approach, drought and climate variability can be viewed as opportunities to build resilience and drive transformation through planning, preparedness and learning.

For the purposes of this Plan, resilience is defined as the ability of people and the environment in the Ovens Murray region to cope with change, while continuing to function in a desired way. Resilience is about being able to adapt, thrive and take advantage of new opportunities rather than trying to maintain the status quo. This includes the ability to be flexible yet decisive during periods of uncertainty and change.

Resilience is critically important in rural and regional communities because it assists individuals and groups to develop the mindset, social network, and business skills to navigate difficult periods and extreme events.

Plan development

Agriculture Victoria facilitated the development of this Plan in collaboration with a Reference Group of key stakeholders from the Ovens Murray community, regional organisations, and sectors with a role in managing drought and its impacts (Appendix 1). In addition to the Reference Group, the Plan was co-developed in consultation with:

- farmer representatives
- industry groups
- the water, health, education and financial sectors
- Traditional Owners
- local, state, and Australian government agencies.

The wider community was engaged via the Victorian Government's public consultation platform Engage Victoria.

Several engagement strategies were used to consult with community throughout the Plan's development, including:

- periodic meetings of the core Reference Group to guide the process and content
- targeted interviews with key stakeholders to provide content and advice
- surveys of community members and key stakeholders for feedback
- micro-workshops with key stakeholders and sectors.

Action learning is a process where peers 'learn by doing', collaborating on a project to problem solve, question, reflect and support each other to achieve a desired outcome. This type of learning has been central to the way the Plan has been developed. By listening, questioning and challenging diverse perspectives, we have attempted to identify and collate actions to enhance drought resilience into the future.

The initial stages of developing the Plan involved gathering information from the community on their experience of past droughts. This included highlighting what worked, what didn't work and identifying what the community believes is needed to increase drought resilience in the future.

Stakeholders told us that drought is experienced differently across the region and that:

- the pathway to resilience will vary depending on individual circumstances
- there is a strong connection between drought, fire, and flood
- drought has had a significant impact on Traditional Owners' ability to care for Country
- a more integrated approach to how risk is mitigated is required
- increased awareness and preparedness are essential to building social, environmental, and economic resilience
- all businesses have a responsibility to prepare for drought and that the best way to mitigate the impacts are by understanding the risks and being well prepared.

The development of the Plan included scanning existing strategies, plans and programs related to drought and drought resilience. This Plan builds on, extends, and seeks to avoid duplication with existing planning and strategic drought work in the region. This information was organised into themes and led to the development of a **thematic framework** under which the Plan's actions are now arranged.

Plan design

The Plan has a thematic framework which contains 5 **Themes** with associated **Outcomes**. Within each theme, **Actions** to achieve the desired outcomes are arranged under **Focus Areas** to guide effort and investment for building drought resilience. Some of the actions can be addressed directly by the community, while others require broader cooperation from governments, agencies, community organisations or the private sector.

Though a strong focus of the Plan is on agriculture and allied industries, community feedback highlighted that resilience should be considered more broadly due to the interconnection of social, economic, and environmental impacts of drought and the ripple effect on agricultural enterprises and the broader community.

The community identified a wide range of actions to improve resilience which have been collated into five themes with aligned outcomes to form the basis of this Plan:

Theme 1: People and Community

Outcome: A healthy and thriving region, resilient to climatic shocks, supported by local, trusted health and wellbeing services, and community connection

Theme 2: Coordination and Collaboration

Outcome: A coordinated and collaborative approach to decision making and delivery of drought resilience activities within the region

Theme 3: Agriculture and Allied Industries

Outcome: Thriving agricultural industries better able to withstand the impacts of drought supported by a skilled workforce

Theme 4: Natural and Built Environment

Outcome: Healthy landscapes better able to withstand the impacts of drought

Theme 5: Research, Education and Innovation

Outcome: Evidence based research and development to support industry to manage risk, uptake innovative practices and increase profitability

VISION

A broad range of values and perspectives are held across the Ovens Murray community. This helps shape the community's identity and potential to build resilience to change. Understanding the community's values and perspectives is critical, as individual and collaborative action is needed to achieve significant change and improve drought preparedness.

To encapsulate the region's commitment, enthusiasm and drive to become more resilient, a vision was developed. The vision articulates the aspirations of the region through the implementation of the Plan.

Vision:

Ovens Murray communities are empowered to take a coordinated and collaborative approach to building drought resilience across the region.

THE OVENS MURRAY REGION

Region and Community

The recognised Traditional Owners of the Ovens Murray region include the Taungurung, Yorta Yorta, and Gunaikurnai Peoples, as well as other First Nations groups not formally recognised. They have inhabited the region for millennia and maintain a strong connection to land and water through their cultural practices and spiritual beliefs.

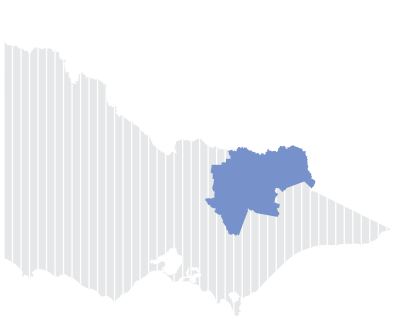
The Ovens Murray region is situated in northeast Victoria and encompasses the local government areas of the Alpine, Benalla Rural City, Indigo, Mansfield, Towong, Wangaratta Rural City, and Wodonga City Shires. It is characterised by fertile land, natural waterways, attractive townships, localities with a rich offering of cultural events, and friendly welcoming communities. There is a strong sense of belonging, volunteerism, community connection and stewardship of natural resources.

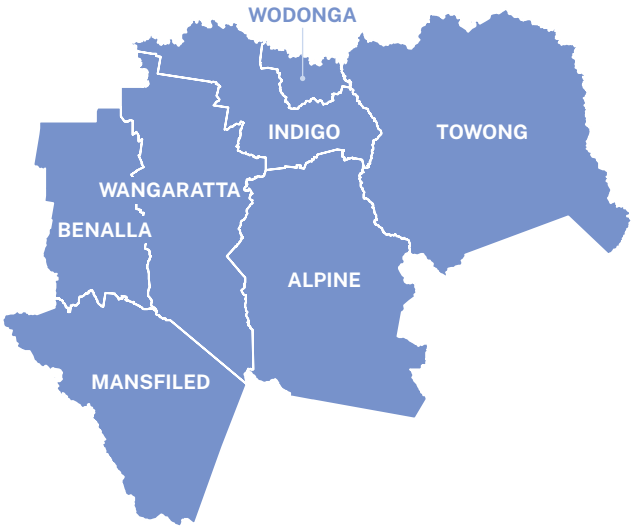
The Ovens Murray region borders New South Wales (NSW) and also shares a border with the Goulburn and Gippsland regions of Victoria. Cross-border communities present unique opportunities and challenges, and demand collaborations across national, state, regional and municipal levels.

"Community is many things. A geographical place, an industry, an organisation, or more generally: a group of people that come together through a common interest or shared goal. Community is the lifeblood that connects us together and fosters an environment of belonging and purpose. Critically, a community requires internal sustenance through the continued efforts of its members, in addition to external environmental factors such as funding and opportunities.

The strength of a community is made up of the sum of individuals that live and work within it. In regional areas, where townships can be quite small and resources are finite, it is essential that people can come together, increase their capacity, and be empowered and inspired to grow their communities".

— Alpine Valleys Community Leadership, 2023





POPULATION
(2022)

135,054

POPULATION GROWTH
(2013–2022)

11.4%

GROSS REGIONAL PRODUCT
(2022)

$7.7 billion

Source: Ovens Murray Regional Economic Development Strategy (2022)

Geography

The region has varied agricultural land encompassing the Ovens and Murray River catchments, and the Victorian alpine region. It comprises distinct regions, with the south extending to Mansfield and Lake Eildon, the west containing the undulating plans of central Victoria and the Hume Highway, Victoria's High Country and Lake Dartmouth to the east, and the New South Wales-Victorian border along the Murray River with Lake Hume in the north.

The region is a part of the Murray-Darling Basin and water flows from the alpine region down through the Ovens, Kiewa and Mitta-Mitta rivers. These water catchments are nationally important, supplying 40% of the inflows into the Murray-Darling system[10]. The landscape is rural, alpine, and urban, covering mountains, farmland, forests, and floodplains. Due to the large national and state parks, less native vegetation has been cleared than in other parts of the state.

Population

In 2022 the region had a population of 135,054, predominately distributed across the largest towns of Wangaratta, Wodonga, Benalla, and Mansfield[11]. Wodonga is one of the top 5 fastest growing regional cities in Victoria, with projected population growth of 23% in 2023–2036 reflecting its livability and the educational and employment opportunities in the area. Over the past two decades, the region more broadly has experienced stable population growth, although the rate of growth has been slower than the regional Victorian average. This trend is expected to continue[2].

Industry/employment

The Ovens Murray region has a diverse and interconnected economy with a Gross Regional Product (GRP) of $7.7 billion in 2022[11]. The top 7 employing industries account for approximately 70% of the region's workforce (Figure 3.), and are all significant drivers of economic growth and employment.

The region's employment continues to diversify, with ABS Census data recognising that employment in the agriculture industry has gradually declined since the early 2000's. Future declines in agricultural industry employment are projected in the transition to more capital intensive and less labor-intensive markets, where there may be gains through innovation, improved productivity and value add throughout the agricultural supply chain[12].

The region's main food processers are in Wodonga, Wangaratta, Wahgunyah and Benalla. Activities are focused on grain mill and cereal products, processing beer, wine and dairy products.

The region's strategic location between Sydney and Melbourne, supports a large transport and logistics industry, including Logic in Wodonga, with the capability to convey goods to 75% of Australia's population within 24 hours. It also hosts the Bandiana Military area, Wodonga TAFE and La Trobe University.

Manufacturing is the largest industry, making up 15% ($876 million) of the region's total economic output. Beef, dairy, sheep, and wool make the largest contribution to the agriculture industry (Figure 4.). Together, the agriculture and manufacturing industries comprise 72.8% of the

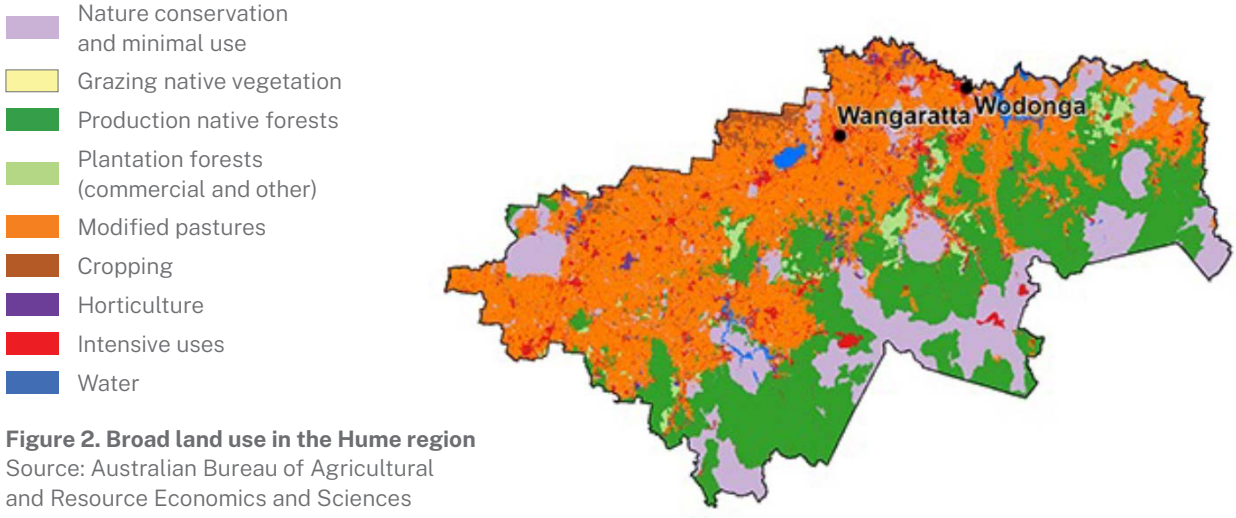


Figure 2. Broad land use in the Hume region
Source: Australian Bureau of Agricultural and Resource Economics and Sciences

region's export value[2]. In addition to the more traditional agricultural enterprises, there are many vineyards, equine ventures, and lifestyle farms. Food and wine, including cellar doors, cafés, restaurants and accommodation, and the nearby snow fields are the major drivers of tourism, accounting for approximately 3.9 million visitors and a $1.3 billion regional tourism spend[13].

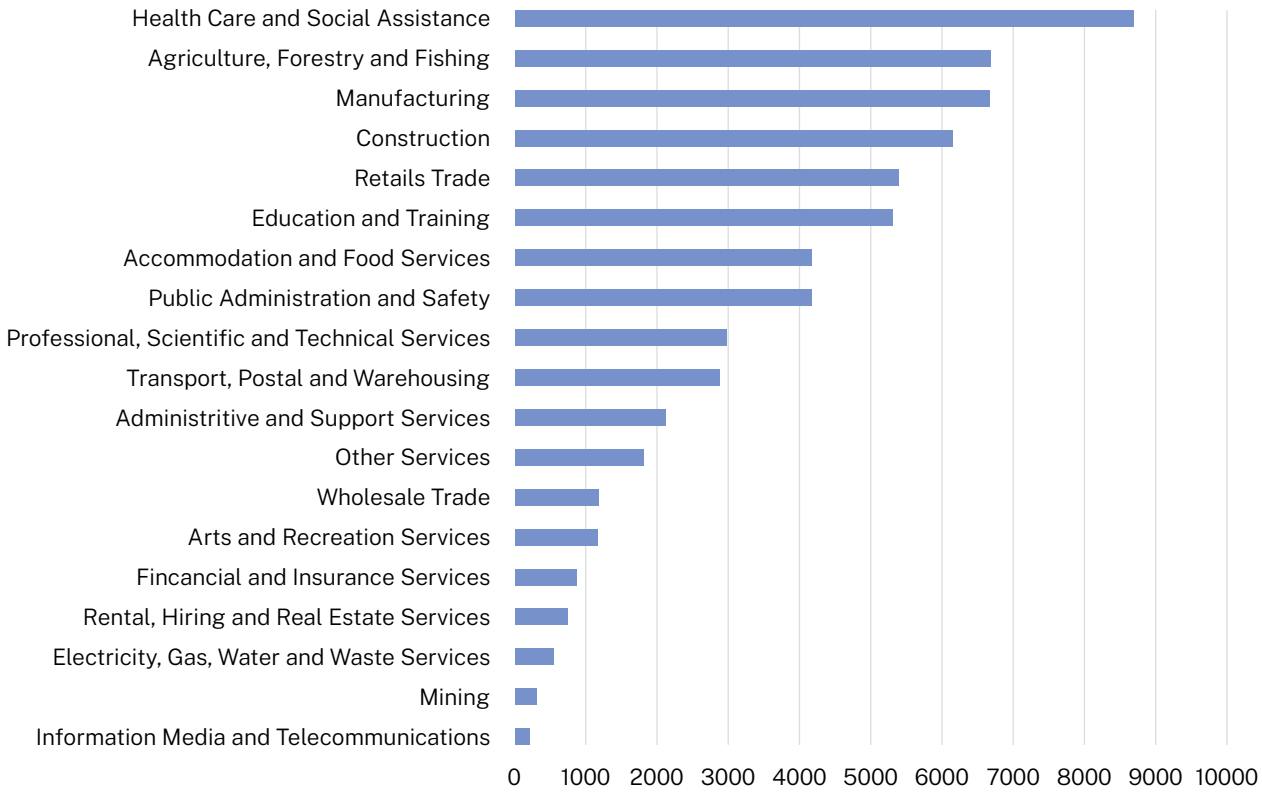


Figure 3. Employment by industry in the Ovens Murray
Source: Ovens Murray Regional Economic Development Strategy (2022)

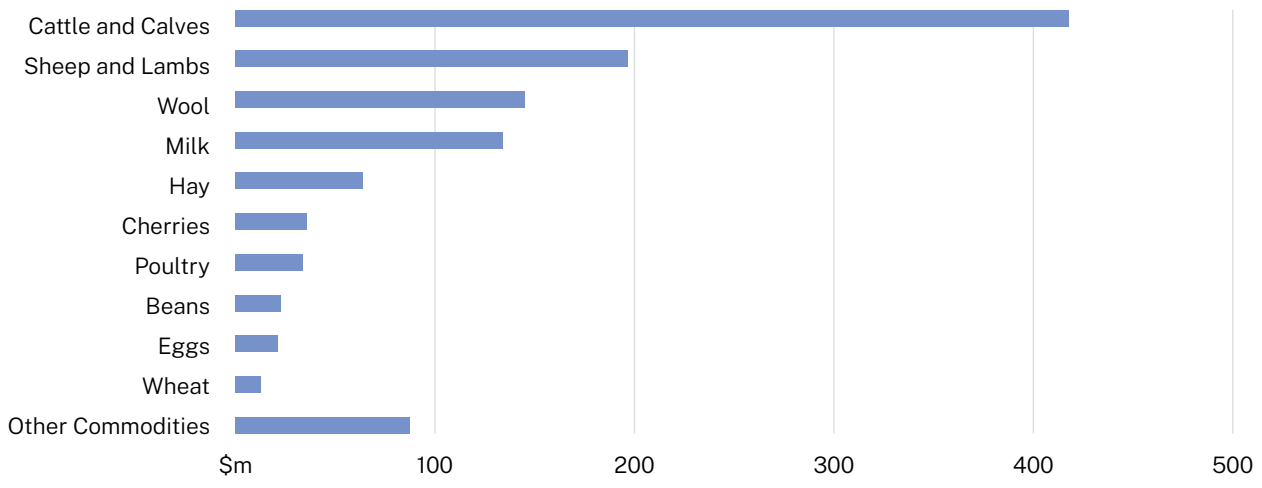


Figure 4. 2018-19 value ($ million) of agricultural production in the Hume region
Source: Australian Bureau of Agricultural and Resource Economics and Sciences

Climate trends

Rainfall in the region is highly variable, occurs predominantly in winter and spring, and is generally the result of rain-bearing weather systems from the west. Most areas receive annual rainfall of 700–800mm. The highest rainfall occurs around Harrietville, with an annual median of 1219mm, while Rutherglen records an annual median of 566mm[14]. Since the 1950s, rainfall has declined in most seasons.

Climate projections for the region, based on climate change scenario modelling[13], indicate continued variability and change in future such as:

- average temperatures to increase by 1.4–2.4°C
- spring rainfall to decrease by 6–14%
- an increase in the number of fire danger days by 44%
- a decrease in frost risk.

DROUGHT IN THE OVENS MURRAY REGION

Droughts are a period of drier than normal conditions and are a cyclical feature of the Australian weather cycle. They are a complex phenomenon, easily identified in hindsight, but highly variable depending on a region's topography, rainfall, temperature, wind patterns, vegetation, and soil types.

Drought poses substantial risks to regional communities' landscapes, infrastructure, industries, people and economies. Drought can negatively impact agricultural yields, employment, health and regional spending. Often the slow onset of drought can add complexity to decision making that is essential to best prepare and successfully manage an agricultural business.

The drought cycle includes three phases:

- preparing for drought
- responding to drought
- recovering from drought

As regions transition through the drought cycle communities experience a series of flow on effects. Impacts to mental health increase substantially, soil and surface moisture declines, fodder, water, and cash reserves become depleted, and supplementary feed, water and transport costs increase. As drought impacts increase, there is an escalation in family violence, abuse, and suicide. Further along the drought cycle, spending from the agricultural industry reduces and negatively impacts regional and national supply chains.

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.

An integrated assessment of the socio-economic and environmental impacts of past and future droughts was prepared to inform the development of the Plan and is available as a supplementary report – Drought in the Ovens Murray Region[13]. The report looks at the effect drought has on agriculture and the flow on impacts to regional communities.

"We fail to realise the hidden impacts of drought, fire, flood and storm on the wellbeing of staff and the community".

— The Alpine Community Recovery Committee – Community Recovery Plan

Past experience of drought

The region has witnessed multiple droughts of varying duration and extremity, and its farming families have first-hand experience of the impact of drought on their businesses, land, and wellbeing. The effects also extend to non-farming community members through the interdependence of farms, businesses, services, and the social networks that constitute and bind communities.

Significant droughts in the region have included:

1837–1844

It was so dry the Wodonga Lagoon (today known as the Belvoir Park Lagoon) was used to grow hay

1866–1869

In 1868 the year closed amidst great depression, temperatures of 46°C in the shade and bushfires on the hills around Albury and Wodonga on Christmas Day[15]

1892–1902

The Federation drought saw much below average rainfall, which impacted towns dependent on the Murray River for transport by paddle steamer

1914–1915

A strong El Nino brought intensely dry conditions and the lowest rainfall on record in some areas

1937–1945

The World War II drought – stories include that it was so dry that there was not one shower of rain from November through to March for 4 years

- Black Friday bushfires of 13 January 1939

1965–1967

For over a decade, very dry years were interspersed with milder conditions

1982–1984

A very strong El Nino event led to many areas experiencing their lowest rainfall on record

- The earliest seasonal Total Fire Ban Day in 40 years was declared on 24 November 1982
- The devastating Ash Wednesday bushfires occurred on 16 February 1983

1997–2009

The Millennium Drought with record low rainfalls recorded in many areas

- 2003 the Hume Weir was just 6% capacity
- Black Saturday bushfires – 173 lives were lost on 7 February 2009
- Traditional Owners had a reduced ability to care for Country

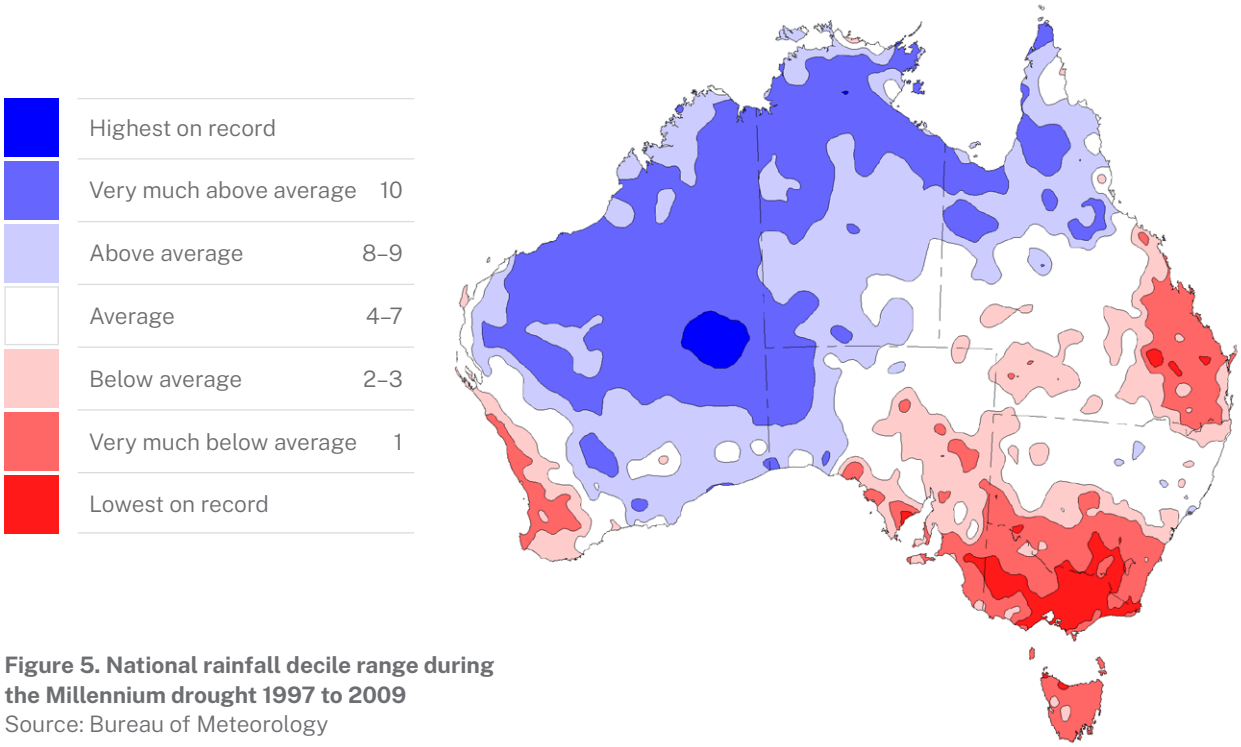


Figure 5. National rainfall decile range during the Millennium drought 1997 to 2009
Source: Bureau of Meteorology

Figure 5 shows the severity of the Millennium drought from 1997 to 2009, with the North East region experiencing its lowest rainfall on record.

The Bureau of Meteorology (2024) reported that the Millennium Drought was essentially a cool-season drought in southern mainland Australia, with low rainfall in winter and spring, and above average warm-season (November to March) rainfall received in many areas. A distinctive feature of the Millennium drought was the extended dry periods the region encountered for over a decade.

Recent experience of drought

In 2018–2019, widespread dry conditions were experienced, and rainfall was very much below average[16]. The region experienced significant economic, social, and environmental impacts. There was a cumulation of production losses, a decline in consumer spending and negative impacts on employment in the community, with GRP declining by over $100 million annually. Negative impacts were often concentrated in smaller isolated communities where businesses did not have many options to adapt their economic activity. This led to a surge in demand for mental health and Rural Financial Counselling services[13].

In January 2019, the Bureau of Meteorology reported that the Murray Darling Basin was in the grip of its most severe 3-year dry spell in 120 years. Impacts included:

- water levels in local river systems experienced significant declines
- incomes of many farm businesses were slashed
- many families experienced difficulties paying utility bills
- farmers worked long hours to earn additional income off farm
- exposed ground cover led to a severe dust storm
- livestock producers faced forced stock sales
- invasive pests caused widespread damage on public and private land
- farmers lodged less farm management deposits (due to restricted cash flows)
- compounded experiences of bushfire

Figure 6 shows the severity of the 2018–2019 drought with the region experiencing very much below average rainfall.

Recent analysis of the Ovens Murray region[17] found that the cumulative effects of drought, and changes to rainfall patterns and bushfires were the biggest risks to agricultural businesses in the north east, with a relatively even spread across industries.

Over 75% of land managers have made changes to their business due to the changing climate, in part driven by experience of recent extreme weather events (e.g. drought, bushfire and flood).

The major recent financial investments in adaptation have been pasture improvements (25%), machinery (22%) and water infrastructure/storage (16%). The analysis reported that 71% of landowners indicated that they intend to make fundamental changes to their agricultural businesses because of the changing regional climate.

The effects of climate change, including drought, also significantly impact on Aboriginal communities across Victoria. Drought harms Country and people, through impacts on waterways, plants, animals, ecosystems and seasons, making it hard to practice culture and heal Country. Cultural heritage sites are also damaged by fire, drying soils and erosion, caused by drought.

The social, environmental, and economic vulnerabilities that may already exist in regional communities are amplified as drought conditions slowly unfold. Table 1 summarises the interconnected social, economic and environmental impacts of drought as described by the Ovens Murray community.

"Utilising professional services can play an important role in supporting good decision-making in drought preparedness and recovery".

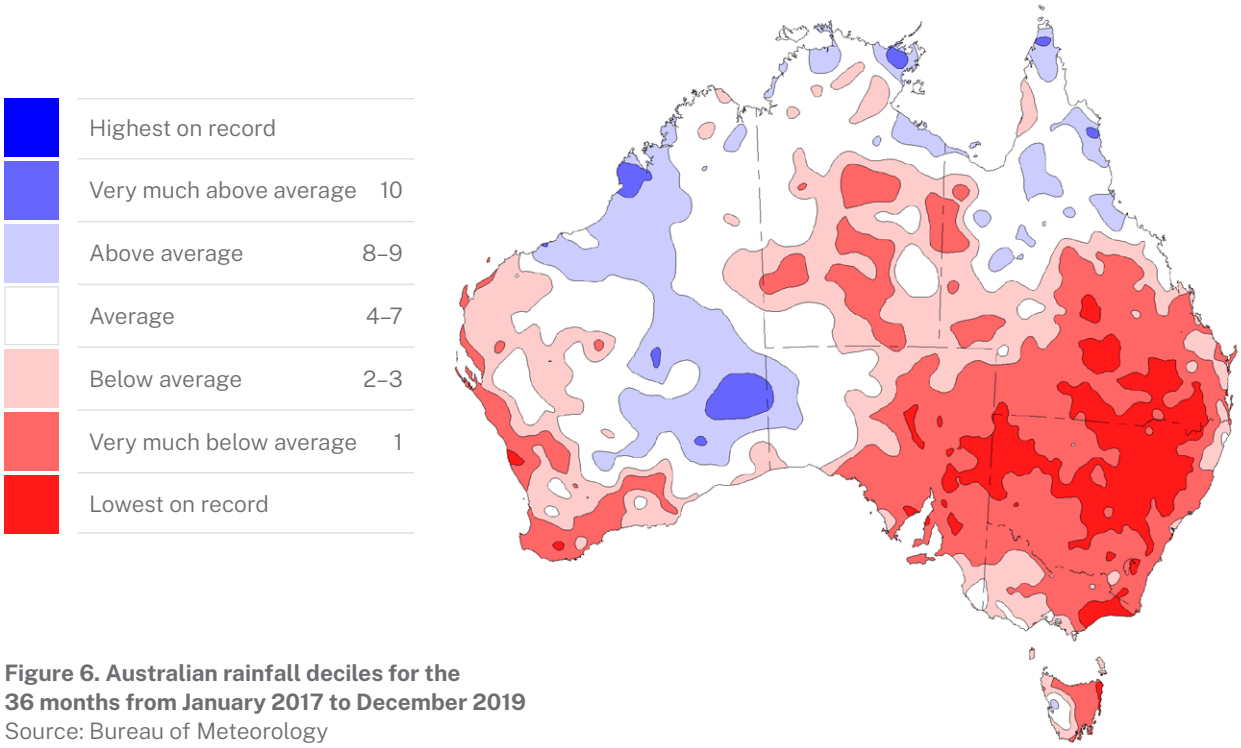


Figure 6. Australian rainfall deciles for the 36 months from January 2017 to December 2019
Source: Bureau of Meteorology

Social

- Negative health and wellbeing outcomes with many in the community in 'survival mode'
- The uncertainty of the timing and duration of drought and other climatic events
- Increased family violence
- Reduced amenity and community aesthetic
- Reduced capacity for recreation when green spaces are lost and water sports are inhibited
- Some individuals have a better understanding of resilience and seek to be better prepared
- Heightened community angst around understanding of community water plans
- Emphasised lack of community water literacy
- Increased demand on not-for-profit sector and support services such as The Salvation Army, St Vincent de Paul and others
- Families move away from the region causing a slow erosion of confidence
- Farm safety risks increase
- Heath system burden with increased health issues, particularly mental health
- Traditional Owners unable to practice culture and care for Country
- Damage to cultural heritage sites

Economic

- Negative impacts on regional GDP
- Decreased on-farm productivity, business profitability and viability
- Pasture profitability drops and stocking rates decline
- Producers are exposed to increased fodder prices
- Reduced water, pasture, and fodder availability
- Inability to build good feed and fodder reserves
- Reduced cashflow leading to decreased spending in the regional supply chain
- Decision making paralysis
- Little to no cash flow for most impacted social-economic populations
- Decreased enrolment and attendance at school and education institutions
- Reduced tourism
- Negative impacts on other regional industries such as construction, manufacturing, hospitality, and retail
- Reduced employment opportunities
- Lack of business planning prior to and within drought exacerbates economic impacts
- Increased demand for small businesses financial, business and succession advice
- Increased pressure from invasive native and pest species on farms (including feral deer)
- Changes in water markets and how water moves through the system
- Understanding and utilisation of water markets changes
- Restrictions in water trade compared to the Murray system
- Increase in irrigation water prices
- Increased competition for bore water
- Requirement to cart water at higher costs
- Incorrect modelling used to build infrastructure

Environmental

- Declining inflows into river systems leading to reduced water availability for native flora and fauna
- Increased understanding of the nuances of reduced stream flows
- Changing water security planning
- Decline in waterway health, for example erosion
- High reliance from landowners for stock access to water ways
- Water quality declines impacting domestic and stock use
- Permanent loss of established trees and plants
- Increased ecosystem stress
- Traditional Owners' ability to care for Country using traditional and culturally appropriate tools is reduced
- Elevated fire risk
- Firefighting challenged with river system reserves low and volunteer firefighter capacity reduced
- Increased animal health and wellbeing concerns

Table 1. The interconnected impacts of drought in the Ovens Murray region as described in community consultation[a]

[a] Ovens Murray Regional Reference Group workshop

"There is a need for better preparedness at the individual, property, community and regional scales".

— The Alpine Community Recovery Committee – Community Recovery Plan

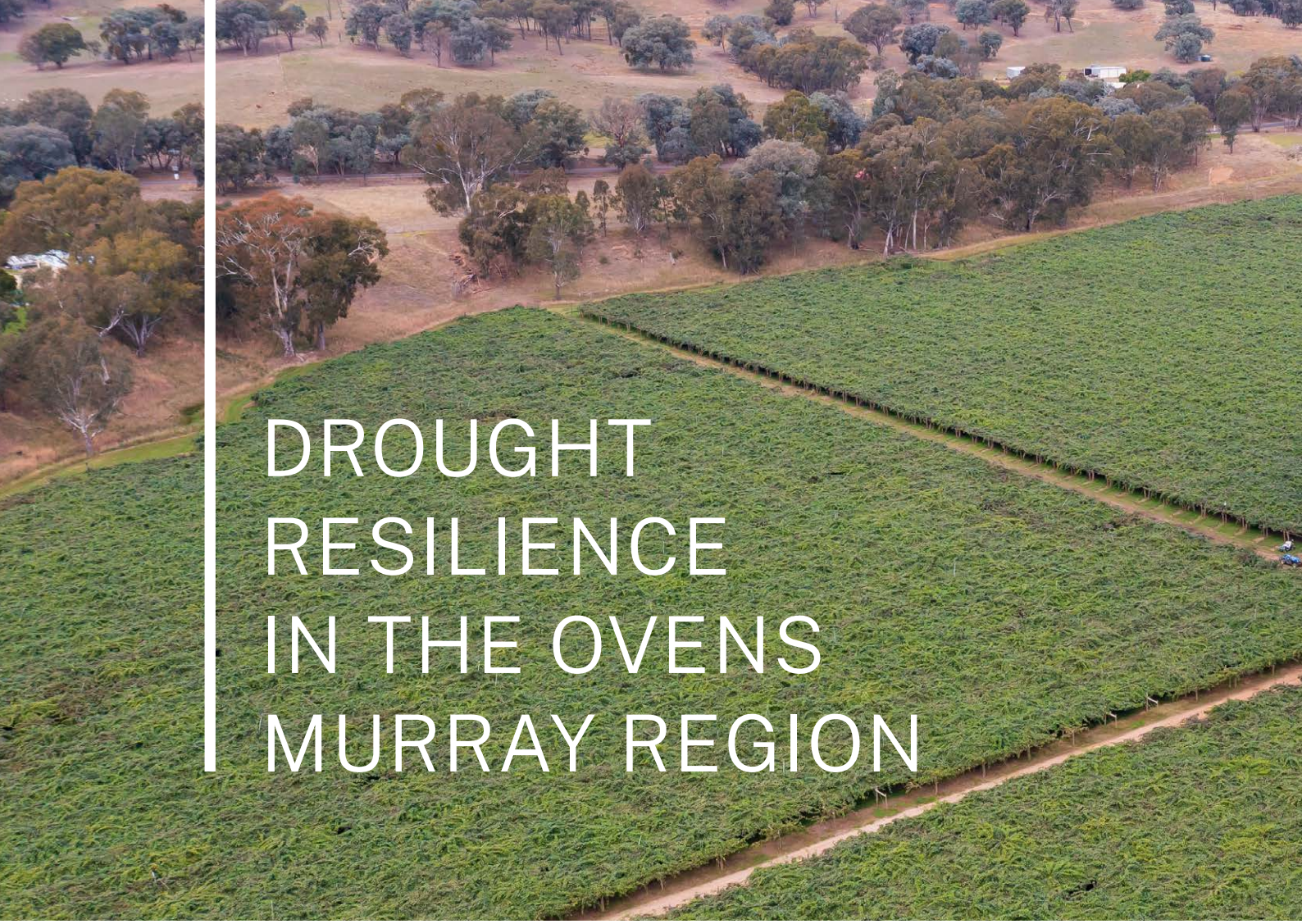
Despite the physical region that the Plan encompasses, it is recognised that many communities, including Traditional Owner communities, do not exist and function solely within such boundaries. Equally, the social, economic and environmental impacts are not confined to any one part of a region. Land and resource management may have inter-regional impacts and effects. And, for many Traditional Owners, connection to Country is more holistic than the constructs and regional boundaries of the Plan.

Therefore, many aspects of the Ovens Murray Plan will be applicable to neighbouring communities and regions. It will be important to cooperate and share information on drought resilience between regions through the RDRP Program, not only with immediate neighbours such as bordering shires, but also between states and across Australia.

Future drought scenarios

Future drought modelling by Frontier Economics[13] forecasts greater impacts on smaller, agriculturally reliant communities in the north-west of the Ovens Murray region. Ongoing and continued experience of dry seasonal conditions and drought in the region will result in:

- a growing number of fire danger days per year
- inland lakes, rivers, and dam levels continuing to decline with negative impacts on biodiversity
- Gross Domestic Product falling by 9.2%
- a reduction of more than 800 jobs
- a decline of 2.7% in consumer spending
- social and economic impacts on the community
- an increase in population moving to coastal areas
- parks and sporting precincts experiencing water restrictions
- fluctuating tourist numbers
- increasing wait times for services such as healthcare and Rural Financial Counselling
- land use changes such as the movement of cropping areas, impacting landscape biodiversity
- increased vulnerability of cultural sites located on flood plains



DROUGHT RESILIENCE IN THE OVENS MURRAY REGION

There are many definitions for the term resilience. Resilience is defined by Walker (2020)[18] as the capacity of a system to absorb a disturbance and reorganise to keep functioning in the same kind of way. Rather than just bouncing back, resilience is also about changing and adapting to new circumstances.

In looking for something more specific to this region, resilience is defined as the ability of the people and environment in the Ovens Murray region to cope with change, while continuing to function in a desired way. Resilience thinking helps us to understand and manage dynamic systems such as landscapes and river catchments[6].

The capacity to cope with disruption and continue to function in desired ways is critical when encountering change. A lack of resilience limits the ability of regional economies and communities to adapt and bounce back when shocks cause significant disruption. A resilient region can better absorb challenges, allowing different parts of the economy to flourish, while those who are challenged are supported to recover and adapt.

It is vital that the region continues to evolve and changes its emphasis from responding to shocks and events, to understanding that enduring long term positive change is driven by looking more deeply at the systems, structures and processes used before. The challenge is to move from a 'persistence' mindset to an active 'adaptation and transformation' mindset. The concept of resilience has been explored extensively across the Ovens Murray and neighbouring Goulburn and Gippsland regions, and is reflected in several key strategies that underpin work programs and activities that relate to or can be applied to drought resilience including:

- Goulburn Murray Resilience Strategy[19]
- Goulburn Broken Regional Catchment Management Strategy 2021–2027[20]
- Hume Regional Climate Adaptation Strategy[5]
- Gippsland Drought Resilience Plan[21]
- Goulburn Drought Resilience Plan[1]
- Wimmera Southern Mallee Drought Resilience Plan[22]
- North East Regional Catchment Strategy[6]

The Plan has been developed with a focus on the connections between people and place across the region. This has then been brought together in a strategic framework to take action. Building resilience includes a focus on the long-term sustainability of communities with the explicit objective of strengthening the liveability, viability, and wellbeing of both the people and the landscape.

A drought resilient community should demonstrate:

- Local leadership and initiative
- Governance that embraces change
- Connection through formal and informal networks
- Diverse experiences and perspectives, representative of the whole community, including Traditional Owners.

The community needs to be able to:

- Work together in the pursuit of common goals
- Foster responsibility within
- Be flexible and adaptable
- Learn from change
- Anticipate issues
- Solve problems from multiple angles.

"Communities should be empowered to lead their own recovery and resilience". — Sam Kirby, Emergency Recovery Victoria

THEMES, OUTCOMES AND FOCUS AREAS

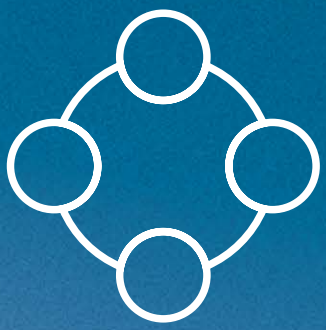
As a result of the engagement with community, the following themes, outcomes, and actions have been identified in the Ovens Murray Drought Framework. The tables detail implementable actions to achieve the desired outcomes for a drought resilient region.

Under each theme, focus areas have been articulated with multiple actions to deliver. These include activities to assist farms and other businesses to anticipate and manage drought risk, and supporting programs such as networking and leadership training that will contribute to better health and wellbeing of individuals and the community. The Plan also identifies longer term actions involving partnerships and systems that can be activated to support communities in the lead up to, during, and post drought.

Photo: Henry Brydon

Theme 1

PEOPLE AND COMMUNITY



Theme 1 focuses on enhancing community resilience by strengthening community connections and health services, to support a healthy, well prepared and connected community capable of managing the challenges of drought.

The theme promotes strengthening local health services, improving collaboration and advocating for trusted service providers. It also aims to bolster community and business leadership through mentoring and building trusted, integrated business networks.

Outcome:

A healthy and thriving region, resilient to climatic shocks, supported by local, trusted health and wellbeing services and community connection.

Focus Area 1: Strengthen health and wellbeing services

Actions	
1.1.1	Strengthen the capacity and tenure of local health care and community care services, and co-design programs to best meet the local need, especially in remote areas
1.1.2	Provide training and awareness programs for health and community service practitioners to better understand and support the community through the impacts of drought
1.1.3	Improve collaboration and coordination between healthcare and community service providers to optimise service delivery, and improve the user experience (e.g., consider 'one touch' case management and memorandum of understandings between providers)
1.1.4	Promote and support connection and links to health and wellbeing support services, and programs, including those in cross border communities
1.1.5	Promote the provision and uptake of health and wellbeing services pre, during and post drought, and link these with the work being completed by recovery groups and committees
1.1.6	Advocate for the engagement of local, trusted service providers, and utilise these services to meet the needs of community, including those in isolated border communities
1.1.7	Raise awareness of, access to, and support for community services e.g., Neighbourhood House and Service Clubs
1.1.8	Improve information sharing with and among service clubs and not-for-profit organisations through community forums
1.1.9	Partner with Traditional Owners to support culturally appropriate practices during emergency events

Focus Area 2: Strengthening community and business leadership and networks

Actions	
1.2.1	Identify, support and build the collaborative leadership capacity and capability across the region
1.2.2	Support the development of leaders through pathway programs, mentoring opportunities, and access to regional leadership networks and cross sector leadership networking events
1.2.3	Support community-driven events that bring people together and build social cohesion
1.2.4	Encourage businesses to establish a trusted, integrated business network to build capability, capacity, expertise and sharing of knowledge
1.2.5	Support networking of industry, businesses, and the professional services sector (Bankers, lawyers, solicitors, financial advisors, agronomists)

Theme 2

COORDINATION AND COLLABORATION

Theme 2 highlights the shared responsibility of community, industry and government to enhance collaboration to build drought resilience in the region. The actions emphasise a coordinated approach by utilising a governance body to identify priorities, clearly define stakeholder roles, and promote interagency planning and alignment to the work being done in neighbouring regions. The theme promotes collaboration in sharing education materials in relation to preparing for drought and strengthening forecasting and communication tools.

Outcome:

A coordinated and collaborative approach to decision making and delivery of drought resilience activities within the region.

Focus Area 3: Delivery of a coordinated approach

Actions	
2.3.1	Establish or utilise an existing governance body to coordinate the delivery of the Ovens Murray Drought Resilience Plan to increase preparedness and resilience of the region
2.3.2	Develop clear regional drought governance and coordination arrangements with appropriate industry, community and agency leaders
2.3.3	Define and articulate the responsibilities of all stakeholders in drought preparedness
2.3.4	Promote and support proactive interagency planning for the preparation for and response to drought periods and incorporate mitigation actions into relevant regional and local strategies and plans
2.3.5	Leverage and align to the work being done in neighbouring regions and interstate resilience initiatives
2.3.6	Collaborate to strategically design and develop local programs, leveraging off the learnings from community leadership programs focussed on disaster recovery and climate change adaptation and resilience
2.3.7	Support opportunities for Traditional Owners to build drought resilience and preparedness efforts, in line with their self-determined values, goals and aspirations for Country and community
2.3.8	Support, advocate for and assist, the community to design and implement drought resilience projects
2.3.9	Local Government Authorities and community groups to provide a voice for the region at state and national government levels to drive action for drought preparation, mitigation and adaptation
2.3.10	Support Local Government Authorities to prioritise strategic drought planning and infrastructure investment, and ensure this is in alignment with their Municipal Emergency Management Plans (MEMP), and implementation of their climate adaption strategies
2.3.11	Promote an all-hazards approach to planning and risk mitigation
2.3.12	Advocate for our Local Government Authorities and towns to connect in identifying their resilience strategies and build relationships with all services to prepare for events through centralised education programs, so critical decisions are made consistently and clearly
2.3.13	Promote the use of shared local trusted services within and along the borders by developing Memorandum of Understanding between Local Government Authorities
2.3.14	Develop a collaborative approach which supports proactive targeted community messaging on drought resilience, including those in isolated cross border communities

Focus Area 4: Information sharing and collaboration

Actions	
2.4.1	Support the collaborative provision and centralised collation of information that enables community to better understand how drought impacts them and broader business resilience. Information is to include: • Social, economic and environmental impacts of drought and climate change in the region • Relevant policies and plans • Climate change impacts and projections • Climate change scenarios and possible technologies, services and land use that may become relevant • Drought preparedness case studies and success stories • Drought preparedness education opportunities • Drought resilience research, development and extension information • Indigenous knowledge and practices • Resources to help understand drought and climate change and their impacts on business and the region • The interrelated risks of drought, fire, floods, biosecurity and storms
2.4.2	Strengthen forecasts and communication tools about water availability under predicted climate scenarios including drought
2.4.3	Collaboratively produce and distribute education and communication materials relevant to the region on water use (efficiency, allocations and its distribution) to the various users in community (urban, rural, brokers, groundwater)
2.4.4	Continue to document best practice, lessons of experience and case studies to inform future drought mitigation processes, strategies and programs

"It is important to avoid duplication by using trusted existing partnerships, setting up mechanisms so there is a joint effort, and working together with partner agencies"

— Mark Bailey, Goulburn Murray Water

Theme 3

AGRICULTURE AND ALLIED INDUSTRIES

Theme 3 emphasises bolstering the economic viability and resilience of the business community by proactive holistic business planning, skill development and management programs. It aims to support agribusinesses to strengthen their strategic business planning to manage risk, improve decision making and diversify income streams and builds farm resilience by utilising innovative land management practices. It also aims to empower the younger generation to view a career in agriculture as a rewarding choice and advocates for improved training, career programs and youth engagement to increase the attraction and retention of a skilled workforce.

Outcome:

Thriving agricultural industries better able to withstand the impacts of drought, supported by a skilled workforce.

Focus Area 5: Encourage and support business planning incorporating risk management

Actions	
3.5.1	Improve access to, and build the capability and capacity of, local business planning organisations to support farmers and agribusinesses
3.5.2	Encourage and support businesses to identify, navigate and seek professional advice to strengthen holistic business planning incorporating: • drought as a risk • timely decision making • system and income diversification
3.5.3	Promote drought business preparation and self-resilience messaging through established industry supply chains and community networks
3.5.4	Support business at all scales adapt to the challenges of a changing climate to enable them to become more resilient and competitive in the marketplace

Photo: Murray Dairy

Focus Area 6: Encourage and support on-farm drought resilience and preparedness activities

Actions	
3.6.1	Strengthen the Ovens Murray extension knowledge network to encourage innovative land management practices to improve efficiency, productivity, sustainability and overall system health
3.6.2	Build farmers knowledge base, skills and decision-making capabilities to improve practices that build landscape resilience, leading to longer term productivity gains
3.6.3	Promote landscape management strategies to maintain ground cover to support healthy soils, maintain soil moisture content, reduce erosion, increase productivity and improve resilience to drought
3.6.4	Encourage the establishment of appropriately designed stock containment areas, including infrastructure and reticulation considerations, as well as fostering successful feed management and fodder production systems
3.6.5	Support primary producers by offering one-on-one advice, field visits, peer learning networks and developing online resources to develop and implement farm water plans
3.6.6	Develop farm water extension programs that promote the drought resilience benefits of fencing off farm dams and waterways, and utilising infrastructure such as tanks, troughs, pumps and pipes
3.6.7	Advocate for a review of regional water point management and number (locations, operation, ownership, maintenance) to ensure sufficient access to water during times of drought
3.6.8	Encourage and educate producers to select for genetic traits that maximise productivity to build the resilience of their herds
3.6.9	Promote the integration of renewable energy into agricultural systems

"I believe that farmers as land stewards have a responsibility to the community to farm sustainably and in doing so, have an opportunity to be part of the solution for climate change".

— Jane Carney, Chair (North East) Ovens Landcare Network Inc

Focus Area 7: Create agricultural educational pathways that meet the needs of the region's agricultural industry

Actions	
3.7.1	Establish or strengthen programs such as youth networks, vocational training in high schools, scholarships and exchange programs to make careers in agriculture and natural resource management more accessible and attractive to youth
3.7.2	Advocate for the provision of training for those already in, or new to, the agriculture industry to support up skilling, transitioning and/or retention
3.7.3	Support and promote careers and educational pathways to gain industry qualifications in agriculture through workshops, agricultural enterprise excursions, careers days, on-farm work experience and traineeships
3.7.4	Support and encourage the attraction, training and retention of high calibre educators to schools, TAFEs and universities, to improve the standard and overall outcomes of agricultural education
3.7.5	Support the creation of partnerships between universities, vocational education training providers, community leadership programs, and the agriculture industry, to support industry-wide tailored training initiatives, and ensure agricultural graduates have streamlined access to career opportunities
3.7.6	Provide access to training to grow the agricultural and natural resource management workforces to better deal with the specific challenges of drought and other climate related risks

Photo: Rural city of Wangaratta

Theme 4

NATURAL AND BUILT ENVIRONMENT

Theme 4 highlights the importance of sustainable land management practices, supporting healthy resilient landscapes through collaborative stewardship. It promotes sustainable landscape management and climate adaption strategies, in collaboration with Landcare and Traditional Owners, for long term drought resilience that addresses social, economic and environmental needs.

Outcome:

Healthy landscapes better able to withstand the impacts of drought.

Focus Area 8: Sustainable landscape management

Actions	
4.8.1	Advocate for cohesive policy development that acknowledges how land and resource management may vary between sub regions as they experience vastly different conditions (e.g. between Rutherglen and Harrietville or Mansfield and Myrtleford)
4.8.2	Support landholders to plan for drought resilience at the landscape scale through the development of whole of farm management plans, with consideration to waterways and catchments, biodiversity linkages, invasive plants and animals and on-farm natural capital
4.8.3	Support activities to understand and promote water retention in the landscape, including linkages with other regions
4.8.4	Identify, in partnership with Traditional Owners, opportunities to use traditional knowledge, and culturally appropriate tools to heal and care for Country
4.8.5	Support Traditional Owners/First Peoples to protect and build resilience of significant cultural landscapes vulnerable to drought, in line with Government's legal and policy obligations
4.8.6	Support and promote the role that Landcare groups and networks play in building drought resilience at farm and landscape level
4.8.7	Increase the understanding of ecological thresholds (tipping points) for threatened species and ecological communities to inform management actions, considering climate change and extreme events such as drought
4.8.8	Advocate for additional support in the management of invasive pests, weeds and biosecurity risks during drought
4.8.9	Mitigate bushfire risk to the community by proactively reducing forest fuel loads with planned burning in a targeted and timely manner

Focus Area 9: Strategic infrastructure management

Actions	
4.9.1	Advocate and build collaborative partnerships to use recycled water close to water plants in the Ovens Murray region
4.9.2	Invest in community infrastructure and support access to water supplies to maintain irrigation of sporting, recreational facilities, green urban spaces, and other community assets during drought

Theme 5

RESEARCH, EDUCATION AND INNOVATION

Theme 5 advocates for evidence-based research and development to enhance adaptive sustainable management in agricultural industries. It promotes translating research to on-farm application and collaboratively identifying research and development priorities with industry. It promotes the awareness and uptake of new innovative technology and practices to support the region through climate adaptation.

Outcome:

Evidence based research and development to support industry to manage risk, uptake innovative practices and increase profitability.

Focus Area 10: Support climate related research and development

Actions	
5.10.1	Identify and seek investment in research, development and extension gaps, leveraging investment through collaboration and partnering with both national and global research providers
5.10.2	Support innovation and the co-development of research which is translatable to practical on-farm solutions and aligns with drought resilience principles
5.10.3	Strengthen collaboration and knowledge sharing between industry and research and development
5.10.4	Address research gaps, such as to understand and quantify underground water resources, inflow volumes and associated ecological change, including under climate change scenarios; and the shift of rainfall-runoff relationships, inflow volumes and associated ecological change in the region
5.10.5	Ensure research, development and extension priorities and activities are strategic, collaborative and targeted to improve profitability, productivity, competitiveness and preparedness for future opportunities and drought challenges

Focus Area 11: Support the adoption of new technologies

Actions	
5.11.1	Advocate for and support ongoing regional leadership and collaboration to eliminate the region's digital divide, and capitalise on its digital strengths and opportunities
5.11.2	Strengthen awareness of, and investigate new technologies and practices for, climate adaption
5.11.3	Co-design research and extension programs that resonate with farming communities, and highlight economic returns and farm sustainability
5.11.4	Support and empower farmers to accelerate the adoption of innovative and resilient farming practices that best suit their needs and circumstances, offering one-on-one advice, communities of practice, peer learning networks, workshops and online resources
5.11.5	Support and advocate for integrated training on modern farm systems across education providers and allied services
5.11.6	Increase the farming community's digital skills and the integration of smart technology (e.g., having the knowledge and infrastructure to access cloud-based software, or benefit from cloud connected water monitoring systems)
5.11.7	Undertake an extension and awareness program that increases understanding of natural capital, natural capital accounting and environmental markets, such as carbon and biodiversity

"You can't manage what you don't measure".

— Sophie Hanna, Riverine Plains

CASE STUDIES OF RESILIENCE

The following case studies offer instances of real-life stories from the Ovens Murray community aligned with the themes of the drought framework. These examples showcase various facets of fostering resilience and encompass building a cohesive community, health and wellness, sustainable land management, self-accountability, adaptive governance and clear communication.

"Wherever we can, we should use and build the capacity of local groups".

— Helen Wilson, North East Catchment Management Authority

Photo: Alpine Valleys Community Leadership (AVCL)

CASE STUDY 1

Alpine Valleys Community Leadership Program

Aligned – Theme 1: People and Communities – Focus Area 2: Strengthening community and business leadership and networks

The strength of a community is made up of the sum of individuals that live and work within it. In regional areas, where townships can be quite small and resources are finite, it is essential that people come together, increase their capacity, and be empowered and inspired to grow their communities.

In a world that is being disrupted by constant change, an ongoing challenge for regional communities is how to nurture, support and sustain leaders who encounter a variety of challenges that can impact their ability to lead effectively.

Alpine Valleys Community Leadership (AVCL) operates across the Northeast and Border regions of Victoria and NSW, delivering a range of contemporary programs focused on community capacity strengthening. The flagship program is the Alpine Valleys Community Leadership Annual Program (AVCLP) and is one of nine Victorian Regional Community Leadership Programs that aim to develop and facilitate the emergence of local leaders; strengthen existing community leadership capabilities; and develop stronger connections between local leaders and regional development initiatives.

Elise Hill is an Upper Murray dairy farmer, and an active member of her community, lending her support to the township and region she's proud to call her own. In 2022, Elise completed the Alpine Valleys Community Leadership Program, through a scholarship funded by the Gardiner Dairy Foundation.

Through the program, Elise was immersed in place-based learning, undertook a community focused project with the intention of producing positive outcomes to the region, and engaged in experiential learning where she was introduced to key issues that encouraged her to develop and explore her own learning and leadership styles.

"The AVCL program was terrific, it helped me further develop and extend my skill set and strengthened my capacity to contribute and provide leadership within my community."

People like Elise are at the heart of any thriving community, creating a sustained need for individuals who are empowered to act as local leaders, taking up positions through which they can facilitate action on local issues. The AVCLP has been invaluable in enhancing Elise's and the broader region's capacity, empowering AVCLP Alumni to pursue leadership opportunities, in both a community and professional capacity and to facilitate solutions to community-based projects, in alignment with regional priorities.

Written by Madeline Hines, Alpine Valleys Community Leadership

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CASE STUDY 2

Case Study 2 – Lessons from drought: prepare early

Aligned – Theme 2: Coordination and Collaboration – Focus Area 3: Delivery of a coordinated approach

Goulburn-Murray Water's (GMW) role is to efficiently manage, store and deliver water to a diverse range of enterprises across northern Victoria. GMW's customers include gravity irrigation, regulated and unregulated surface water diverters, groundwater, urban water corporations and environmental water holders.

Victoria's climate and streamflow is highly variable, but within this variability the Ovens Murray region has experienced a warming and drying trend over recent decades.

With the severity of the Millennium Drought of 1997-2009 still fresh in the minds of the community, seasonal determinations in northern Victorian systems ended the 2015 year below 100% of high-reliability water shares. Under the Victorian allocation policy this meant water reserves for the 2016-17 year were low and water availability would depend on rainfall before 1 July 2016. This scenario had not occurred since the last year of the Millennium Drought.

Photo: Goulburn Murray Water

As the Northern Victorian Resource Manager, GMW, in consultation with urban water corporations, Catchment Management Authorities and the Victorian Environmental Water Holder, began preparing operating scenarios if dry conditions continued. This involved:

- defining actions to conserve water;
- agencies briefing their own networks with updates on the impact of low storage volumes;
- advising local government to help them prepare for impacts;
- a "Prepare for Dry" media campaign jointly prepared by GMW, Lower Murray Water and DEECA informing irrigators and communities and urging early preparation for a possible very dry year with low water availability and;
- conducting public information sessions to allow community members to ask about water availability.

Mark Bailey was Manager of Water Resources with GMW at the time, reflects that:

"Fortunately, the region experienced wet conditions early in 2016 meaning our worst fears of a drought were not realised as rains began to refill storages. Ultimately, some parts of the Murray experienced flooding.

However, we learnt that with proactive planning and collaboration we gained a shared understanding allowing for more informed preparations, enhanced planning for actions and coordination across agencies, better information for communities, and closer liaison between water-based agencies".

In future, the Ovens Murray climate will likely continue to be variable with wet years and dry years, against a background drying trend. With a warmer future and projections of declining water availability, there may be more frequent and severe droughts in coming decades and more extreme rainfall events.

These actions emphasise how a coordinated approach utilising a governing body to identify priorities, clearly defining stakeholder roles, promoting interagency planning and aligning interagency works, can assist in mitigating risk when dry conditions arise.

Written by Goulburn Murray Water

CASE STUDY 3

Young Farmers connecting and collaborating across industry

Aligned – Theme 2: Collaboration and Communication – Focus Area 4: Information sharing and collaboration

The future of agriculture in the Ovens Murray region rests with young farmers, however, there are many challenges for young people in the industry, such as:

- Difficulty accessing land and capital
- Low profitability and high financial risk
- Limited opportunities
- Negative perceptions and stereotypes
- Social and cultural factors, such as gender and family expectations

The challenge of attracting and retaining young people in agriculture is complex and requires a collaborative and holistic approach. The 'Riverine Plains Youth in Ag Program' provides an excellent opportunity for young farmers, agribusiness professionals and students to connect with like-minded people and receive early-career advice from industry leaders and Riverine Plains Scholarship Program recipients.

The Riverine Plains Youth in Ag Program is focused on establishing strong industry learning and networking connections, with two major events that bring young farmers: the Youth in Ag dinner, and the Cultivate & Connect Mentoring Day. These events include agribusiness tours, trial site and farm visits, discussions panels and keynote speakers of industry experts and business owners. New products and innovative practices are also on show; the Cultivate & Connect Mentoring Day is one of the most valued opportunities of the program. Former Riverine Plains CEO, Catherine Marriott has participated in various mentoring programs throughout her career and recognises their value, especially for those in the early stages of their career journey.

"Mentoring can be either formal or informal and is a great way for professionals to share their experiences and expertise to support young people on various aspects of career development. Mentoring is about creating connections that can be called on when needed, particularly when advice is given generously and with the sole aim of helping someone out".

Written by Riverine Plains

Photo: Riverine Plains

CASE STUDY 4

Managing business risk and increasing profitability

Aligned – Theme 3: Agriculture and allied industries – Focus Area 5: Encourage and support business planning incorporating risk management

Scott and Belinda McKillop operate their 500 hectare, 380 cow dairy farm in Dederang in the Kiewa Valley. Their operation is predominantly dryland with a small amount of effluent water used for irrigation.

The McKillops endeavour to manage business risk and get a better return on investment by constantly exploring opportunities to optimise their farm production and profitability in an ever-changing environment.

The Ovens Murray dairy industry has a strong history of working collaboratively via discussion groups and farmer-to-farmer interactions. Scott and Belinda look to these and other trusted sources such as Dairy Australia, the CSIRO, long time farmers in the region, and the Bureau of Meteorology to build their knowledge base, skills and decision-making capabilities.

They also manage business risk by prudently controlling their costs and profitability with the following strategies:

- Improving operational efficiencies wherever possible
- Keeping pasture quality high to ensure the milk production is higher for longer
- Regularly calculating their feed program and building fodder reserves as insurance against season variability
- Proactively looking ahead using weather forecasting tools to manage climate influenced risk
- Diversifying income streams
- Enhancing animal welfare with cow activity collars, offering insights on how cow health is impacted by extreme weather conditions
- Reducing energy costs by using solar energy
- Nurturing good relationships with suppliers and contractors.

Scott believes that managing risk requires daily focus and a willingness to be decisive when adapting to changing climatic conditions. He is also a strong advocate for being proactive and flexible as it helps to build a more resilient farming business that is more connected to the local industry and agricultural community.

Written by the North East Catchment Management Authority

Photo: North East Catchment Management Authority

Photo: North East Catchment Management Authority

CASE STUDY 5

Holistic farm planning

Aligned – Theme 3: Agriculture and Allied Industries – Focus Area 6: Encourage and support on-farm drought resilience and preparedness activities

Jane and Peter Carney breed high performance Angus cattle on two grazing properties in the Ovens Murray region. Over the past two decades they have experienced the nuances of the region's varied seasonal patterns and learnt to adapt to wet seasons, severe frosts, droughts, bushfires and storms.

Peter and Jan take a holistic approach to farm planning, seeking to find a balance between making short term decisions and long-term decisions to generate longer term profitability and sustainability.

Aiming to build productivity, they have concentrated on producing high quality feed and higher performing animals to minimise their carbon footprint. They have also joined their local Better Beef Group, sought to maximise the benefits of rotational grazing, started a multi species pasture cropping program, become an active Landcare member with a focus on implementing sustainable farming practices, sought agronomy advice, and taken part in the North East Catchment Management Authority's Soils Health program.

The Soils Health program provided farmers with peer-to-peer learning and technical advice, with results demonstrating reduced salinity, increased moisture retention, increasing organic matter and nutrient value, which should ultimately lead to improved pastures.

The Carney's demonstrate it is possible to unlock the potential productive value of soils, creating a robust viable farm business, and mitigating risk by setting up 'holistic farm' planning to improve productivity, profitability, and sustainability.

Written by the North East Catchment Management Authority

Photo: Agriculture Victoria

CASE STUDY 6

Young Farmer Business Bootcamps

Aligned – Theme 3: Agriculture and Allied Industries – Focus Area 7: Create a flexible workforce that meets the need of agricultural businesses

Agriculture Victoria has long recognised that the future of Victorian agriculture rests with young farmers. As a result of this, the Young Farmers Network was established by Agriculture Victoria to support the next generation of farmers and provide opportunities for young people in agriculture to have a say, enhance their skills and progress their careers.

A key program delivered through the Young Farmers Network are the Young Farmer Business Bootcamps, designed to help producers to understand and manage business risk, develop a business plan to grow their business and to have confidence that there is a future in agriculture for them.

These fun and interactive Bootcamps use a series of farm case studies as real-life examples, providing participants with the skills to help manage their farm business, as well as planning their business future.

Agriculture Victoria Young Farmer Coordinator, Sarah Wallis, is highly motivated by amazing stories from passionate young farmers who are being assisted in the agricultural industry.

"What makes the program so powerful is the rich mentoring relationships that are facilitated by private consultants. With the benefit of their mentor's knowledge and experience, young farmers are assisted in building strong networks, being upskilled, supported to make better decisions, and to thrive in their pursuit to be a successful farmer".

Upskilling of new entrants to agriculture and attraction and retention of youth in the industry has been identified as a key initiative in the Ovens Murray region, and young farmers looking to establish a successful career in the agriculture industry can gain valuable skills through Young Farmer Business Bootcamps.

Part of Agriculture Victoria's Farm Business Resilience Program, which is jointly funded through the Australian Government's Future Drought Fund and the Victorian Government's Future Agriculture Skills Capacity Fund, the Young Farmer Business Bootcamps are helping to grow the resilience of young farm businesses and prepare them for the future, while also providing opportunities for emerging farmers to connect with like-minded motivated people.

Written by Agriculture Victoria
www.agriculture.vic.gov.au/youngfarmers

CASE STUDY 7

Managing biosecurity risks and improving soil health

Aligned – Theme 4: Natural and Built Environment – Focus Area 8: Sustainable landscape management

Victoria's High Country is renowned for its pristine natural environment that attracts visitors to its alpine areas, agricultural landscapes and rural towns.

Upper Ovens Valley Landcare President Peter Jacobs believes that *"extra care is needed to ensure riparian areas and waterways throughout the High Country are protected for the sake of future generations of visitors and locals alike."*

"Important riparian areas alongside rivers and streams act as a filter that preserves water quality and supports the habitat of animals and plants throughout the landscape. These areas are vulnerable to invasive pests and feral animals like deer, pigs and goats, and introduced tree and plant species like willows, maples, box elders, elms, sycamores, and blackberries. Without ongoing management, these kinds of biosecurity risks can cause significant harm by choking out native species, taking over the natural habitat and degrading the landscape."

By completing strategic restoration work in high value areas, Peter and the Upper Ovens Valley Landcare group are stopping these invasive species from taking over the natural environment. Their continued efforts are demonstrating outstanding results in protecting the health of waterways throughout the Ovens Murray region.

Written by Agriculture Victoria
www.agriculture.vic.gov.au/make-a-difference

Photo: Upper Ovens Valley Landcare

CASE STUDY 8

Utilising technology to better inform management decisions

Aligned – Theme 5: Research, Education and Innovation – Focus Area 10: Support the adoption of new technologies

Anna Toland, Simon Riddle and family run Toland Merino with approximately 1200 stud Poll Ewes, 800 Flock Ewes and shear 4500 sheep annually at their 650-acre property, at Feltrin in North East Victoria. They aim to breed highly productive modern sheep, with an emphasis on wool quality, growth rates and worm resistance.

An active community member, Anna recently joined the Board of Riverine Plains, who specialise in providing independent and relevant information through a research program, publications and events for the north east and Riverina farming community. The Board of Riverine Plains also coordinate the Northeast Node of the Victorian Drought Resilience Adoption and Innovation Hub, a program of the Australian Government's Future Drought Fund.

One of the activities recently delivered by Riverine Plains, focused on maximising use of electronic identification (EID) tags to better inform livestock management decisions. Livestock producers are increasingly using EID tags to support livestock management decisions, however, despite a widespread increase in adoption, many are not collecting or utilising the data.

Photo: Toland Poll Merino

Anna and Simon have been using electronic identification (EID) for many years and identify the many benefits to the information the tags hold and how this supports livestock management and decision making. Benefits for Anna and Simon include:

- fibre diameter measurement in wool classing and selection
- fleece weight
- annual pregnancy stats
- ram allocation
- stock selection for improved current and future production
- in a dual-purpose enterprise, allocating Merino ewes or lambs into wool and meat groups based on wool fibre diameter, fleece weight and body weight

Anna and Simon's message is simple.

"Identify what your buyers want and use it to define your breeding objectives. This will inform the data you require to collect through EID so you can select and manage stock accurately, improve your decision making, and be efficient."

On-farm adoption of innovations, such as EID technology, has strengthened Toland Merino's adaptive business practices and management decisions. Being adaptive has led to improved productivity and profitability, especially during periods of adverse conditions such as drought, when decision making is critical.

Written by Sophie Hanna from Riverine Plains

NEXT STEPS

This Plan takes the first step in providing the necessary framework for the Ovens Murray region to communicate its needs and priorities in building regional drought resilience. We acknowledge that continued collective action is necessary for the Plan to succeed.

This Plan is a document to be used by the community, in collaboration with industry, the not-for-profit sector, and all levels of government to:

- coordinate investment
- align to other plans or strategies to support funding proposals
- collaborate for shared outcomes
- inform future drought resilience priorities
- develop drought resilience programs
- monitor resilience to future droughts.

Some of the actions identified can be addressed directly by the community, while others will require broader contribution, collaboration and coordination from governments, not-for-profit organisations, and industry.

A partnership approach will be needed with Traditional Owners to implement some elements of the Plan, in line with the Government's policy and legal commitments, including 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.

Immediate next steps include securing resources to support delivery of actions within the Plan, identification of a lead organisation to coordinate the Plan's delivery, and establishment of a governance group to support and collaborate on the Plan's implementation.

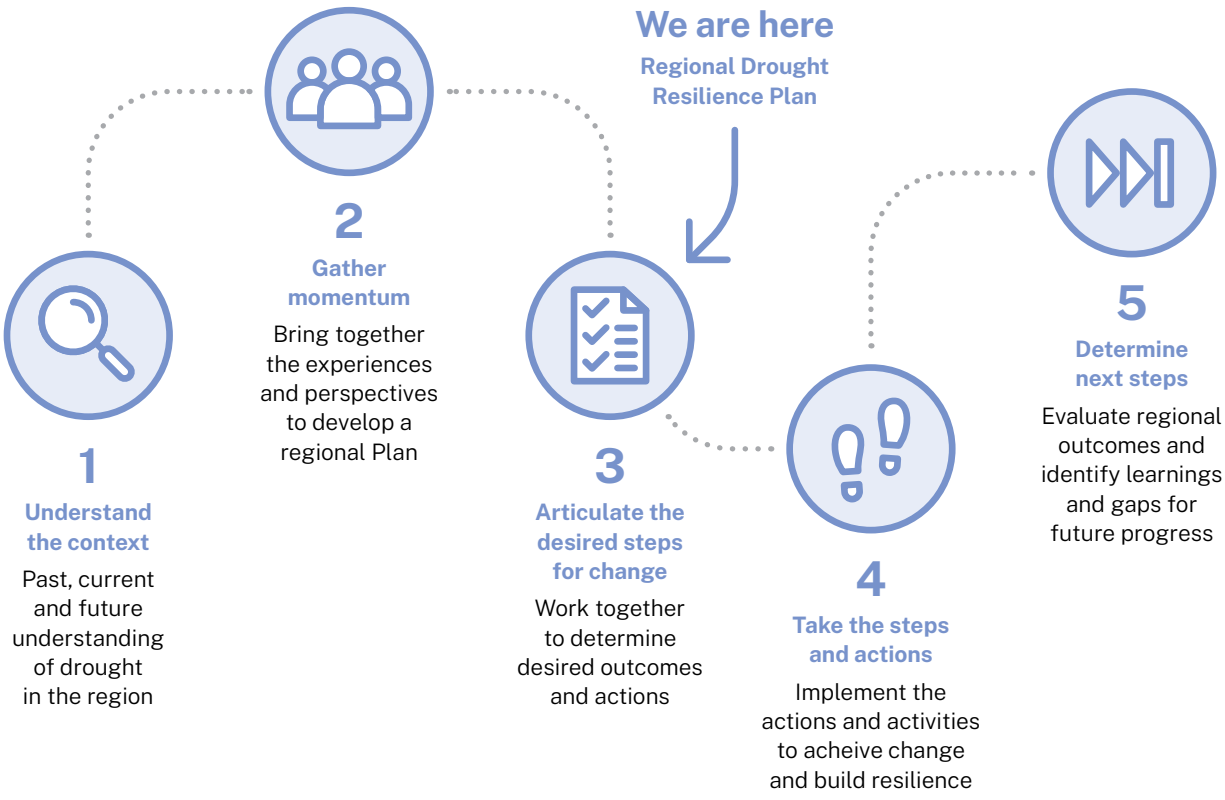
The Plan Coordinator will ensure engagement and partnership with community, industry, business, not-for-profit, government stakeholders and Traditional Owners/First Peoples to identify roles and responsibilities to deliver the Plan and achieve desired outcomes.

It is acknowledged that the Plan will need to be agile and adapt in response to changes in the natural environment, the operational and policy environments of industry and various levels of government, evaluation and learning, and the needs of the community.

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 Ovens Murray. 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.

Figure 8. Pathway of program delivery through discovery, engagement, development, implementation and evaluation



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 over 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 (Figure 8). 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 to coordinate 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 implemented.

Assumptions underpinning success of the Plan

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 and capability to participate in strategic planning
- Regional stakeholders are willing to cooperate with each other on regional planning
- Program design is sufficient to give regional stakeholders opportunities to identify and communicate regional drought resilience needs
- 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 change in practice in the Ovens Murray
- There are sufficient opportunities and funding for the region to implement elements of the Plan
- Plans contain implementable activities to build drought resilience
- The Ovens Murray Plan Coordinator and regional stakeholders continue to review and implement the Plan

MEL Framework

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

The Framework is aligned to existing MEL Plans at the Program and Fund level to ensure consistence and to ensure the data collection tools provide information across a range of learning and reporting requirements.

Table 1. MEL Framework for the Ovens Murray

FDF[1] Strategic priority	Progress measures (2–4 years)	Indicators
People and Community A healthy and thriving region, resilient to climatic shocks, supported by local, trusted health and wellbeing services, and community connection.		
Social resilience for resourceful and adaptable communities	Improved collaboration and coordination between governments, industry, communities and health care networks. Communities are learning and building capability, capacity, expertise, and sharing innovative ways to build social resilience. Improved community awareness of and access to health and wellbeing services.	Communities are using their knowledge to plan for drought resilience. 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.
Coordination and Collaboration A coordinated and collaborative approach to decision making and delivery of drought resilience activities within the region.		
Social resilience for resourceful and adaptable communities	Communities are communicating regional drought resilience needs and priorities to inform investment. Communities are coming together to prepare for and respond to drought. Plan actions and opportunities are incorporated into other strategic planning across the region. Traditional Owners are engaged in regional drought preparedness activities, and those activities reflect Traditional Owners' priorities.	Implementation/planning groups and networks function well together. Leaders in the region are more confident to implement strategic actions. Stakeholders are working together to plan and deliver on actions across the region. Traditional Owners are increasingly involved in drought programs and activities.
Agriculture and Allied Industries Thriving agricultural industries better able to withstand the impacts of drought, supported by a skilled workforce.		
Economic resilience for an innovative and profitable communities **Environmental resilience for sustainable and improved functioning of our natural landscapes**	Primary producers and businesses are better able to prepare for drought. Primary producers are better able to identify business risk and make timely decisions.	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.

1. Future Drought Fund

FDF[1] Strategic priority	Progress measures (2–4 years)	Indicators
Natural and Built Environment Healthy landscapes better able to withstand the impacts of drought.		
Environmental resilience for sustainable and improved functioning of our natural landscapes **Economic resilience for an innovative and profitable agricultural sector**	Knowledge and understanding of resilience of natural resources across the region is increasing. Capability to manage natural resource to build resilience is improving across region.	Partnerships, networks and engagement between stakeholders managing natural resources are ongoing. Stakeholders have increased understanding of natural resource management to build drought resilience.
Research, Education and Innovation Evidence based research and development to support industry to manage risk, uptake innovative practices and increase profitability.		
Environmental resilience for sustainable and improved functioning of our natural landscapes **Economic resilience for an innovative and profitable agricultural sector**	Innovative pathways and opportunities to improve drought resilience in the region are being identified. New technologies and practices are known and being adopted to support primary producers and communities to adapt. Research and extension programs are being co-designed with community and industry to provide outputs relating to the region.	Best practice approaches are being used to identify opportunities to build drought resilience in the region. Stakeholders are learning about, implementing and adopting new practices.

APPRECIATION

On behalf of the Regional Reference Group, Agriculture Victoria thanks the many individuals, groups, associations, agencies, departments, and organisations who contributed to the development of the Plan. Your support and considered input are greatly appreciated and will go a long way to ensuring the Ovens Murray region is better prepared and more resilient to the impacts of future droughts.

The members representing the organisations listed below for the Regional Reference Group are also acknowledged and appreciated for the vital role you played in the development of this Plan.

- Alpine Shire
- Benalla Rural City Shire
- Indigo Shire
- Mansfield Shire
- Towong Shire
- Wangaratta Rural City Shire
- Wodonga City Shire
- Department of Energy, Environment and Climate Action (formally known as Department of Environment, Water, Land and Planning
- Department of Families, Fairness and Housing
- Department of Health (formally known as Department of Health and Human Services)
- Emergency Recovery Victoria
- Goulburn Murray Water
- Murray Dairy
- North East Catchment Management Authority
- Riverine Plains – North East Node of the Victorian Drought Resilience Adoption and Innovation Hub
- Rural Financial Counselling Service
- Agriculture Victoria

"A community that grows local leadership and invests in its future leaders demonstrates a vibrant and sustainable region".

— Judy Charlton, Chair Alpine Valley Community Leadership

Photo: Rural city of Wangaratta

REFERENCES

[1] Goulburn Drought Resilience Plan (2023) Regional Drought Resilience Planning program. Future Drought Fund www.agriculture.gov.au/fdf

[2] Ovens Murray Regional Skills Demand profile (2023) Victorian Skills Authority. Department of Jobs, Skills, Industries and Regions

[3] Ovens Murray Coast Digital Plan (2022) Regional Partnerships Ovens Murray. Regional Development Victoria

[4] Victorian Primary Production Climate Change Adaptation Plan 2022–2026. Department of Environment, Land, Water and Planning

[5] Hume Regional Climate Change Adaptation Strategy (2021). Department of Environment, Land, Water and Planning

[6] North East Regional Catchment Strategy 2021–2027. North East Catchment Management Authority.

[7] Farm Business Resilience program, Future Drought Fund www.agriculture.vic.gov.au/farm-management/prepare/farm-business-resilience-program

[8] Victorian Drought Resilience Adoption and Innovation Hub – North East Node – Riverine Plains www.riverineplains.org.au/victoria-drought-resilience-adoption-innovation-hub

[9] Strong, Innovative, Sustainable: A new strategy for Agriculture in Victoria (2020) Victorian Government

[10] Hume Bushfire Management Strategy (2020) Department of Environment, Land, Water and Planning

[11] Ovens Murray Regional Economic Development Strategy (2022). Regional Development Victoria

[12] Australian Bureau of Statistics (last updated 2023) www.abs.gov.au

[13] Drought in the Ovens Murray Region (2022) Frontier Economics

[14] Bureau of Meteorology (last updated 2023) www.bom.gov.au

[15] Droughts, fires and floods affecting Albury/Wodonga. Wodonga Historical Society

[16] Bureau of Meteorology. Historical view of the drought years www.bom.gov.au/climate/drought/knowledge-centre/previous-droughts.shtml

[17] Data collection and an analysis for decision making in agriculture and local government (2003) North East Catchment Management Authority

[18] Resilience: what it is and is not (2020) Walker B. *Journal of Ecology and Society*, vol 25/2

[19] Goulburn Murray Resilience Strategy – Adapt, Transform, Thrive (2020) Regional Partnerships Goulburn and the Victorian Government

[20] Goulburn Broken Regional Catchment Management Strategy 2021–2027. Goulburn Broken Catchment Management Authority

[21] Gippsland Drought Resilience Plan (2023) Regional Drought Resilience Planning program. Future Drought Fund www.agriculture.gov.au/fdf

[22] Wimmera Southern Mallee Drought Resilience Plan (2023) Regional Drought Resilience Planning program. Future Drought Fund www.agriculture.gov.au/fdf

APPENDICES

Appendix 1
Ovens Murray stakeholder engagement

The Ovens Murray Regional Reference Group was established to provide expert input to the Plan and ensure that the outcomes and actions identified represent a coherent and balanced view of stakeholder feedback. We acknowledge and appreciate all of the knowledge, insight and support that we have received in the creation of this Plan.

Ovens Murray Regional Drought Resilience Plan Reference Group Members

Agriculture Victoria

Alpine Shire

Benalla Rural City Shire

Indigo Shire

Mansfield Shire

Towong Shire

Wangaratta Rural City Shire

Wodonga City Shire

Department of Energy, Environment and Climate Action (previously the Department of Environment, Land, Water and Planning)

Department of Families, Fairness and Housing

Department of Health and Human Services

Emergency Recovery Victoria

Goulburn Murray Water

Murray Dairy

North East Catchment Management Authority

Riverine Plains - North East Node of the Victorian Drought Resilience Adoption and Innovation Hub

Rural Financial Counselling Service

Agricultural Industry and Farm Business Services

Agriculture industry representatives

Agricultural consultants

Finance

Murray Dairy

AgriFutures

In-depth conversations with the organisations and individuals listed below were instrumental to the development of the Plan.

Community and Not-for-Profit Organisations

Australian Red Cross (State-wide and regional programs)

Lions Need for Feed (Victoria)

Alpine Valleys Community Leadership

Landcare Victoria

Country Fire Authority

Community Health Organisations

National Centre for Farmer Health

Education and Capability Building

TAFEs

Melbourne University

Farmer Groups and Local Business Leaders

Municipal agriculture sector advisory groups

Victorian Farmers Federation

United Dairy Farmers Victoria

Riverine Plains

Rural Financial Counselling Service

Small Business Mentoring Service

Business Support Partners Australia

Government Agencies and Statutory Authorities

Centre for Regional and Rural Futures

Climate Change Adaptation, Community & Partnership Programs

Country Fire Authority

Cross Border Commissioner

Emergency Management Victoria

Emergency Recovery Victoria (formerly Bushfire Recovery Victoria)

Foundation for Rural regional Renewal (FRRR)

Fire and Forest Operations

National Recovery and Resilience Agency

Rural Assistance Commissioner

Victoria Police

Natural Resource Management Organisations

North East Catchment Management Authority

Goulburn Murray Water

Goulburn Valley Water

North East Water

Landcare networks

Parks Victoria

Other Future Drought Fund Programs

Victorian Drought Resilience Adoption and Innovation Hub

Leadership development program (Australian Rural Leadership Foundation)

Farm Business Resilience program (Agriculture Victoria)

Regional Drought Resilience Planning program – Goulburn, Gippsland, and Wimmera Southern Mallee (Agriculture Victoria)

Agriculture Dependent Resilient Communities Community of Practice

Regional Development Organisations

Regional Development Victoria

Small Business Organisations

Small Business Victoria

Small Business Mentoring Service

Traditional Owners

Taungurung Land and Waters Council Aboriginal Corporation

Yorta Yorta Nation Aboriginal Corporation

Gunaikurnai Land and Waters Aboriginal Corporation

Dhudhuroa – Victorian Aboriginal Corporation for Languages

Appendix 2
Existing strategies, reports and programs

This Appendix outlines the existing strategies, reports and programs that have been reviewed for their relevance in building drought resilience in the region, in addition to those referenced. This appendix is intended to be used as a resource document.

Agriculture

Climate Futures – Opportunities and Challenges. (Climate adaption for dairy farming in the Alpine Valleys (2019) Patten Bridge, Bridge Logic Consulting

Dairy Australia Strategic Plan 2020–2025. Dairy Australia

Dairy Australia Climate Change Strategy 2020–25. Dairy Australia

Drought preparedness module – more beef from pastures. Meat and Livestock Australia, www.mbfp.mla.com.au (last updated 2019)

Farm decision making. The interaction of personality, farm business and risk to make more informed decisions (2020) Grains Research Development Corporation

Future Focus – Dairy Industry Strategy Murray Region (2019) Dairy Australia

Murray Dairy Strategic Plan 2020–23. Dairy Australia

People in Agriculture, www.peopleinag.com.au (last updated 2022)

Community Health

From inside the farm gate: rural women's stories of surviving and thriving. National Centre for Farmer Health, www.farmerhealth.org.au/inside-farm-gate (last updated 2021)

Steering Straight: Adapting suicide risk safety planning as a prevention-focused self-management resource for the Australian farming community (2023) Australian Journal of Rural Health

Summary of the Royal Commission into Victoria's mental health system. National Centre for Farmer Health, www.farmerhealth.org.au (last updated 2022)

Economic Development

Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES), www.agriculture.gov.au/abares (last updated January 2024)

Ovens Murray Regional Profile – an analysis of regional strengths and challenges (2019) Infrastructure Victoria

Ovens Murray Digital Plan (2022) Regional Partnerships Ovens Murray, Regional Development Victoria

The Economic Benefits of Native Shelter Belts Report (2015) Basalt to Bay Landcare Network Inc. Landcare: Issue 3

The Financial Impact of 2020 Summer Bushfire Smoke on the Wine Regions of North East Victoria (2020) Walpole M., Rural City of Wangaratta and North East Catchment Management Authority

Emergency Management

Bushfire recovery consultation report (2020) Victorian Council of Social Services

Community Resilience Framework for Emergency Management (2017) Emergency Management Victoria

Hume Regional Emergency Management Plan (2020) Hume Region Regional Emergency Management Planning Committee

Federal and State Government Policy and Programs

Agriculture and Climate Change. Department of Energy, Environment and Climate Action, www.agriculture.vic.gov.au/climate-and-weather/policy-programs-action (last updated 2021)

Drought, disaster and rural support. Department of Agriculture, Fisheries and Forestry, www.agriculture.gov.au/agriculture-land/farm-food-drought/drought (last updated 2023)

Drought Policy. Department of Agriculture, Fisheries and Forestry, www.agriculture.gov.au/agriculture-land/farm-food-drought/drought/drought-policy (last updated 2023)

Future Drought Fund Regional Drought Resilience Planning Program Framework Extension (2022) Australian Department of Agriculture, Fisheries and Forestry

National Climate Resilience and Adaptation Strategy 2021–2025. Australian Department of Agriculture, Water and Environment

National Drought Response, Resilience and Preparedness Plan (2019). Australian Department of Agriculture

Natural Environment Climate Change Adaptation Action Plan Victorian Government (2022). Department of Environment Land Water and Planning

Victoria's Climate Change Adaptation Plan 2017–2020 (2016). Department of Environment Land Water and Planning

Victorian drought preparedness and response framework. Department of Energy, Environment and Climate Action, www.agriculture.vic.gov.au/farm-management/managing-for-and-during-drought/drought-preparedness-and-response-framework (last updated 2021)

Victorian Drought Resilience Adoption and Innovation Hub, www.vicdroughthub.org.au (last updated 2023)

Victorian Government Response to the Inquiry into Tackling Climate Change in Victorian Communities (2021). Department of Environment, Land, Water and Planning

Victoria in Future 2019 (2019) Department of Environment, Land, Water and Planning

Knowledge, Research and Innovation

Farm drought resilience research program. CSIRO, www.csiro.au/Drought-Resilience (last accessed 2023)

Future Regions Research Centre (2023) Federation University, www.federation.edu.au/research (last updated 2023)

Tatura Smart Farm – Agriculture Victoria, www.agriculture.vic.gov.au/about/our-research/our-innovation-ecosystem/our-smartfarms/tatura-mildura-smartfarms (last updated 2020)

Natural Resource Management

Climate Futures Report (2022) Murray Dairy

North East Regional Catchment Authority – Insights Paper (2021) North East Catchment Management Authority

North East Region Socio-Economic Value of Recreational Water: Selected Waterways and Waterbodies, North East Catchment (2019) North East Catchment Management Authority

North East Strategic Directions Statement – Integrated Water Management Forums (2019) Department of Environment, Land, Water and Planning

Ovens Murray Climate Projections (2019) Department of Environment, Land, Water and Planning, CSIRO and Victorian Government

Supporting local action on climate change. Department of Energy, Environment and Climate Action, www.climatechange.vic.gov.au/supporting-local-action-on-climate-change (last updated 2022)

Regional Resilience

Central West Regional Resilience Strategy – Championing resilience and prosperity across Central West Queensland (2020) Queensland Government

Combining social capital and technology for drought resilience in agriculture (2013) Ranjan R. *Natural Resource Modelling,* vol 27/1

Community resilience framework for emergency management (2017) Emergency Management Victoria

Drought and the future of rural communities: Opportunities and challenges for climate change adaption in regional Victoria (2012) Kiem A. and Austin E. *Global Environmental Change*, vol 23/5

Making 'resilience', 'adaptation' and 'transformation' real for the design of sustainable development projects: piloting the Resilience, Adaptation Pathways and Transformation Assessment (RAPTA) framework in Ethiopia (2017) CSIRO

Managing extreme water shortage in Victoria – lessons from the Millennium Drought (2016) Department of Environment, Land, Water and Planning

Nature Conservation Strategy (2021) Parks Victoria

Resilience, adaptation pathways and transformation approach. A guide for designing, implementing and assessing interventions for sustainable futures (version 2) (2019) CSIRO, Australia

Social impacts of drought: a report to NSW Agriculture (2004) Centre for Rural Research, Charles Sturt University

Strengthening Australia's Resilience to Climate Change (2022) CSIRO

The Alpine Community Recovery Committee – Community Recovery Plan (2021) The Alpine Community Recovery Committee

Transformative Adaptation Research Alliance (2022) CSIRO, www.research.csiro.au/tara (last accessed 2022)

Understanding the drought phenomenon: the role of definitions (1985) Wilhite D. and Glantz M. *Water International*, vol 10/3

What is maladaptation and why does it matter? Cervest, www.cervest.earth/news/what-is-maladaptation-and-why-does-it-matter (last updated 2022)

Small business

Small Business Natural Disaster Preparedness and Resilience Review (2022) Australian Small Business and Family Enterprise Ombudsman

Traditional Owners

Aboriginal Economic Development Strategy for Gippsland (2021) Gunaikurnai Land and Waters Aboriginal Corporation

Aboriginal Water Program Phase 1 (2016–2020) Department of Energy, Environment and Climate Action, www.water.vic.gov.au/the-aboriginal-water-program (last updated 2023)

East Gippsland Fires 2019-20 Culture and Healing Recovery Sub-plan (2019) Bushfire Recovery Victoria and East Gippsland Shire Council

Gunaikurnai Whole of Country Plan (2015) Gunaikurnai Land and Waters Aboriginal Corporation

Taungurung Country Plan (2016) Taungurung Land and Waters Council Aboriginal Corporation

Water, Country and Community Program 2020–2024 Department of Energy, Environment and Climate Action, www.water.vic.gov.au/the-aboriginal-water-program/water-country-and-community-program (last updated 2023)

Water is Life – Traditional Owner access to water roadmap (2022) Department of Environment, Land, Water and Planning

Yorta Yorta Whole of Country Plan 2021–2030. Yorta Yorta Nation Aboriginal Corporation

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 Ovens Murray Region

Information to support the Ovens Murray 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

The Ovens Murray Region is on the edge of the Murray River and has access to Victoria's high country. The region features the Mitta Mitta, Kiewa, Ovens and King Rivers. This offers a range of tourism and lifestyle benefits for the region including recreational activities of cycling, snow, nature-based tourism, food, wine, craft beer and cultural heritage. The region is located on national freight and transport routes which gives it a strong economic advantage. With a population of 134,593 in 2021, the region has a Gross Regional Product of $6.5 billion. Annually there are 3.9 million High Country visitors and $1.3 billion regional tourism spend.

The Ovens Murray region includes the traditional lands of the Taungurung, Yorta Yorta, and Gunaikurnai peoples as well as other Traditional Owner groups in Victoria who are not formally recognised.

Key industries for employment in the Ovens Murray region in 2021 included health care and social assistance, manufacturing, and retail trade, with agriculture, fishery and forestry contributing 7% employment to the region.

Water in the region is sourced from key rivers including the Ovens and Murray. There is a growing reliance on groundwater within the region and a small amount of irrigation.

The region recently experienced drought and dry seasonal conditions during the Millennium drought 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 Ovens Murray 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 socio-economic 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

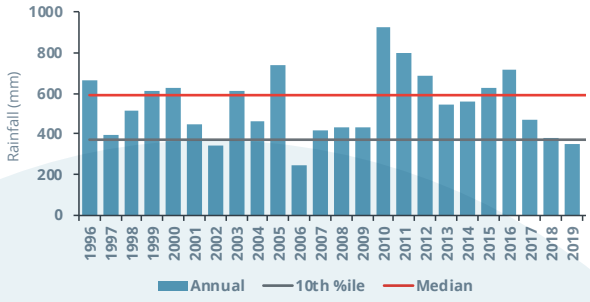
Large drought events have had wide effects across Victoria, with each drought being different in its regional severity and distribution. The last 25 years has seen Ovens Murray experience extensive drought periods, starting with the Millennium drought from 1997 to 2009 and more recently the dry conditions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

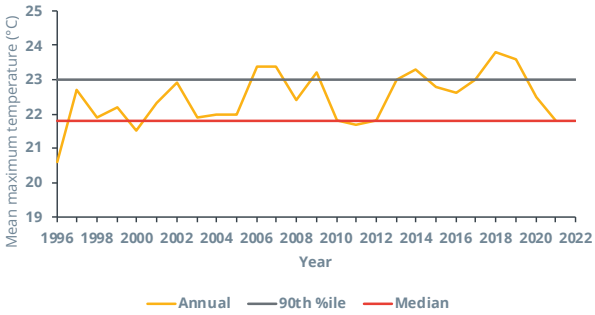
The historical rainfall and temperature charts in **Figure 3**, provides evidence of the severity of these recent drought events. Rainfall was below the 10th percentile in 2019 which was coupled with mean maximum temperatures over the 90th percentile. Additionally, from 2006 to 2009, the region experienced consecutive years of well below median rainfall and above median temperatures.

Water for agriculture in the region is sourced from a mix of regulated surface water, unregulated surface water and groundwater. The above charts show an annual average rainfall, however the success of dryland grazing is dependent on the timing of rainfall throughout the year. Some parts of the region have access to irrigation water which provides a secondary water source for farmers, but irrigation does not play a large role across the Ovens Murray region.

Allocations in regulated systems (such as the Ovens) were 0% during the Millennium drought. The period of 2017 to 2019 also saw significant reductions in rainfall and hot temperatures, however allocations in Ovens were 100% and there was only a single year of reduced water allocations for the Murray in 2019 to 20.

Figure 3 Annual rainfall and average maximum temperature in Rutherglen





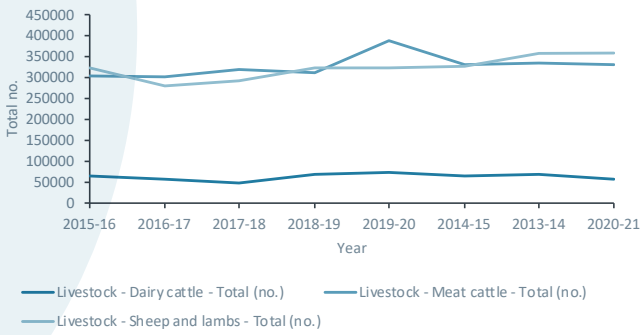
Recently experienced droughts and dry seasonal conditions in the region:

- Millennium drought
- 2017 to 2019

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

The agricultural sector is the second largest exporting industry in the region. Beef is the most valuable followed by dairy, sheep and wool. Along with manufacturing, the two sectors comprise 72.8% of the region's export value. As such, the Ovens Murray community rely on agriculture and downstream production industries for a large proportion of economic activity. This means that drought impacts in the agriculture sector flow through to impact the broader community.

Figure 4 Livestock numbers in the North East NRM region



The impacts of the 2017 to 2019 dry seasonal conditions were mitigated somewhat due to the experience gained and lessons farmers learnt from the Millennium drought which meant farmers had resilience actions in place. **Figure 4** shows the steady albeit increasing number of livestock in the region since 2015-16. The high reliance on livestock compared to other types of farming such as broadacre cropping means there are more drought preparedness and operational practices that can be introduced to reduce the impacts of drought. For example, buying more fodder to replace pastures and existing on farm dam storages can be used to water and feed livestock. Timing of rainfall has a significant impact on fodder growth.

Large fires bring a different dynamic to drought impacts. Bush fires are devastating for the community as they damage land, stock and life. The areas affected by fire have differed between droughts. The most recent dry seasonal conditions contributed to fires in the Ovens Murray in 2019 to 2020 which burnt a significant area in the North East of the region and areas south of Bright. The fires had flow on impacts to winery production and tourism in the region.

Town water

Water restrictions were required during the Millennium drought

- North East Water was active in the market purchasing 5984ML of allocations from the market since 2007 to 2008 and also purchasing some entitlement (860ML) in earlier years.
- North East Water facilitated a pilot project to allow individual urban water users (including car washes, sporting grounds and bowling clubs) to purchase allocations on the water market and then access water through the urban reticulated system.

The drought led to a drilling of more bores in the region to introduce more reliable water supplies.

Recreation and Tourism

Tourism in the region is both water dependent and non-water dependent. Tourists visit the region for its natural landscapes, wineries, high country and waterways. Increasing temperatures and less rainfall is likely to affect tourist's amenity benefit from visiting the towns and landscapes in the region. Decreased water in dams and rivers may lead to stagnant water and blue green algae which is likely to deter visitors who are seeking water recreation in the region as well. The bushfires in 2019 to 2020 had a severe impact on tourism, and this was compounded by traffic disruption, road closures, and air quality issues.

Environment

There were negative impacts on riverbank and in-stream vegetation in the rivers, lakes and dams in the region during the Millennium drought.

Traditional owners

Culturally significant sites particularly those located on flood plains and/or water dependent were exposed and became vulnerable to damage during past droughts. 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 contributes 6.4% in value add to Wangaratta and 4.5% in Wodonga SA3 regions. Key industries for employment in the Ovens Murray region in 2021 included health care and social assistance, manufacturing, and retail trade, with agriculture, fishery and forestry contributing 7% employment to the region. In addition to the significant direct employment in primary production in the Ovens-Murray region, nearly the same number of people are directly employed in the up- and down-stream industries that provide services to agriculture and that process agricultural products.

Some communities in the Ovens Murray region have a high proportion of people directly affected by agriculture, with smaller communities heavily reliant on agriculture more impacted by drought. Production impacts also affect the range of down-stream processing facilities in the region. This means that the negative impacts of drought are concentrated in those communities. Further, businesses in smaller towns generally do not have many options to respond to a decline in the spending and economic activity. In contrast, Wodonga and Wangaratta are regional hubs with a high level of diversification.

This means that decreases in agricultural production in less diversified communities caused by drought created flow-on community impacts through reduced income and employment, especially on-farm labour and agricultural services. However, the 2017 to 2019 drought was well managed by the region, meaning these impacts were not as severe as perhaps the Millennium drought. These impacts do flow on to the wider community through reduced overall spending in the community.

Since 2007, Food Production Manufacturing has been the largest contributor to the gross value add in the manufacturing industry. The sector includes beer and wine, grain mill and cereal products, and dairy products. The sector is relatively concentrated in the region, although it's overall importance as an employer and contributor to value add is falling compared to the state average. This could be due to structural adjustments and the increase in service-based sectors. This industry is reliant on the outputs of agricultural production and is such susceptible to drought impacts.

Economic modelling of the Millennium drought found that the Gross Domestic Product (GDP) of the Ovens Murray region declined by an average of over $100 million annually in the extended drought of 2006-07 to 2009-10. This accounts for the cumulative drought impacts on dryland and irrigated production in addition to negative spending effects in the region. The modelled production impacts were reduced by net water trade into the region, but were still found to have significant employment impacts (averaging well over 500 less jobs annually over the same period).

Overall, there were significant economic impacts to the Ovens Murray region during the Millennium drought. This is due to the cumulation of direct losses to production and the flow on spending and employment impacts to the Ovens Murray community. These also led to an increase in demand for services such as mental health and Rural Financial Counselling.

01 **Future drought conditions + Changes in the Ovens Murray 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 Ovens Murray region and its communities.

01 Future drought conditions

Climate change is likely to increase the variability of the weather in the Ovens Murray Region with future droughts expected to be longer, more frequent and more severe. Climate projections show that by 2050 the Ovens Murray region on average will be hotter, drier and be exposed to a growing number of fire danger days. Similar to the past, the region and sub-regions will continue to face variable conditions within and across seasons — however in the future this variability will be around a lower average rainfall and higher average temperature than previously experienced. This means that, compared to current conditions, it is likely that parts of Ovens Murray will face some seasons with rainfall significantly below and temperatures significantly above current averages.

Ovens Murray has a high prevalence of dryland agriculture, which relies on timing and quantity of rainfall. Dryland agriculture does not offer the same resilience options as irrigated agriculture, which has 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 Ovens Murray region

There have been many learnings and adaptions in agriculture since the Millennium drought, with farmers in the region being well prepared for the 2017 to 2019 drought. Resilience measures were introduced including buying and storing fodder, on farm dams and improving cash reserves. However, these measures were only accessible to farmers who had the means to implement them.

An increase in tree-changers and hobby farmers since the last drought means there are new players in the space. These players are likely to have never experienced drought and most likely will not be prepared.

Town water security planning and investment has increased in the region. The North East water plan growth outstripped the Victorian projections indicating population growth challenges. There is also a misunderstanding of the water sharing arrangements in the region.

It is noteworthy that limited opportunities for water trade and irrigation distribution mean the Ovens Murray region is less exposed to broader 'system level' responses to drought and a changing climate (as compared, for example, to the neighbouring Goulburn region) – including interregional water trade and Basin Plan water recovery.

Finally, there has been a continuing diversification of the region's economy, with ABS Census data identifying the percentage of the community directly employed in the agricultural industry has steadily decreased since the early 2000s.

Figure 5 Climate projections for the Ovens Murray region

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

1.9 to 2.4 °C ↑

Average maximum temperatures in spring expected to increase by up to 3.1°C. Number of days over 35°C increasing from 20.6 days to 30-54 days.

6-14% ↓

Rainfall will continue to be very variable, around a lower average rainfall (in spring expected to decrease by 11-22%).

44% ↑

Number of very high fire danger days to increase by 8 days per year

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

Dairy and mixed farming operations are expected to be most exposed to increasing temperatures, decreasing rainfall and the increased likelihood of prolonged drought. The adaptiveness of these producers and their ability to maintain sufficient reserves (e.g. in cash and fodder) 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.

There is a reliance on water dependent industries and agricultural reliant industries in the larger regional centres and across the region broadly. For example, the Uncle Toby's factory in Wahgunyah is a large employer for the area and relies on wheat and grain production in the region as an input. Furthermore, the winery region attracts a lot of tourists. Without access to effective irrigation many wineries are at risk of crop damage during dry periods. This has flow on effects for cellar door sales in drought years and beyond.

The diversity of water sources in the Ovens Murray region will continue to create a buffer for some farmers to drought impacts. However, a reduction in water availability will impact all agriculture production in the Ovens Murray region. Those farmers that use water from rivers, creeks,

Drought in the Ovens Murray Region

lakes and groundwater are likely to experience impacts from reduced water availability during drought times. Farmers that have access to irrigation water are likely to be somewhat resilient to drought impacts at least in the shorter term.

Future implications of drought are likely to continue to impact the wellbeing and mental health of the local communities. Farmers and community businesses are likely to continue to rely on financial counselling services and the broader community will continue to rely on mental health services.

Access to mental health services should continue to be supported moving into the next drought. People trying to make tough decisions in drought are already in a vulnerable space and need to be supported. Without a plan in place it is difficult to think rationally. The physical and mental health of the community might be impacted as people in the community value green spaces, trees and the waterways.

Town water

Town water security planning has improved building on lessons from drought. Likewise, Urban Water Strategies are now required to incorporate future impacts of climate change (including potential droughts). For example, North East 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. The water corporation is planning investment across a number of North East Water's systems to maintain water supply security and treatment services in the coming decades.

Recreation and Tourism

Tourism will continue to be exposed to fluctuations in water availability under future droughts. Initiatives that are not dependent on water availability could boost visitors to the region. The COVID-19 pandemic has provided a boost to regional travel and tourism as international and state borders were closed for long periods of time.

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. There is likely to be a lack of food and drinking water for wild animals living in the national and state parks in the region. This may impact the habitats of wildlife leading to changes in numbers and overall displacement. Additionally, the increased risk of wildfires will have significant environmental impacts.

Traditional owners

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

03 Community outcomes in future droughts

Figure 6 Computable General Equilibrium (CGE) Modelling for a future drought

Flow through impacts from ag 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 Ovens-Murray to be significantly affected, with GDP in the region falling by 4.6% and a fall in employment over 650 jobs. This flowed through the region reducing consumption/spending by nearly 3.0%.

4.6% GDP

650 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 decrease 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, hotels/cafes
- the road transport sector.

Economic modelling of potential future drought in Victoria, undertaken by the Victoria University's Centre of Policy Studies, found the Ovens Murray to be significantly affected with GDP falling by 4.6% and a reduction of almost 650 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 for community members in the agriculture and non-agriculture sectors will be vital as drought conditions become more prevalent. Not only are mental health services important during times of drought, but improved mental health increase 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.

The physical and mental health of the community might be impacted as people in the community value green spaces, trees and the waterways. 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. North East 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 Ovens Murray 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 Ovens Murray 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 Ovens Murray region's high exposure to agricultural industries creates the potential for significant community impacts from future droughts.

Vulnerabilities and gaps in preparedness

The Ovens Murray region has learned from previous drought conditions and already has resilience measures in place or in development. However, the recent dry conditions, bushfires and other events in the region mean much of the community is 'worn down' by the prospect of another prolonged drought.

An increased number of hobby farmers in the region who have not experienced drought in the past may be at risk of drought impacts. However, they may be able to easily reduce stock numbers or have fodder available due to cash reserves.

Changing industries as tobacco farms are leaving the region leading the way for vines and hops. These crops to not extract as much water but require more consistent water availability. There is potential these newer players in the region are not drought prepared.

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 Ovens Murray 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.

Tourism plays a large role in the region and can prop up agricultural businesses during drought. However, this is dependent on the infrastructure being in place to cater for tourism, and there is a risk a brown and dry landscape will deter tourists from visiting.

Water access is changing in the region. Access to, and reliance on, groundwater for general production and to manage drought is increasing. Also, there are many unregulated water systems that are vulnerable to a drying climate and may go into restrictions earlier and more severely in future droughts.

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

- The major regional centres, Wodonga and Wangaratta, will provide a buffer to some drought impacts as they have a more diverse economy. Townships near Wangaratta and Wodonga may also benefit from this buffer in the face of agricultural declines during drought. This is especially the case for townships within an approximately 50 km radius of the centres that offer the benefits of rural living while also allowing access to employment opportunities in the larger centre.
- Medium sized communities including Mansfield, Corryong, and Bright, are reliant on a mix of agriculture and tourism. Leaving them exposed to compounding effects of drought and fires.
- Smaller communities are still likely to feel impacts of drought due to the reliance on agriculture.

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. Waiting for a boost in service provision as a drought response lags the demand and means that individual's seeking these services are necessarily having to make drought management decisions under significant stress.

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