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# Climate Change, Planning and Development in the Eastern Riverina



# Community wide planning for a future with less water

## Overview of the Project

### Strengthening Basin Communities Project Context

The Strengthening Basin Communities (SBC) program is Commonwealth Government funding initiative to assist communities in the Murray Darling Basin understand the implications of climate change on water availability, identify strategies to adjust to a future with less water, and secure water supplies through the implementation of water saving initiatives.

The \$200 million program is currently being delivered through two separate components. The first is a planning component providing grants for local governments in the Murray Darling Basin to assist in the community-wide planning for a future with less water. The second, a water savings initiative, offers competitive grants for local government authorities and urban water service providers to support projects that improve water security by reducing demand on potable water supplies.

A World with Less Water: Climate Change Impacts on Councils in the South Eastern Riverina

The Riverina Eastern Regional Organisation of Councils' (REROC) World with Less Water: Climate Change Impacts on Councils in the South Eastern Riverina project is a component of the SBC Program (referred to as REROC SBC project hereafter). The objective of this project is to help participating REROC member councils understand the implications associated with climate change and reduced water availability. This will also help increase the resilience of REROC communities to expected changes.

The REROC SBC project comprised three stages. The first two stages were completed in mid 2011, and provided an assessment of climate change and water resources in the region, followed by an evaluation of industry water use, a risk assessment for water dependent industries and an overview of water saving initiatives. As part of these two stages, five technical papers and two wrap up reports were completed:



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Stage 3 built on Stages 1 and 2 by developing plans and priority water security initiatives for each of the participating councils: 10 Local Government Areas (LGAs) in the REROC region and Goldenfields Water County Council (GWCC). This provided a guide for a targeted response to local water security issues in accordance with the intent of the Strengthening Basin Communities Program.

Each participating council received two plans, an Asset and Infrastructure Plan and a Land Use Planning and Strategic Development Plan. The plans considered the potential changes councils will face individually and collectively into the future. Potential climate change influences on infrastructure and misalignments in terms of asset management, land use planning and strategic development were analysed in detail. The collected material was then analysed in order to evaluate how well each council will weather these changes and what additional actions could be taken to face these potential issues.

This wrap up report, and its partner Climate Change and Infrastructure in the eastern Riverina, provide an overview of these issues at a regional level and highlight initiatives relevant for implementation on a regional basis.

The structure of this report is as follows:

#### **Study Area**

Details the geographical and political boundaries of the REROC SBC project.

#### **Climate Change**

Provides an understanding of what climate change is and how it may affect the region.

#### **Social, Industry and Economic Overview**

and industry profile as well as the issues which may be exacerbated by the effects of climate change and reduced water availability.

#### **REROC Planning and Development Overview**

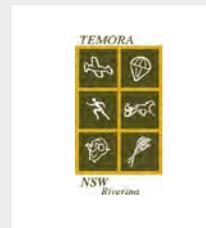
region as a whole and individual Councils, focussing on measures that could be taken in the future to better integrate climate change and reduced water availability challenges.

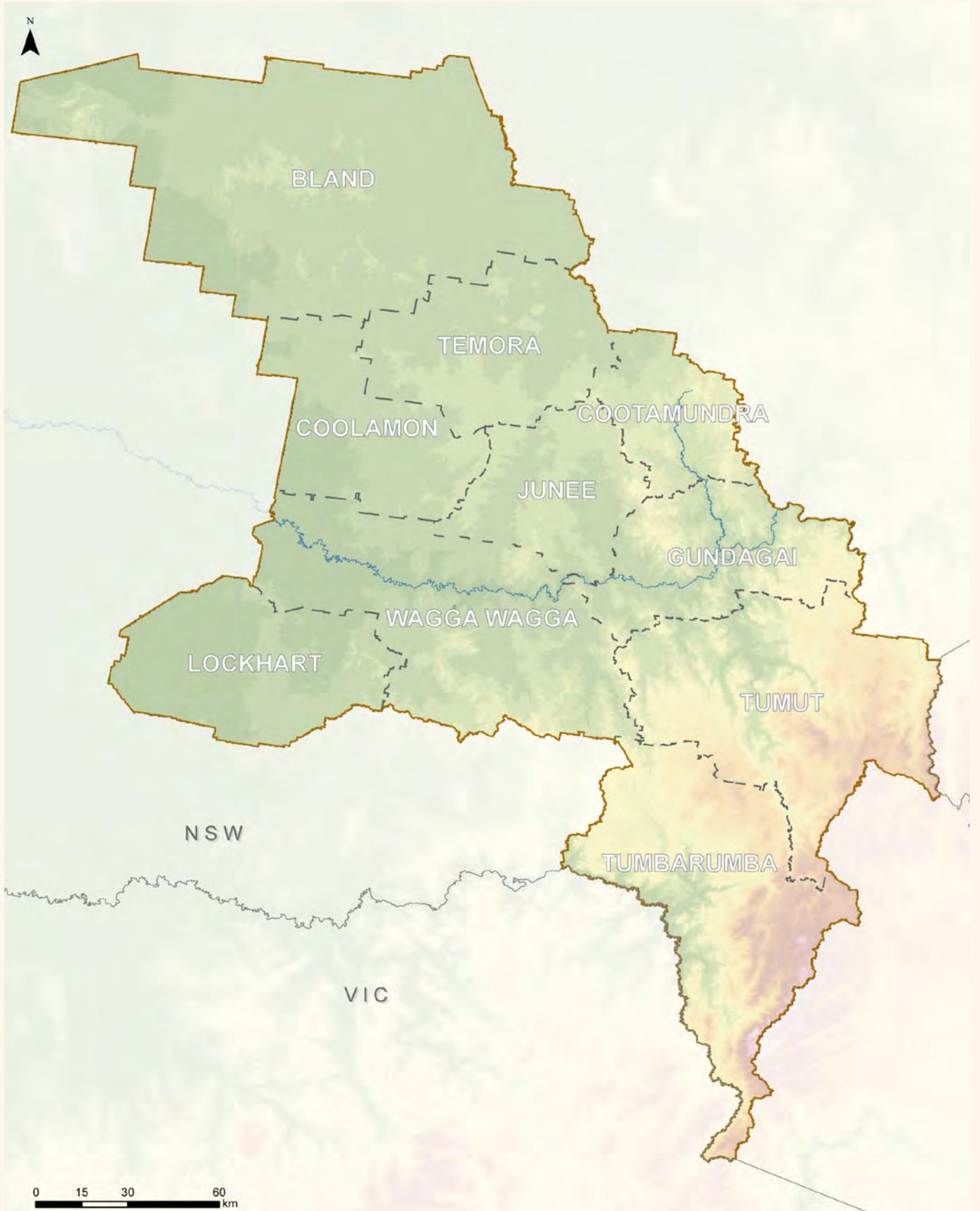


## Study Area

The study area for this project comprised ten local councils and two Water County Councils. As involvement in this project was voluntary, all councils are part of REROC but not all REROC Councils are part of the Study Area.

# Regional issues can ensure that local issues affecting the region can be addressed at a regional level





From the western slopes of the Snowy Mountains to the rolling fields of the Murrumbidgee District, REROC is a vast region with strong contrasts in topography and climate. Similarly, across the region there are varying land based industries, from mining and forestry to dryland agriculture and transport and storage.

While the council areas have political, economic, social and physical differences, there are also some clear synergies between them. Harnessing economies of scale across these commonalities can increase efficiency and effectiveness. Regional initiatives, such as this project, can ensure that regional issues can be more effectively addressed.





# REROC is a large and contrasted region

## Climate Change

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### Understanding Climate Change

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To understand the effects of climate change on REROC's planning and development policies and practices, it is important to firstly understand what climate change is and how it will potentially affect the region. The terms weather and climate tend to be used interchangeably, however they represent two different elements of a common continuum. The weather is the result of rapidly changing atmospheric conditions generally considered on a timescale from a few minutes to a few days. The climate is the average of all the weather statistics over a longer period of time (e.g. over a 30 year period).

Contemporary climate change is mainly attributed to the impact of greenhouse gases, such as water vapour, carbon dioxide, methane, nitrous oxide and aerosols. Some of these gases are released by burning fossil fuels which enhance the natural greenhouse effect on the planet. Major land use changes and some natural climate variability have also contributed to the recent changes in climate conditions in Australia. Even if greenhouse gases released in the atmosphere are dramatically reduced, the warming trend will continue to rise throughout the century; this is due to the inertia of the climate system.

Climate models are the best available tools to estimate what the future climate may be. They represent a simplified version of the physical and chemical processes driving our global climate system. Though the models usually account for processes taking place over continents, oceans and the existing relationship between large land and water masses, they still poorly integrate some features such as the topography, cloud cover, vegetation or large scale driving climate patterns (such as the El Niño). As such, the model results have to be considered as projections, rather than predictions and will always be associated with a significant degree of uncertainty.

Emission scenarios are estimations of future quantities of greenhouse gases that may be released into the atmosphere. Levels of future emissions are highly uncertain, so a variety of scenarios are often used to provide various estimations of how the future might unfold. Greenhouse gas emission scenarios are used as inputs for climate modelling.



## Past, Current and Future Climate

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Past climate trends, current climate, and future projections for REROC have been determined as part of this project from a combination of data sets obtained from eight Bureau of Meteorology (BoM) weather monitoring stations and climate models. Climate observations, or past trends, were obtained through the network of BoM monitoring stations.

Precise and consistent measurements are generally only available for the second half of the 20th century. REROC's current climate has been characterised from data sets in combination with gridded data sets from the BoM stations. Climate models that simulate or replicate the past climate conditions most accurately for REROC have been selected to inform climate projections (future climate) for the region.

## Current Climate – REROC

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In terms of climate, REROC is a large and contrasted region. There is a very clear south-east to north-west gradient. The mountainous south-east region presents the coldest and wettest climate with the lowest evaporation and the highest number of days  $<0^{\circ}\text{C}$ . On the other hand, the plains of the north-west are extremely dry and hot with a much higher rate of evaporation and lower number of days  $<0^{\circ}\text{C}$ . Mean annual temperature does not show such a strong spatial distribution, however the north-eastern part of the region, around Bland and Temora, tends to be the warmest.

# Projections

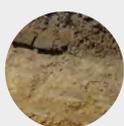
## General Climate Change trends for REROC

For the purpose of this study, AECOM commissioned the Commonwealth Scientific and Industrial Research Organisation (CSIRO) to generate locally relevant climate projections. The results of these models were distributed between a 'most likely future' (where most of the 18 climate models agree, and which represents the most likely evolution of the climate in REROC), and 'worst case scenario' (where a limited number of models agree, and which represents the worst case evolution of REROC's climate). The annual trends for each scenario are:

	Most likely	Worst Case
An increase in mean annual and seasonal air temperature (°C)	0.85 to 3.9	1.4 to 6.6
A decrease in mean annual rainfall (%)	5 to 24	6 to 26
A limited increase in mean annual evaporation (%)	1 to 6	2 to 11
A decrease in mean annual and seasonal humidity (%)	2 to 11	5 to 21

Seasonal trends were also examined, and generally showed similar patterns to annual trends. Exceptions include mean seasonal rainfall, where there is likely to be no change in autumn rainfall, and a greater decrease in winter rainfall; and spring evaporation, which is projected to decrease.

## The changes in extreme events may lead to an increase in flooding, which will put pressure on the region's assets



### Soil

Climate change is projected to lead to variations in precipitation and temperature, both of which will affect soil water content. Changes in soil water content could modify soil structure through the physical process of shrink-swell (IPCC, 2007). The shrink-swell capacity of soils refers to the extent to which clay content within the soils will expand when wet and retract when dry. In wet periods, expansion of the clay can lead to ground heave, which can damage underground assets, and even the foundations of buildings.

The shrink-swell characteristics of soils are likely to be noticed most significantly during periods of extended dryness, or when there is ample precipitation to keep the soils moist. In addition,

changes in soils can leave it more vulnerable to damage by erosion. In the eastern Riverina, investigations found one soil type that showed high propensity to exhibit shrink-swell.

This soil type was Vertosols, which is greater than 35 % clay, and has shrink-swell properties which cause deep and wide cracking when it dries. Vertosols, however, represent a very small portion of the eastern Riverina's soil, with only minor occurrences within the Bland local government area. The remainder of soils in the region are classified as having moderate to low potential for shrink - swell behaviour.

## Tumut

In the town of Tumut, climate projections show that a 104 mm 'event' (104 mm in 24 hours), is going to increase in incidence from 1 in every 100 years, to 1 in every 7 years by 2070.

Projections also show that a 1 in 100 year event in Tumut will intensify from 104 mm to 140 mm. The changes in extreme events may lead to an increase in both frequency and intensity of flooding, which will put pressure on the town's assets, infrastructure and community.

# Increase in both frequency and intensity of flooding, which will put pressure on the town's assets, infrastructure and community



### Extreme Heat

The annual number of days of extreme heat in the eastern Riverina is projected to increase due to climate change. Climate projections generated by the CSIRO for REROC show annual days over 35°C are likely to increase from approximately 20 days to between 30 days and 60 days for most of the region, by 2070.



### Extreme Rainfall

In order to complete a detailed risk analysis, AECOM commissioned CLIMsystems to generate extreme rainfall projections tailored to individual REROC Councils. The models show that extreme rainfall events are likely to intensify across the entire region. Median projections show that a 1 in 100 year event could increase from between 31% and 36% across the region. However, high uncertainty is associated with any extreme rainfall projection due to the poor integration of features such as cloud cover and large scale driving climate patterns into climate models. Consequently, these results should be considered with care.

# Social, Industry and Economic Overview

## Population characteristics

There is the potential for the effects of climate change and reduced water availability to exacerbate a number of social and community issues. For example, changing population demographics can result in a varied demand profile for water and sewerage services as well as infrastructure. If associated with urban development it can create additional impacts in terms of stormwater and flood management.

Of the Local Government Areas (LGAs) examined in the REROC SBC project, in 2006, at the last census date there was a collective population of just over 107,000 people. This figure had grown marginally by 1.9 % over the previous ten years. As Figures 1 and 2 indicate this population was split evenly between men and women and had experienced some ageing over the previous ten years with the percentage of the population over the age of 55 growing from 21 % in 1996 to 28 % in 2006.

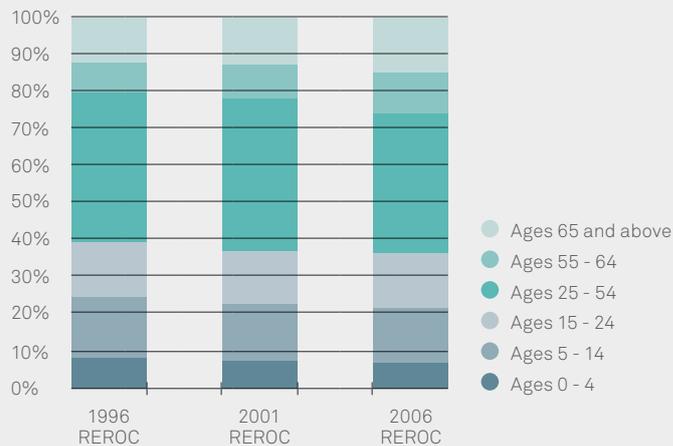


Figure 1: Age Group Profile for REROC (ABS; 1997; 2002; 2007)

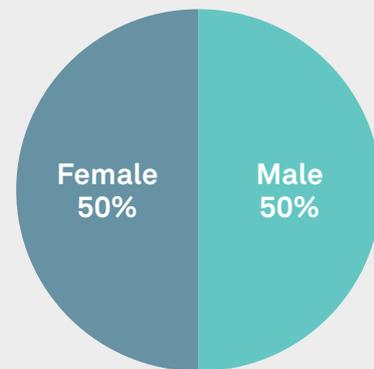
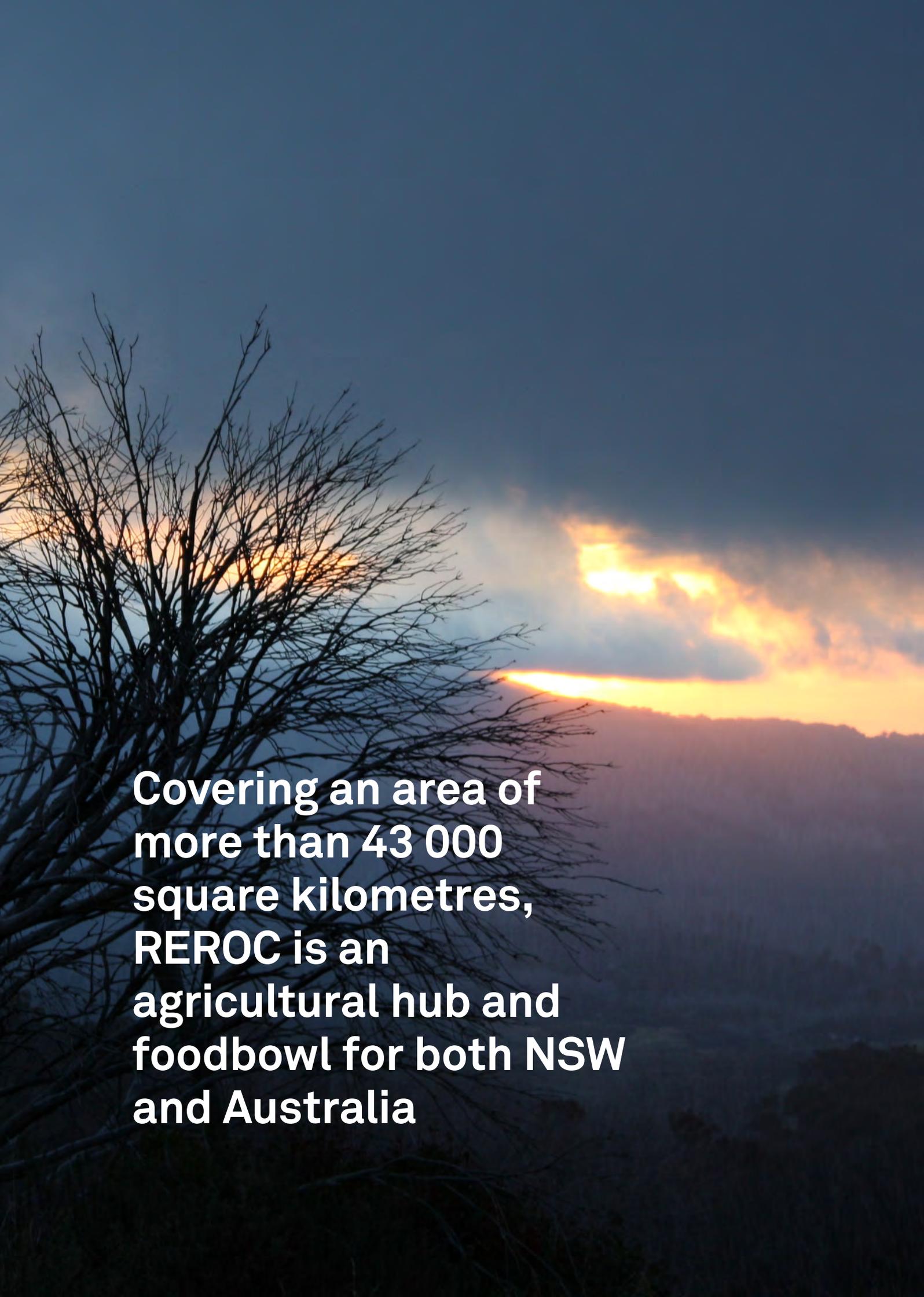


Figure 2: Gender Split in REROC in 2006 (ABS; 2007)

A population characteristic, which can indicate resilience to the potential impacts of climate change, is migration patterns. A high level of population mobility can indicate that populations have relatively low exposure to risk of change as transient populations generally have greater adaptation skills. Community members may move for numerous reasons such as work, family and the possibility of taking advantage of new opportunities.



A photograph of a sunset over a landscape. The sun is low on the horizon, partially obscured by a range of hills or mountains. The sky is a mix of deep blue and orange. In the foreground, the dark, intricate branches of a bare tree are silhouetted against the sky. The overall mood is serene and dramatic.

**Covering an area of  
more than 43 000  
square kilometres,  
REROC is an  
agricultural hub and  
foodbowl for both NSW  
and Australia**

## Social and Community Issues

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It is expected that in light of the potential climate change trends, which may occur across the study area, some of the following social and community, water and climate related issues might be prevalent.

### Population change pressures

- ◆ Population and dwelling demands are likely to change, as will the demographics of the community. This could affect some of the councils' land use and infrastructure planning, existing infrastructure, the vibrancy and economic stability of towns. It could also affect the ability of some councils to generate funds through rates.
- ◆ Population changes expected for the region include an ageing, but growing population with a continuing population shift from rural to urban areas, particularly to larger urban centres. . This has implications for planning as well as economic and strategic development. The region will need to plan for such changes while considering changes in climate and water availability.
- ◆ Another challenge is the water requirement for regional and urban areas. If more people are to migrate from rural to urban areas, there will be a need to reconsider the distribution of regional water resources and associated infrastructure.

### Quality of life, social equity and community cohesiveness

- ◆ Decreased annual rainfall and increased water restrictions have the potential to affect quality of life in communities and impact on community cohesiveness which could be exacerbated by the disparity in income across LGAs in the region. .
- ◆ There is the potential for increased water pricing and reduced water availability to adversely impact communities especially considering the lower than average household incomes in the REROC region (\$748 per week in 2006) compared to the NSW average (\$1,036 per week in 2006).
- ◆ Community cohesiveness can also be affected through impacts on the key regional industries. In areas where there is a strong reliance on water dependent industries (e.g. dry land agriculture or meat industries), any decline in these activities would have implications on the cohesiveness and dynamism of the local community.

### Community's climate change awareness / readiness

- ◆ It is difficult for communities to manage potential risks of which they are not aware. The broader community needs to understand risks and opportunities associated with climate change to manage risk and for councils to justify policy controls being developed to facilitate adaptation.



## Key REROC Industry Characteristics

Covering an area of more than 43 000 square kilometres, REROC is an agricultural hub and foodbowl for both NSW and Australia in addition to being a significant contributor of fresh and processed food products, paper and timber products to Australia's export trade.

The rural economy is built on lamb, beef, wool, wheat and other crops and alongside these primary agribusinesses, there is also agricultural manufacturing and forestry processing (such as

abattoirs and timber processing) and many support services such as wool storage and brokerage, chemical and fertiliser suppliers and agricultural equipment suppliers. Other important non-agricultural industries include property and business services, transport and storage, defence, education, retail trade, mining, tourism, viticulture and aviation.

The following table outlines some of the main employers by industry.

Industry	Main Employers
Sheep, beef cattle and grain farming	Teys (Wagga Wagga), Pace Poultry Farm (Bland), Gundagai Meat Processors Plant,
Agricultural Manufacturing & Forestry Processing	Hyne & Son's Timber Mill (Tumbarumba), Visy's Kraft paper mill (Tumut), Cater Holt Harvey's structural timber mills (Tumut), Heinz (Wagga Wagga), Junee Abattoir (Junee), Australia Bulk Alliance (Coolamon)
Horticulture & Viticulture	Batlow Fruit Co-Op (Tumut)
Manufacturing, Engineering & Construction	Snowy Hydro (Tumut), Austrak (Wagga Wagga), Renewed Metal Technologies (Wagga Wagga), D J Lynch Engineering (Gundagai), Precision Parts (Wagga Wagga), Fonterra (Wagga Wagga)
Mining & related engineering	Southern Oil Refinery (Wagga Wagga), Riverina Oil (Wagga Wagga), Coolamon Steel Works (Coolamon), Barrick Gold Mine (Bland)
Education	Riverina Institute of TAFE, Charles Sturt University, and more than 240 public and private schools
Public Sector	Local Government, Australian Defence Force, NSW Health (Murrumbidgee Local Health District)

**Both individually and collectively through a regional forum like REROC, councils need to examine how to mitigate and adapt to the risks which climate change can present**



## Industry issues

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Reductions in rainfall, increased drought frequency and climate variability, and reductions in water allocations are all future scenarios which may affect industries within the REROC region. Both individually and collectively through REROC, councils need to examine how to mitigate and adapt to the risks which climate change can present. Through a strategic opportunity assessment it is possible to identify where situations can be harnessed as benefits, rather than risks, and which industries the region should focus on supporting from a water dependency perspective:

### **Long term commitment to water saving measures**

- ◆ Economies that are specialised in water intensive industries may be vulnerable to the impacts of climate change upon production/ yields, business running costs and price changes.
- ◆ Based on the REROC Industry and Business Water Questionnaire undertaken in Stage 2 of this project (more information available on request) it was clear that all businesses in the REROC region considered water to have a degree of importance, with half of the respondents suggesting water is critical.
- ◆ The majority of respondents suggested that the long lasting drought conditions had a direct affect on their business both generally and in the way they manage water.
- ◆ However, only one fifth of these same businesses had a water management plan in place suggesting that water efficiency measures are currently implemented on an ad hoc basis.

### **Adaptive capacity of industry and business and support for new industry**

- ◆ Reduced water availability may limit options for diversification of the economy to activities that do not require a guaranteed supply of significant quantities of water.
- ◆ Some businesses may be better able to realise water efficiencies in their operations than others. REROC should look to support those industries, by encouraging the identification and evaluation of water efficiency opportunities and, as a result, encourage implementation of cost effective water efficiency opportunities.

### **Budget management and priorities through climate extremes**

- ◆ Relatively short term budgets and political cycles present a challenge against longer term climate cycles.
- ◆ A focus on short term support for industries, which are currently prospering, may remove focus from longer term planning into new less water intensive industries.

# It is important to recognise that not all effects of climate change and reduced water availability are negative



## Labour Force Characteristics

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The challenges and opportunities that climate change and water availability will present to the industries within the REROC region will in turn have an impact on employment and the economic stability of the councils and the region. It is imperative to recognise that not all effects of climate change and reduced water availability are negative. The possibility of new industries brings with it the prospect for different opportunities and potentially increased incomes.

Currently, as a regional area, a large number of employment opportunities are offered by primary and secondary industry businesses. There are also a large number of opportunities in retail trade and services and professional services. While an

unemployment rate for the entire region was not available from the last ABS census, the unemployment rate ranged from 2.4 % to 5 % across the LGAs in the region. These figures fall within the 4.2 % rate of unemployment Australia wide at the time.

In 2006 the average household income for a REROC resident was \$748. This figure is significantly less than the NSW average, with a resident in the REROC region earning \$288 less a week compared to the average NSW resident, an amount which is a difference of almost \$15,000 over one year.



## Economic issues

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Some of the economic issues, which REROC will need to consider, include:

### **Changes to employment and the adaptability of social/human capital**

Some occupations, such as clerical workers and labourers, have a skill set that has potential for flexibility and capacity to adapt to different tasks, while others are highly specialised and less flexible to change, such as professionals or technical workers.

Communities may need to foster the learning of new skills or utilise existing skills in different industries to adapt to a changing economy. The types of skills required will be dependent on the industries which are prominent in an area.

### **Changes to income depending on industry changes**

- ◆ Opportunity for improved income should be harnessed with new industries.
- ◆ If incomes are affected indirectly by job opportunities available – there is the likelihood of greater migration out of an area.

**Regional forums could provide a coordinated approach for recognising lessons learnt through case studies of successful project adaptation**



## Planning and Development Challenges, Opportunities and Recommendations

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The previous sections of this report have presented the physical, social and economic context relevant to the study area and identified a number of potential issues that may be exacerbated by decreasing water availability and other climate change impacts.

This section provides an overview of the issues as they relate to strategic planning and development across the region generally. It has a focus on identifying regional challenges and opportunities and recommending actions to assist in mitigating these potential risks from changes in water availability or climate change.

The ultimate aim of this overview is to present strategic planning initiatives which can assist in protecting the long-term social cohesion and economic security of individual councils, and the region as a whole:

1

Planning for less water and extreme rainfall events

2

Facilitating a sustainable water supply for socio-economic and industry development

3

Capacity for change, or business and community awareness and preparedness

4

Collaboration between local and regional levels of government

5

Federal and State climate change policies affecting planning, assessment and determination

Categorising issues into these key areas allows for grouped recommendations around potential measures that could be taken in the future to better integrate climate change and reduced water availability challenges.

## Challenges, Opportunities and Recommendations

### Planning for less water and extreme rainfall events

#### Challenge

REROC and Councils may not be prepared for reductions in rainfall, increased drought frequency and climate variability.

#### Recommendation:

REROC could host forums for council members to explore best practice climate change management and ways to share resources between councils for developing climate change risk assessments and adaptation strategies in particular areas of land use planning.

This could provide a coordinated approach for recognising lessons learnt through case studies of successful project adaptation. For example, a forum on what revised flood management plans should and can include or how councils can better manage water use, and reuse.

#### Opportunity

After a long drought followed by extreme flooding across the region many communities do have some awareness of, and are beginning to plan for, managing extreme weather patterns. Communities want to learn how to use planning and development practices to their advantage.

#### Recommendation:

REROC is well positioned to undertake further studies on best practice land use planning and development within the region. This can provide a learning framework for LGAs to use these best practice planning and development initiatives in their own policies and processes.

Best Practice Case Study: Coolamon LGA is an example of where the council is using its new LEP and DCPs to incorporate design and planning provisions to better manage hazards such as floods or increased dry periods.



**Challenge**

There are no standardised, regulated land use planning instruments across the region resulting in varied policies and practices.

**Recommendation:**

A DCP could be developed by REROC which commits councils to ensuring that all their land use planning policies account for and attempt to adapt to less water and extreme weather future. This could, for example, seek to ensure that new developments with high water use are subject to water use efficiency targets and improvement plans.





Facilitating sustainable water supply for social-economic and industry development



### Challenge

Across the region, population and dwelling demand will change, as will the demographics of the community. This will affect development and planning, existing infrastructure, the vibrancy and economic stability of towns and the ability for local councils to guarantee water availability.

### Recommendation:

REROC could work with councils to undertake economic modelling of population changes in a manner that responds to climate change and water availability. This modelling could consider key principles such as deliberation on the foreseeable needs of future generations as well as avoidance, remedy or management of adverse affects. An economic model, which can predict different population scenarios, will allow REROC to develop new strategies around economic, social and industry development.



### Opportunity

Stage 3 of this project involved a strategic economic opportunities assessment for each of the councils in the Study Area to identify economic opportunities, which may not be water intensive. These opportunities included the availability of industrial land, transport infrastructure and accessibility, tertiary educational institutions, health services, tourism and significant resource reserves.

### Recommendation:

Consideration should be given to leveraging economic opportunities that have a lower reliance on higher volumes of water or can use waste water from other industries.

REROC could host industry forums based on these opportunities inviting both council representatives and potential private organisation suppliers to start building relationships and profiling the region as an area for investment for these industries.

REROC already has the Start Your Business Here on-line program in place which is an online service providing people who want to start or expand a small business in the REROC region with a one stop portal to access state and local regulations. This website should be adapted to also provide information for larger businesses as well as providing incentives, if possible, for less water intensive businesses.



## Challenge

While new industries should be encouraged, there is also a need to consider industries for which water access is critical to their business functions.

REROC has already been working with councils within the region looking to explore options to improve the effectiveness of water supply mechanisms. One part of this initiative has been an Energy and Water audit program for small businesses and schools within the region. Almost 100 businesses and schools have been audited with advice provided as to how to reduce usage through the introduction of new technologies and water efficient practices.

## Recommendation:

REROC should continue the Energy and Water Audit program as well as exploring options to improve effectiveness of supply mechanisms.

Other recommendations alongside current work like the audit program includes encouraging the co-location of complementary water users, with controls utilising smart metering and direct business-to-business connection. Wastewater generated from one industry could potentially be utilised by another industry as a process input, saving the need to utilise high quality potable water.

While this may erode the various council's abilities to generate revenue from their water supply, it would provide a regional response to stimulating economic development which in turn could result in long term economic growth.

Actions could be taken to implement or subsidise WMPs with the results and lessons being shared between the councils.

## Case Study:

Temora LGA has the Farmlink Research station which focuses on dryland agriculture research. The objective of this research is to explore efficiency gains to offset water reductions. These lessons can provide valuable tools for all LGAs across the region – not just for dryland agriculture but also the process of exploring how water efficiency gains can offset water reductions.

Capacity for change or business and community awareness and preparedness

### Challenge

Increased water prices and reduced water availability can adversely affect businesses, households and communities by increasing the proportion of household or business budgets that must be allocated to water.

While many of the communities across the eastern Riverina are aware of the need to improve efficiencies in existing and new development, most councils' land use planning policies do not adequately address this issue.

### Recommendation:

REROC could develop education programs and communication strategies about the long term benefits of implementing water savings which may ameliorate concerns regarding the application of LEP and DCP controls relating to water efficiency and water use.

REROC has been working already with a local software company, based in Wagga Wagga to develop innovative programs such as Safe Sharps, using iPhone and iPad applications. A similar marketing campaign to target community awareness of water issues could be developed to track water usage.

The organisations could continue to liaise with Regional Development organisations, service providers and the State/Federal Government to ensure that services are appropriately funded to meet identified community needs.

A REROC wide DCP could be written and implemented which commits councils to land use planning and development policies that account for gradual and extreme weather events and changed water availability.

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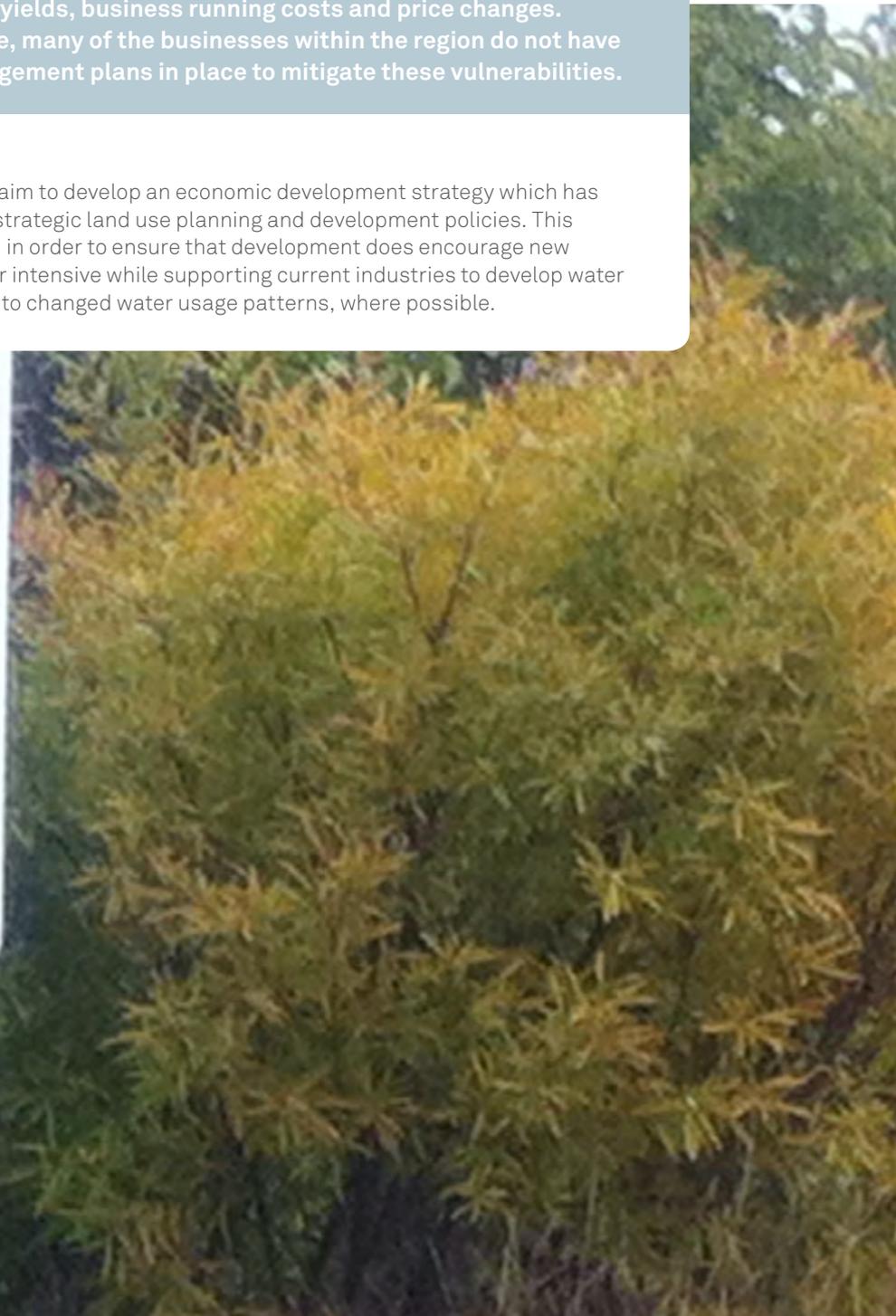
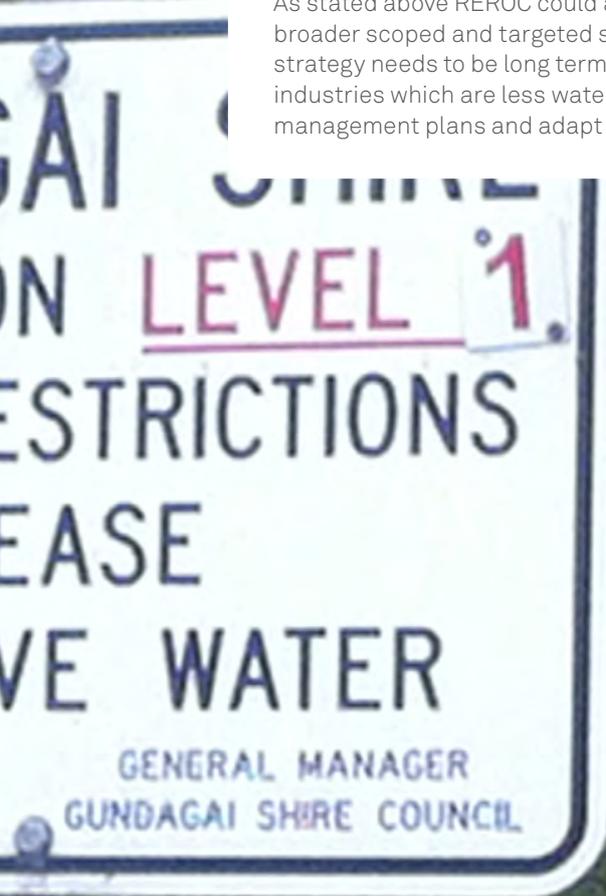


**Challenge**

Dependence on water intensive industries could increase the vulnerability of the economy to the impacts of climate change on production/yields, business running costs and price changes. Furthermore, many of the businesses within the region do not have water management plans in place to mitigate these vulnerabilities.

**Recommendation:**

As stated above REROC could aim to develop an economic development strategy which has broader scoped and targeted strategic land use planning and development policies. This strategy needs to be long term in order to ensure that development does encourage new industries which are less water intensive while supporting current industries to develop water management plans and adapt to changed water usage patterns, where possible.





### Challenge

Councils often have limited resources and access to technology, sometimes limiting their ability to efficiently respond to climate change, shifts in State and Federal policies - or local issues and needs.

### Recommendation:

LGA and regional future land use planning forums could be facilitated through REROC to achieve regular sharing and documentation of knowledge and current issues between senior assessment officers, strategic planners, engineers, and asset management/property managers.

The availability to actively track development by scale and land use type, whilst available in some LGAs, would be useful across the region to follow development trends alongside other social, economic and climate factors. Tracking development could also provide material which supports funding and other grant applications.



### Opportunity

Local lessons and best practice in water resource management could be better shared at a regional level. One of REROC's primary goals is to initiate resource sharing activities, and already there are a number of activities run by the organisation which involve sharing resources and staff.

### Recommendation:

Opportunities should be investigated which support the REROC region and LGA programs to adapt to climate change and changed water availability. This may be in the form of assisting councils in strategic planning for climate change or land use planning research and policy advice. Specifically, REROC could provide best practice examples at a regional level which continue to incorporate requirements for water-efficient design for new business and industrial activities into the LEP and DCP/s to reduce vulnerability to changes in water supply and pricing in the future. Alternative water sources including reuse should be incorporated into development design and suit end-use requirements.

While REROC has its Water Smart – Total Urban Water Management in the eastern Riverina project - it should also develop a Climate Change Special Interest Group to specifically look at regional solutions to extreme weather and changes in climate.



## Challenge

Federal and State climate change policies will continuously affect what REROC and the councils are doing

### Recommendation:

REROC should prepare strategic alignment documents mapping current policies in order to better understand how to align with them and work within their constraints. REROC could also organise forums to discuss upcoming state and federal changes to plan for and better manage alignment.

REROC could prepare reports to lobby/influence state and federal changes which may adversely affect policies which are already in place and working well. It was recognised in REROC's last annual report that one of the strengths of the organisation has been its joint submission writing and lobbying. In last financial year REROC prepared three major submissions to the Murray Darling Basin Plan, one to the MDBA, one to the Senate Inquiry and one to the House Standing Committee on the impact of the Plan on Regional Australia. There have also been several federally initiated inquiries into the urban water supply sector and REROC has been active in representing member views.

#### Case Study: Federal Government's Price on Carbon

The Federal Government has made a commitment that 20 per cent of Australia's electricity supply will come from renewable sources by 2020, and has announced the introduction of a price on carbon from July 2012. This may influence the way the community uses products and services and change industry focus and create new opportunities.

REROC could consider capturing opportunities for new markets that may develop out of a price on carbon and require less water use. This could be achieved through strategic planning and LEP/DCP provisions that facilitate/encourage the development of clean technology industries, biofuels, opportunities associated with the Carbon Farming Initiative, or renewable energy.

Assess any risks to current industry or employment to support industries needing to adapt.

#### Case Study: NSW BASIX SEPP

The NSW BASIX SEPP sets the water and energy targets for residential development in NSW and overrides any local planning policy attempts to set energy and water efficiency targets.

REROC could work with councils to provide an understanding of how to develop policies which align with the NSW BASIX and what other water measures can be used other than water targets for striving to achieve best practice.

# Appendix

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During the last part of the REROC SBC Stage 3, the highest priority adaptation initiatives were provided to each participating council for consideration. This priority list included a combination of initiatives that responded to risks identified in the Infrastructure and Asset Management Plan and those recommendations identified in the Land Use and Strategic Development Plan. In consultation with each council, the most relevant option was chosen.

The following information outlines the initiative each councils chose.

## Bland, Cootamundra and Goldenfields Water County Council

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### **Best Practice Planning, Integrated Water Cycle Management (IWCM) and/or Demand Management**

Bland Council, Cootamundra Council and GWCC selected an Integrated Water Cycle Management Plan as their priority adaptation initiative. GWCC reticulates water to Bland and sells bulk water to Cootamundra Council, which in turn is reticulated to customers in the Cootamundra Township. Bland and Cootamundra provide the sewerage services in their LGAs. Given the interconnectedness of Bland, Cootamundra and GWCC's operations, the IWCM 'mini project' for these three Councils was developed collectively.

An IWCM aims to ensure more efficient and effective management of the urban water cycle, including water, wastewater and stormwater, for the benefit of the community and the environment. The strategy facilitates integration with other services (e.g. roads, drainage and waste collection) and natural resources within the catchment. IWCM Targets include the legislation, licence conditions, contracts and level of service requirements that a utility must comply with or has agreed to achieve. Having appropriate targets in place, understanding a utilities' obligations and understanding current performance with respect to the targets, is central to identifying and addressing water management issues through the IWCM process.

The IWCM 'mini project' prepared by AECOM was to commence the first task of the IWCM Evaluation Process under Task 2.1 of the IWCM Targets, as defined in the Integrated Cycle Management Generic scope of work evaluation and strategy.

The scope of works for the mini project, or adaptation initiative, therefore included:

- ◆ Reviewing reports and documentation provided by GWCC, Bland, and Cootamundra, as part of all stages of the REROC project, as well as relevant publicly available documents
- ◆ Identifying data gaps
- ◆ Developing a comprehensive IWCM Targets Register based in excel, allowing the Councils to identify and prioritise IWCM issues.

## Coolamon

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### **Non-Potable Water Supply Project**

Coolamon Council currently has an established effluent recycling scheme that is targeted at irrigation of sporting ovals. During rainfall, the STP produces more effluent than can be stored. Council also harvests stormwater for reuse in roadworks. This initiative involved the scoping of additional storage so that treated effluent or harvested stormwater could be captured during rainfall and used for later or additional use. This was based on an expression by Council in establishing an irrigation scheme for parks and ovals, which currently are not irrigated.

## Gundagai

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### **Relocate/Upgrade of STP**

Gundagai's existing STP has a history of flooding and failure due to stormwater ingress and regional flooding. This is a problem that climate change is likely to further exacerbate and consequently, two key components of future adaptation will involve the need to design an adequate treatment process and more strategically the identification of most appropriate location of the new STP.

The adaptation initiative, which AECOM prepared, was therefore a first scoping study for the identification of the most appropriate location of the new STP. The study involved the following tasks:

- ◆ Identifying the drivers for relocation and providing an overview of the current system and the LGA's licensing requirements

- ◆ Identifying potential areas for a new STP
- ◆ Evaluating the existing environment including ecological, heritage and social constraints
- ◆ Undertaking an engineering feasibility evaluation.

This initiative used the following parameters to assist in considering what location would be most appropriate: impact of sewer catchments, requirements for additional associated infrastructure (pump stations, network), flood immunity and level of service.

## Junee

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### Non-Potable Water Supply Project

The objective of this initiative was to identify the most cost effective ways to improve or expand Council's infrastructure to collect and store stormwater for use as social infrastructure (e.g. wetland) and to provide a non-potable water source that could supplement Council's recycled effluent irrigation scheme. The project is expected to assist the Council in the identification of infrastructure projects such as new stormwater harvesting ponds, opportunities for stormwater reuse or upgrades to existing infrastructure to maximise the benefits to Junee. The project scope included an examination of the feasibility of stormwater harvesting given the local climatic conditions under predicted climate change scenarios and the need to protect and support environmental flow as well as addressing flooding issues in Junee by examining harvesting and storage options that best mitigate flood impacts.

## Lockhart

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### Extreme Rainfall Management

To assist Lockhart Shire Council in managing the risks associated with extreme rainfall events, AECOM prepared an extreme rainfall assessment for the council which provided a qualitative analysis of the capacity of existing stormwater infrastructure in Lockhart and the ability for this infrastructure to cope with the intensification in extreme rainfall events predicted due to climate change. The methodology for the initiative involved:

- ◆ Undertaking a site visit to identify existing stormwater infrastructure located in Lockhart

- ◆ Identifying current climate rainfall intensities for Lockhart and assessing peak stormwater flows for a range of design storm events for key catchments identified within Lockhart using climate rainfall intensity data

- ◆ Using the future intensification in extreme rainfall events data to calculate the possible increase in peak stormwater flows in key Lockhart urban catchments resulting from climate change

- ◆ Developing an understanding of the current capacity of the existing stormwater system and reviewing the adequacy of the existing stormwater infrastructure to cope with predicted future climate peak stormwater flows

- ◆ Providing recommendations on how to better manage risks associated with extreme rainfall events.

## Tumut

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### Asset Management Processes and Documentation

Strengthening parts of the Tumut Asset Management system could be achieved by improving the level of documentation of asset management systems, processes and responsibilities. Although asset management planning is generally very successful opportunities were identified to enhance Council's performance, particularly in the area of stormwater asset management. This initiative would also look at improving the capture of stormwater asset information. AECOM's initiative involved defining the scope of a detailed asset management gap analysis and prioritising asset management objectives.

## Tumbarumba

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### Strengthen Water Security

Potable water supply in Tumbarumba remains reliant on stream flows and surface water resources which may be less reliable in the future. In order to adapt, investigations into increased storage of raw water and optimum allocation of potable water in the township of Tumbarumba would be beneficial. One proposal Tumbarumba is currently exploring is the development of a new dam along the gravity pipeline from Burra Creek to enhance the water security for the town.

To assist in scoping the proposed dam, AECOM prepared for the council a Rapid Environmental Desktop Appraisal (REDA) of the potential environmental constraints and approvals likely to be required. Based on desktop information the REDA highlighted further investigations required in developing and obtaining environmental approvals for the proposed water storage. The assessment considered biodiversity, water quality, heritage, land use, contamination and statutory planning issues.

## Temora and Wagga Wagga

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### **Economic Development Strategy (EDS)**

To assist the two councils in considering long term implications of climate change within an economic framework, AECOM prepared a scope and objectives for an Economic Development Strategy for both Temora and Wagga Wagga which included the following considerations:

- ◆ Strengthening existing industries including those that hold a competitive advantage and are water efficient.
- ◆ Identifying requirements and opportunities for adaptation in key water-exposed industries.
- ◆ Identifying opportunities for diversification of the economy and to accommodate industries that are considering locating to the LGA, including those requiring a guaranteed water supply.
- ◆ Facilitating markets that may emerge from climate change concerns and a price on carbon, particularly enterprises that require less water and can be developed at scale that does not compromise the use of land for agriculture or result in the loss of employment. This could supplement farm incomes to improve resilience to potential rising water costs.
- ◆ Identifying opportunities for development within parts of the LGA that are already serviced and have capacity for growth in order to minimise new connections and/or significant water supply infrastructure expenditure.

The EDS prepared can be used to inform Local Environmental Plan objectives and Development Control Plan guidelines on targeted industries and development types, encouraging these to establish or grow in the local area.



