Case Study

Droughts and the future of rural communities

NCCARF
National
Climate Change Adaptation
Research Facility

Synthesis and Integrative Research

Historical Case Studies of Extreme Events

Drought and the Future of Rural Communities: Drought impacts and adaptation in regional Victoria, Australia

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The role of NCCARF is to lead the research community in a national interdisciplinary effort to generate the information needed by decision makers in government, business and in vulnerable sectors and communities to manage the risk of climate change impacts.

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Preface

The National Climate Change Research Facility (NCCARF) is undertaking a program of Synthesis and Integrative Research to synthesise existing and emerging national and international research on climate change impacts and adaptation. The purpose of this program is to provide decision-makers with the information they need to manage the risks of climate change.

This report on drought and the future of rural communities in regional Victoria forms part of a series of studies/reports commissioned by NCCARF that look at historical extreme weather events, their impacts and subsequent adaptations. These studies examine particular events – primarily extremes – and seek to explore prior vulnerabilities and resilience, the character and management of the event, subsequent adaptation and the effects on present-day vulnerability.

The reports should inform thinking about adapting to climate change – that is, capacity to adapt, barriers to adaptation, and translating capacity into action. While it is recognised that the comparison is not, and never can be, exact, the over-arching goal is to better understand the requirements of successful adaptation to future climate change.

This report compares the impact of drought in two agricultural communities, Mildura and Donald. The Big Dry, or Millennium Drought, has affected southeast Australia since the mid-1990s. Although there has been a return to wet La Niña conditions, it will be several seasons before conditions will return to 'normal'. This drought had serious impacts on water availability, agricultural production (due to decreased irrigation allocations), biodiversity (due to prolonged changes in habitats) and bushfire regimes. Two case studies (Mildura and Donald) were chosen to investigate the socio-economic impacts of drought, past and present drought adaptation measures, and the future adaptation strategies that will be required to deal with projected increases to the frequency and magnitude of drought events.

Other reports in the series are:

- *Adaptation Lessons from Cyclone Tracy*
- *East Coast Lows and the Newcastle-Central Coast* Pasha Bulker *storm*
- *The 2008 Floods in Queensland: Charleville and Mackay*
- *Storm Tides, Coastal Erosion and Inundation*
- *Impacts and Adaptation response of infrastructure and communities to heatwaves: The southern Australian experience of 2009*
- *Drought and Water Security: Kalgoorlie and Broken Hill*

To highlight common learnings from all the case studies, a Synthesis Report has been produced, which is a summary of responses and lessons learned.

All reports are available from the website at www.nccarf.edu.au

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Abbreviations

ABARE	Australian Bureau of Agricultural and Resource Economics
ABS	Australian Bureau of Statistics
AIFS	Australian Institute of Family Studies
AWB	Australian Wheat Board
BCG	Birchip Cropping Group
BoM	Bureau of Meteorology
BSC	Buloke Shire Council
CCRSPI	Climate Change Research Strategy for Primary Industries
CEWH	Commonwealth Environmental Water Holder
CFA	Country Fire Authority
CMA	Catchment Management Authority
COAG	Council of Australian Governments
CPRS	Carbon Pollution Reduction Scheme
CSIRO	Commonwealth Scientific and Industrial Research Organisation
CURS	Centre for Urban and Regional Studies, University of Newcastle, Australia
DAFF	Department of Agriculture, Fisheries and Forestry
DCC	Department of Climate Change and Energy Efficiency
DEWHA	Department of the Environment, Water, Heritage and the Arts
DPCD	Victorian Department of Planning and Community Development
DPI	Victorian Department of Primary Industries
DSE	Victorian Department of Sustainability and Environment
EC	Exceptional Circumstances
ENSO	El Niño/Southern Oscillation
EVAO	Estimated Value of Agricultural Operations
FHSS	Farm Household Support Scheme
GCM	Global Climate Model (or General Circulation Model)
GDP	Gross Domestic Product
GFC	Global Financial Crisis
GRP	Gross Regional Product
IOD	Indian Ocean Dipole
IPCC	Intergovernmental Panel on Climate Change
IPO	Inter-decadal Pacific Oscillation
MCMA	Mallee Catchment Management Authority
MDB	Murray-Darling Basin
MDBA	Murray-Darling Basin Authority
MDC	Mildura Development Corporation
MRCC	Mildura Rural City Council
NACCAP	National Agriculture and Climate Change Action Plan
NCCARF	National Climate Change Adaptation Research Facility

NCCMA	North Central Catchment Management Authority
NDP	National Drought Policy
NGO	Non-Government Organisation
NRM	Natural Resource Management
NSW	New South Wales
NVIRP	Northern Victorian Irrigation Renewal Project
NWI	National Water Initiative
NWMS	National Water Market System
PDO	Pacific Decadal Oscillation
R&D	Research and Development
RAS	Rural Adjustment Scheme
RDV	Regional Development Victoria
RFCS	Rural Financial Counselling Service
RMCG	RM Consulting Group
SA	South Australia
SAM	Southern Annular Mode
SEA	Southeast Australia
SDLs	Sustainable Diversion Limits
SKM	Sinclair Knight Merz
SLA	Sustainable Livelihoods Analysis
SMECC	Sunraysia Mallee Ethnic Communities Council
SREC	Special Report on Emission Scenarios
SST	Sea Surface Temperature
STR	Sub-Tropical Ridge
SWS	Sustainable Water Strategies
TAFE	Technical and Further Education
USA	United States of America
VFF	Victorian Farmers Federation
Vic	Victoria
WDA	Wimmera Development Association
WA	Western Australia
YACVic	Youth Affairs Council of Victoria

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Executive summary

Vulnerability to climate change has been highlighted by recent long-running drought conditions[1] – with climate projections indicating that the frequency, intensity and duration of droughts may increase throughout some regions of Australia. While the magnitude and impacts of anthropogenic climate change remain under debate, the need to address climate variability and change in drought-affected regions continues to be both necessary and urgent. At the forefront of climate concerns is the vulnerability and adaptive capacity of inland rural towns, which make up the majority of drought-affected areas and whose economic and social viability is heavily dependent on agriculture. There is widespread acknowledgement that past policy responses to drought have not worked effectively and are unlikely to do so in the future. The National Climate Change Adaptation Research Facility (NCCARF) represents one initiative by the Australian government to coordinate innovative and holistic research on climate change and variability, to improve understanding of the impacts of climate change and to develop more effective adaptation responses.

This research project is funded under the NCCARF Synthesis and Integrative Research Program: Historical Case Studies. Through these case studies, NCCARF aims to develop an understanding of the impacts of climate change in Australia, and to develop appropriate adaptation responses. In this project, the focus is on the impacts of drought – including existing and potential adaptation strategies – in two exemplar rural communities, Mildura and Donald, both in regional Victoria. This study attempts to provide answers to questions that remain highly uncertain, including:

- What are the effects of long-term drought on rural communities?
- What are the critical issues likely to affect the future of rural communities?
- What options do rural communities have in terms of drought adaptation?
- Do rural communities have the capacity to implement adaptive strategies and remain viable into the future?

The project reflects a concept of drought being a climatological, environmental, social, economic and political phenomenon. By utilising case studies, the project also acknowledges recent calls for more connected and participatory approaches to studying drought impacts in agricultural regions. In this way, the project respects the strong connections that farming communities have with the land and its cycles, and acknowledges farming communities as representing the very people who are at the forefront of creating, facilitating and enacting successful adaptation (and mitigation) strategies to drought.

While both case study areas are located in regional Victoria, each has been affected by the current drought in different ways, due to its particular climate, agricultural traditions and socio-economic setting. Thus the case studies allow for a useful comparison of how each community is faring under the current long-running drought conditions, and how this might change in the future. The key findings from this project, summarised below under headings relating to the four questions mentioned above, provide a unique insight into rural communities' experiences, adaptive capacity and likely futures under a drying and changing climate. As indicated, some findings are applicable specifically to Mildura or Donald, but some

[1] The many definitions of drought, including the one used in this project, are discussed in Section 2.

are applicable to both case studies and many are applicable to all rural communities. The broad recommendations emerging from these findings are listed at the end of the Executive Summary.

Experiencing 'drought-and-more' under changing rural contexts and climates – what are the effects of long-term drought on rural communities?

The areas of Mildura and Donald are currently experiencing an unprecedented combination of strains on their farms, farming families, communities and rural towns. These challenges arise from extensive changes to farming enterprises that include a rapidly evolving water market, increasingly competitive commodity markets and wide-ranging rural demographic shifts. Drought and long-term drying of these traditional agricultural regions represent just one challenge amongst this melee of change. Across the diverse stakeholders involved in the research, one point was consistently reiterated: that 'it's not just drought'.

Drought itself is experienced in different ways in Mildura and Donald. For Mildura, drought is affecting the health of the Murray River, the water supply and security for irrigated agriculture. For Donald, an agricultural area that relies almost solely on rainfall, drought is a regular occurrence and has become 'the new normal' since the mid-1990s. Hence, some of the most devastating and influential effects of drought have been felt through the irrigation districts of Mildura as they come to terms with unprecedented declines in water supply and security. In particular, a new system of water trading and allocations is providing significant challenges to farmers in Mildura. Farmers are learning how to cope with declining water allocations, while navigating and managing a water market of tradeable and saleable water unbundled from the land. The rapidity and volatility of water deregulation has resulted in varied experiences from confusion, inconsistency and outright resentment through to experimentation and learning. Many farmers have lost considerable amounts of money in an initially uncertain and highly fluctuating water market and allocation system. Most notable is the immense change in thinking and farm planning required to deal with these rapid changes, as they increasingly try to anticipate potential water losses, the cost of water versus the value of crops, and the declining value of land now unaccompanied by water – a process that has seen many people exit farming entirely. On the other hand, water trading has also been the saviour of many businesses, and provides opportunities to manage risks that previously did not exist. While the water market has been disastrous for some, for others the impacts of the most recent drought may have been much worse if the water market did not exist.

For both locations, their relationship with water – economically and socially – is undergoing significant change as a result of recent drought conditions. As mentioned, Mildura is confronting quite comprehensive changes to its water trading and allocation system, and both communities are tackling changes to traditions of farming and water use – a process that is creating complex relationships with water.

In Mildura, there is a deep attachment to the Murray River and the immense value of water to Mildura people's livelihoods – economically, socially and mentally. Many spoke with great sadness about the decline and drying of the river and surrounding areas, and the impact this decline has had on the well-being of the community. While there is considerable resentment from some farmers who remain attached to traditions of perpetual irrigation supply, there are also attachments to the river and a respect for water engrained in this rural community that

provide potential for adaptation and change in the region. People's close relationship with the river and water can present opportunities in nurturing new understandings of the variable, and probably reduced, availability of water. Such a change in thinking around water, its value, and availability will be essential under the projected continued drying of this region into the future.

For the dryland farming areas of Donald, notions of lacking and insecure water availability are customary, and most farming communities in this area consider themselves to be adept at managing and living with limited rainfall. However, simultaneously, they also have a deep and abiding respect for water and its place in supporting individual and community well-being. In the drylands surrounding Donald, water is seen as important for the well-being and 'sanity' of people living and working there. Water is also viewed as fundamental to the social life and economic activities that sustain small dryland communities. It is this social element of water that will need to be addressed and valued as part of policies governing water delivery and supply to these dryland communities.

However, as previously stated, it is not just drought confronting these regions. Exacerbating the issues of water security and supply is the complexity of the agriculture industry and associated economics, as well as rural demographic changes that currently are occurring across both regions.

The first issue to consider is the changes presented by declining and fluctuating commodity prices. Mildura has perhaps suffered the most due to the large amount of bulk wine grape production in the region – an industry that has experienced massive declines in global commodity prices due to a glut in the market. With such a large number of wine grape producers in the region, the severe downturn in the industry has had resounding effects on business profit and viability, which leads to people exiting the industry and as a result a reduction in the productive capability of the region. Unlike Mildura, in the dryland areas of Donald the problems of commodity prices are not so much the result of commodity glut. In the cropping sector, farmers are still adjusting to selling grain without the 'single desk' of the Australian Wheat Board (AWB). The single desk represented a central body through which to market grain globally. Under recent wheat market reforms, the single desk has been replaced by a free market system of marketing and exporting grain. In the face of already declining commodity prices, this shift has placed added pressure on farmers, as they are now responsible for marketing and selling the grain as well as growing it, which has obvious flow-on effects as farmers spend less time with their families and participating in community and social events.

Second, both irrigated and dryland regions have been confronted by shifts in the farming sector more broadly – some of these are related to issues of drought, while others are part of the sector's response to changing global markets and rural demographic shifts. In particular, interviewees discussed the rise of the large amalgamated farm and multinational agri-business, with farms growing larger and more technologically advanced to gain economies of scale. The flow-on effects to the composition of farms and farming communities are immense in conjunction with the associated decline of the traditional family farm and farm succession. Moreover, as farms increase in size and sophistication, the ability of farmers to work together, employ local workers and use local agricultural services is diminished. The compounding nature of these transformations is progressively carving out new and uncharted farming landscapes across both regions.

Third, rural demographic shifts have been accelerating these changing farming landscapes. Rural communities in general are increasingly characterised by declining and ageing populations, decreases in young people and an influx of retirees, immigrants and people from disadvantaged socio-economic circumstances seeking access to low-cost housing and employment. These shifts are introducing potential problems that – even without the added pressures of drought, pricing and farming industry changes – would threaten the future of some smaller rural communities across these regions. The pressures of demographic change are particularly evident in and around Donald, which does not have the diverse economic base and rural riverside amenity of Mildura. The Donald community is declining and ageing, putting immense pressures not only on the traditions of family farm succession but also on the viability of local businesses and service providers. At present, many smaller rural towns are diminishing and dying, with little attention being paid to how to manage these transitions in a dignified and supportive manner.

People living and working in Mildura and Donald describe the immense economic and social impacts of this current aggregation of issues confronting farming communities. Economically, many farms are experiencing dwindling financial returns and reserves after many years of drought and low commodity prices. This has the combined effect of decreasing cash surplus and everyday spending (which also impacts on local businesses), and increasing the strain of ongoing and accumulating debts. Indeed, many families are no longer in a position to borrow funds, which impedes their ability to change and adapt via new technologies or crops.

Moreover, although traditionally asset-rich, farmers are now confronting the increasing strain of farm debt, magnified by a changing farming sector that is associated with increased costs to stay competitive (e.g. technology, fertiliser, water efficiency and the cost of water itself) and shifting land and water regulations. For many, the farm is regarded as their last asset (i.e. their superannuation), yet land values are depleting under current drought conditions. As a result, the financial future of many farmers is uncertain.

As a consequence, many farming families are seeking to diversify their income base through secondary or off-farm employment. The diversification into off-farm income may offer an effective short-term solution to some of these financial strains. However, off-farm incomes potentially enhance the narrow focus on economic survival and limit more strategic financial and farm planning. Moreover, the adoption of secondary employment is putting an increasing strain on family relationships, as farmers, their partners and/or their children are working more hours – often away from home – to cover daily expenses.

For many farmers, their focus has been narrowed to economic survival – ‘holding on’. In Mildura, due to an extreme crash in wine grape prices, this economic survival has widely been fed by an increasing reliance on government financial assistance. Indeed, many of those working in support services describe a burgeoning ‘welfare industry’ in the Mildura region, created and sustained by reactive government support programs. For Donald, however, this economic survival is being held more at ‘break-even’ point. Income assistance is still relatively new to this area, and farmers are holding on to properties rather than exiting, in the hope of better years ahead. Although possibly demonstrating a better picture of economic health, this type of situation does not support investment, adaptation or long-term planning for the future. At best, there are significant opportunities for proactive action in these dryland regions to avoid the looming ‘welfare disaster’ presented by Mildura. It is important to note that the financial position of many farmers is such that, even if the pressures of drought

and commodity prices were to break immediately, the financial stress on farming families and rural communities would continue due to large debt levels.

Arising from these economic effects, and compounding them, are the extensive social impacts created by the 'drought-and-more' conditions confronting these regions. Those farmers in the industry, and others associated with it, are now acknowledging the mounting social issues as pressures of drought, markets and commodity prices continue to distress the community as a whole. Anecdotal and qualitative evidence suggests that farmers increasingly are suffering from depression and emotional exhaustion from the uncertainty and stress of farming. They are feeling overwhelmed and isolated with their own problems, and many are hard to reach, both due to their 'resilient ethos' and their geographically remote location.

As a result, professional service providers have reported increased incidence of depression and anxiety, suicide, separation and relationship dissolution, grief and feelings of loss and shame, and withdrawal from the community and social activities. Furthermore, initial contact with these farmers is often through the Rural Financial Counselling Service (RFCS), accountants and financial advisers – as a result of insufficiently trained mental health and outreach workers and also because, for many farmers, financial assistance is the first service they can easily seek and the one with which they feel most comfortable. The increasing reliance placed on financial advisers is distressing for these advisers and well outside their professional capabilities in many instances. Trained and supported mental health professionals who are from rural backgrounds and understand farmers' experiences are needed immediately to address this imbalance and offer assistance to potentially increasing and sometimes critical cases of mental health problems in these regions.

The impacts of these social strains are now being felt in families and throughout the community as a whole. Children are increasingly deprived of essentials and educational opportunities, and are experiencing the pressures placed on their parents. Moreover, the educational and training opportunities for farmers are also impeded, with increasing pressures of time, money and exhaustion limiting farmers' participation in training programs. For the community, the subsequent withdrawal of farmers and farming families into their own problems can often result in decreasing participation in community events and other recreational activities vital to the well-being of rural communities.

As a result of these resounding impacts, ideas of strength and resilience, central to the identities of these rural communities and key to enhancing adaptive capacity, are being tested to their limits. Uncertainty is abounding and increasingly is becoming ingrained under these chronic conditions, producing stagnation and impeding change, adaptation and activity. Moreover, scepticism is apparent in relation to both the notions of anthropogenic climate change and the research and researchers continually targeting these communities. People are cynical and tired of 'climate change workshops', 'drought programs' and 'drought research', feeling that they gain little that assists them in the daily struggles and stress they are experiencing.

In the context of enduring drought, these immense social impacts become chronic, exhausting the resources of farming communities to foster community strength and togetherness in the face of further long-term climatic and farming industry changes. Strategic and multi-agency responses are required from governments to be able to address what appear to be serious declines in mental and social well-being in these regions, particularly

through increasing support for rural outreach services to ensure that incidences of declining health and social well-being do not continue to go untreated.

Government support to alleviate and transition rural communities – what are the critical issues likely to affect the future of rural communities?

For government, non-government organisations (NGOs) and researchers working in this area of climatic and rural change, the challenges are extensive. Critical health and well-being needs are evident and require immediate support. However, long-term planning and investment in alternative futures are also lacking. Indeed, it is the traditional emphasis on short-term crisis-management responses that has created and exacerbated many of the problems facing these farming regions. With current debates and major policy reviews questioning the effectiveness, equity and long-term outcomes of current drought policy, it is a crucial moment at which to examine these policies as part of everyday drought-affected contexts.

For farmers and service providers, the current government drought-support context is commonly viewed as an imperfect mechanism for helping farmers in financial crisis. Most stakeholders involved in the project acknowledged that the traditional short-term welfare and exit grant programs supported by Exceptional Circumstances (EC) provisions are far from ideal in the longer term outcomes for farmers – with problems of welfare dependence already widely noted in the Mildura region, and critical land-use planning and succession issues created by farm exit grants.

At present, those support workers engaging with EC 'on the ground' are attempting to utilise it in the most effective ways they can, to try and gain relief for those farmers who are struggling. There have been successful experiences of gaining help for farmers through Centrelink's Rural Services Officers, who have done much on-farm and outreach work to engage many of the hard-to-reach farming families, and have overcome many of the preconceptions and embarrassment farmers felt in accessing government support services. Maintaining this type of on-farm and personal support service is crucial in engaging hard-to-reach farming families and must be sustained, even under new government-funded rural assistance schemes.

Indeed, for farmers and those working in support services, four commonly identified practices and programs were observed to be 'successful' and fundamental to the provision of effective long-term support in the region:

- **Collaboration between rural service providers and practitioners:** a way of working that supports close and knowledgeable service networks, facilitates referrals and connections with communities, counters common criticisms of an overlapping and over-serviced 'drought industry', and suits the intimate rural communities in these areas.
- **Community-led projects and programs:** an approach that engages communities in social events and activities, and provides much-needed opportunities to take leave of farming problems, and relax and socialise with friends and family.
- **Proactive, consistent and long-term approaches to service provision:** the current drought-support system remains defined by reactive, short-term funding.

There is great need for a change in focus and language to address issues beyond drought in a holistic way, to help transition and re-skill farmers leaving the industry in a dignified manner, to aid those farmers remaining to undertake long-term planning and investment, and to assist those working to support these rural communities to sustain knowledge through long-term funding and positions.

- **Practice-oriented research and development schemes:** an approach that is vital to supporting adaptation and future sustainability of the region, and in engaging farmers in respectful ways.

Government and NGOs have a critical role to play in supporting rural transitions, adaptation and mitigation measures across drought-affected communities. Those people living and working in these areas are quick to identify the service approaches that work and those that do not. All stakeholders affirmed that focusing support services solely on drought limits assistance to short-term crisis-management responses, and impedes long-term planning and investment in alternative farming and rural community futures. Governments, NGOs and researchers must engage with those who are working at the forefront of these rural transitions – those who can confirm that holistic and community-engaged services are vital to supporting farming families and rural communities through change in the most effective and respectful ways.

Future scenarios of climate change impacts and adaptation – what options do rural communities have in terms of drought adaptation?

While the projected impacts of anthropogenic climate change on drought-affected regions is often distressing and ominous, stories from Mildura and Donald also express optimism, innovation and adaptation in the face of very real and immense change and distress. These communities abound – perhaps surprisingly – in optimism and creativity. Optimism is a vital and strong response to the detrimental vagaries of uncertainty that are plaguing these regions. Moreover, people often express optimism in a strategic way, as a means of envisioning sometimes immense industry and behavioural changes in the region as a response to long-term climate changes.

Indeed, imagining and planning for different futures, and making use of adaptation and mitigation measures to address these scenarios, is one of the primary priorities of climate change research and policy at present. Our research observed extensive adaptation and mitigation measures being used, experimented with and talked about on farms. In remote, conservative rural areas renowned for scepticism and disbelief in anthropogenic climate change, people are undertaking adaptive on-farm practices and thinking about different climatic futures, perhaps more than their urban counterparts, as they confront the realities of climate changes in everyday ways.

Farmers and grass roots organisations such as the Birchip Cropping Group (BCG) in the region are experimenting and trialling different crops, ways of growing and irrigating; they also have made rapid and world-leading advances in areas such as water conservation and land management. It was widely noted that farmers possess great potential for effective adaptation due to their innate practical nature and inclination to experimentation in farming activity, and also the communication that occurs ‘over the fence’ between farmers.

Farmers also acknowledged that this type of intrinsic adaptation is hastened during drought because it is often a matter of survival. And, of course, farmers' ability to engage in these adaptive behaviours (i.e. their adaptive capacity) is influenced by the types of social and economic impacts outlined above. Therefore, those who are on the cusp of financial viability and are experiencing severe health impacts as a result, do not have the financial or mental resources to be able to undertake such change in thinking and practice.

An important part of supporting change and adaptation for future climate change is recognition of the role that the rural community takes within these scenarios, as a vital factor in sustaining farmers and their families. For Mildura, the town's size and industry scope will provide some buffering from the rapid changes and impacts on farming in the region. However, for many of the smaller towns (e.g. Donald) throughout the dryland region, their future remains uncertain as people, services, schools and businesses are depleted – a pattern that is likely to be exacerbated under a drying climate.

Drought and the future of rural communities – where to from here? Do rural communities have the capacity to implement adaptive strategies and remain viable into the future?

While the future of rural communities can look grim, people have a view of their future that notes the immense challenges faced and offers alternative visions and strategic plans for survival. Many imagine very different futures, where isolation and service demands are managed through technology, and alternative industries and energies offer a sustainable and economically viable way forward for their towns. There are strong attachments between the people, the land and their community in these regions. Rural communities remain confident of their future, even if that future does not necessarily involve farming (this was more the case for Mildura than for Donald). Thus the rural town and its close and abiding connections can provide opportunities to build and adapt to new futures.

Both regions are already experiencing rapid and extreme changes to their traditions and foundations of agriculture, and this is common to many rural drought-affected areas. Ongoing drought and drying, along with less available water, are widely acknowledged as a realistic climatic future for such regions. The irrigated areas of Mildura are facing 'uncharted territory' as they learn to live with limited water and the other issues discussed above (e.g. collapse in wine grape prices). In the dryland regions around Donald, ongoing drought has, in many ways, merely accelerated changes already occurring in both the farming industry and the demographic makeup of these small rural towns. The economic and social impacts of these shifts are resounding, and the support services required to deal with them are being stretched to their limits.

The 'messy' problems facing rural communities will require multiple service and support strategies, joined-up agency working and lots of learning – and a large amount of this work will need to be done in the social domain. It will be important for people to be well supported through the processes of change, in ways that are respectful and revitalising for people who are fatigued from the chronic drying of their environment and the increasing pressures on their farming enterprise.

Drought need no longer be the centrepiece of government policy in drought-affected regions, and in fact it would be detrimental to continue with such an approach. The issues facing this region are 'more-than-drought', and only understanding and addressing these issues in a holistic way will offer an effective means of support through future change. Stakeholders in Mildura and Donald continually emphasised that there is no one answer or panacea to the complex issues confronting these rural communities. These issues require proactive approaches in envisioning, planning for and enacting different futures based on strong climate and social science. Through this process, it is vital to work with local people to gauge their immense practical knowledge. Adaptation is 'not just about changing people's minds' (Howden *2*008), but also a process of working with people to garner experiences and insights that are closely attuned to a region confronting drought and climate change in very real and specific ways.

Key insights and recommendations

The key insights that emerged from this project are listed below:

- **Key insight 1:** The social and economic issues facing inland (rural) communities are not just a product of drought – to understand them as such would under-estimate the extent of the problems and inhibit the ability to coordinate the holistic, cross-agency approach needed to address them.

- **Key insight 2:** In areas relying on irrigation, there is an immediate need for a stable and secure water allocation and buy-back system, which can more readily and effectively be negotiated, planned for and managed by farmers. The new Murray-Darling Basin Plan (draft released in October 2010) may provide stability, but there will likely be stakeholders who are negatively affected by this 'stability'.

- **Key insight 3:** There are opportunities to engage people's love for rivers and respect for water in rural areas to promote adaptive responses. A shift in understanding and language around water is necessary to acknowledge its scarcity, variability and value for 'making a living', the environment and the community.

- **Key insight 4:** Government support for farmers is crucial but the traditional Exceptional Circumstances and welfare approach needs to be re-examined, as this sustains short-term responses and creates further problems of dependence.[2]

- **Key insight 5:** Services for ageing populations (the norm for Australia, but emphasised in small rural communities) need to be addressed, particularly in light of increased farm debt and/or decreasing superannuation (due to the global financial crisis (GFC)) and in some cases the asset-base of farms.

[2] As an example of a way forward, from July 2010 to June 2011, the Australian government, in partnership with the Western Australian government, is conducting a pilot of drought-reform measures in parts of Western Australia that will test a package of new measures developed in response to the national review of drought policy. The measures are designed to move from a crisis-management approach to risk management. The aim is to better support farmers, their families and rural communities in preparing for future challenges, rather than waiting until they are in crisis to offer assistance.

- **Key insight 6:** Exit grants can produce negative flow-on economic and social impacts to inland (rural) communities if they are not properly integrated with land use planning and assistance for redevelopment and restructure at the community and individual level. These impacts need to be acknowledged as part of more holistic government assistance schemes, incorporating re-skilling and accreditation programs for exiting farmers. Further provisions are also required for succession and long-term land-use planning.

- **Key insight 7:** Increasing and critical cases of declining mental health, unmanageable emotional load and stress in farmers and farm families require immediate attention. Trained and supported mental health professionals with appropriate rural knowledge are needed to address these issues.

- **Key insight 8:** The language used in climate change adaptation research and policy needs to be clear that the goal is to increase adaptive capacity through resilience (i.e. the ability of communities to reconfigure themselves without significant declines in crucial functions) as opposed to stoicism (i.e. endurance in the face of adversity). Reinforcing ideas of the 'stoic farmer' can prevent farmers from seeking help and undertaking change, and therefore hinder adaptive capacity-building.

- **Key insight 9:** Scepticism towards climate change is not necessarily a barrier to adaptation, since farmers adapt to much shorter time frame challenges and risks – both climate and market. However, scepticism towards research in this area (i.e. numerous studies doing similar things with few tangible benefits) is concerning and needs to be addressed through more coordinated and connected outcome-based research activities (see Recommendations 4 and 5 in Section 7).

- **Key insight 10:** The multiple uncertainties (e.g. climate impacts, water markets, commodity prices, demographic changes) pervading the farming community are detrimental and exhausting. Government policy and assistance schemes need to provide a strong and consistent response to service delivery and rural support.

- **Key insight 11:** Supporting optimism in drought-affected communities can be important for countering uncertainty and envisioning alternative futures; however, it is important that this is not false optimism.

- **Key insight 12:** Partnerships and connected working between service providers are essential to facilitating an effective referral and support network of practitioners. Existing pressures on rural financial advisers to confront mental health issues must be addressed through the inclusion of dedicated mental health professionals in this service network.

- **Key insight 13:** People are tired of hearing about drought and depression. Community-led, informal and social activities (e.g. fire shed gatherings held monthly in the Buloke Shire, which includes Donald) are one way of offering opportunities to engage farmers and build relationships between service providers and communities. This micro-level engagement provides the opportunity to strengthen local networks and facilitate an effective information flow while at the same time building connectedness, which is strongly related to better mental health.

- **Key insight 14:** Proactive, long-term and practice-oriented support and funding schemes are the most effective way of facilitating adaptation in farming communities. Research and training will be key factors in such an approach, but it was stressed that this research should be relevant to the local area and be brokered at the local level (as opposed to the Commonwealth government level).

- **Key insight 15:** Adaptive capacity and the ability to conceive of different futures are apparent – these capabilities can be built on and developed to create effective and locally responsive adaptation and mitigation strategies.

- **Key insight 16:** Programs, roadshows and events centred on technology, adaptation, and new crops and industries are the key to engaging rural communities and farmers in positive and proactive change. Birchip Cropping Group's (BCG's) model of adaptation, where there is a more farmer-centric perception of issues and needs, is also proving successful. Research conducted in this way addresses the community's priorities and is adopted because of this.

- **Key insight 17:** Some farmers are not in a financial position to be able to adapt sufficiently. They must be assisted to transition to a more stable financial state, with its benefits for social and emotional well-being, or helped to leave farming in a dignified and supported manner.

- **Key insight 18:** In revising understandings of variable water availability, it is important also to acknowledge the vital social benefits gained from the amenity associated with water (e.g. in rivers, lakes, and pools), particularly in dryland regions.

- **Key insight 19:** In dryland communities, welfare dependence is still relatively limited. However, many dryland farmers and other businesses in rural areas are just 'breaking even', and need proactive financial and planning assistance to ensure that they do not become dependent and inactive in their business activities.

- **Key insight 20:** Addressing problems of farm debt may require attention to bank lending policies, and whether these are in line with projected scenarios of climate change in these regions.

- **Key insight 21:** Social and recreational activities (e.g. sport) are critical to the well-being of rural communities. More holistic service approaches that encompass farms, families, communities and towns will need to include provisions for supporting such recreational activities.

- **Key insight 22:** Service systems, as well as research and development (R&D) programs addressing climate change, must look to the strength and practical knowledge already existing in these communities as effective foundations for building in adaptation, mitigation and change. Groups like Birchip Cropping Group (BCG) are already strongly active in this area.

- **Key insight 23:** The service approach undertaken by Centrelink Rural Services Officers has been extremely effective. Even under new government support

schemes, such 'joined-up' and community-engaged networks should be built upon and sustained to better service farming communities.

- **Key insight 24:** Dryland farmers can be hard to reach, both geographically and due to their 'stoic' ethos, and are unlikely to go to where the support is. This must be taken into account when planning support and mental health services through the inclusion of farm visitation programs and other community-led social activities.

As a result of the above insights, the following recommendations are made:

1. There is great advantage to be achieved in furthering comparative, case study-based research into climate change impacts and adaptation. The actual experiences of drought and other climatic extremes are vital to advancing our knowledge of how to respond and adapt to such conditions, and how this might vary between different areas – such as the irrigated areas of Mildura and the dryland communities around Donald, or even the flood-prone communities of Queensland. Such an approach will be vital in addressing the specificities of regional climatic issues, while also bringing together a coordinated foundation for government response to climate change nationally, drawing on those successful programs and practices that are common across different regions. There are a number of specific critical issues that need further attention in research into drought-affected rural communities. These include: the mental health and well-being issues confronting these regions, including the unique effects of chronic drying and uncertainty; the potential challenges faced in rapidly ageing communities with growing socio-economic disadvantage; and the issues of debt and the declining asset-base of farmers, and how this might better be anticipated and supported. Further, we strongly advocate the incorporation of research that examines, identifies and builds on the immense and already existing adaptive capacity and knowledge of these rural communities living at the forefront of often-harsh climatic changes. It is particularly important to maintain this focus when it rains and drought is temporarily forgotten.

2. Across any such research projects, further efforts to revise the language and understandings of drought are crucial. These efforts need to address the changing environment and climate by shifting from notions of 'drought-as-crisis' to 'ongoing drying' – acknowledging the variable availability of water and the potential for multi-year periods of significantly reduced water availability to become more frequent. The immense value of water to human beings' economic, social and environmental well-being should also be recognised in a more meaningful way. Clarification in the language used in climate change adaptation research and policy is also required to highlight the importance of resilience (as opposed to stoicism) in enhancing adaptive capacity (as per Key Insight 8).

3. Food supply is important to Australia's future, and global food security – particularly under a changing climate – combined with respect for the people growing food is distant and wanting, as aptly described by a dryland farmer from Donald:

> Farmers are thinking what's the point? City people think 'you can live out in the sticks and work seven days all your life, that's fine', you know 'keep working out there to make food for us, and if it's a big deal we'll just buy it from overseas'. It just breaks people's hearts. Support the local industry at least. People put more emphasis on having a GPS unit, or a new big flat-screen TV, than they do their food. It's got right out of

> kilter and the governments must realise that the emphasis is wrong. (Dryland farmer, Donald)

The urban population is disconnected from food production and farming. More efforts must be made to rebuild this connection and revalue the farming enterprise. As part of this, we reiterate the need to reframe our language of service provision and support in drought-affected regions. This reframing will require shifting from notions of farmer welfare and dependence towards holistic rural support and investment in a vital food industry, a shift that will be necessary in order to maintain the health and dignity of rural and food-producing communities as they face changing futures.

4. There is an urgent need for more accurate (not to be confused with precise) and reliable seasonal to multi-decadal climate forecasts that are relevant at the farm scale. Research is needed to determine what constitutes a 'good' climate forecast for farmers and rural communities (e.g. What variables? What format? What level of accuracy and/or lead time is useful and what is not? What temporal and/or spatial resolution?). Unfortunately, significant uncertainties currently exist around the climate science and modelling needed to produce the sorts of forecast farmers say they need. It should also be noted that, especially for rainfall forecasts at the farm scale, this uncertainty will remain for the foreseeable future. Therefore, while there is a need to reduce uncertainty around climate forecasting, where possible the more urgent, and more achievable, objective should be to robustly quantify this uncertainty and to build resilience (i.e. the ability to reconfigure without crucial loss) such that rural communities are capable of adapting to the climatic variability that exists in Australia and also the fact that this variability may change. Farmers are adept at dealing with uncertainty so long as they are aware of what the bounds of that uncertainty are and have ongoing, consistent and proactive (as opposed to short-term, changing and responsive) drought, water and agricultural policy to support them. The message conveyed here relating to uncertainty around climate forecasts is equally applicable to uncertainty around economics, commodity prices, social demographics and water-trading policies. It is not the uncertainty itself that is frustrating for farmers; rather, it is that the uncertainties seem to be in a state of flux – and it is all happening at the same time!

5. Future research also requires a coordinated and respectful approach to working with drought-affected communities. People living and working in these regions are becoming tired and sceptical of 'yet another' drought or climate-change research project when they have been involved in so many before and seen few positive outcomes. Further efforts are needed to coordinate 'outcome-based' research activities – a practice that not only provides the benefits of interdisciplinary and inter-agency knowledge, but also respects those with whom we are working by not over-burdening them with separate and disconnected research interventions. Research needs to be engaging and worthwhile for those at the forefront of rural climatic change. In addition, while a lot of drought and climate change adaptation research has been, and continues to be, conducted, the well documented facts, key themes and recommendations continue to emerge with little evidence of effective implementation. Urgent investigation is required into why the already well-documented solutions and priorities have not been implemented – what are the barriers that are preventing implementation, and how can these barriers be overcome?

1. Introduction

Australia is not only the driest inhabited continent, but it is also characterised as having one of the world's most variable rainfalls (Smith *2*003; Hennessy et al. *2*008). Therefore, drought is – and likely always will be – a routine and prevailing feature of the Australian climate. While there are numerous government policies and adaptation strategies that attempt to address the problems of drought in Australia, the consensus is that these approaches have not worked well in the past and are unlikely to be effective in the future (e.g. Edwards et al. *2*009; Productivity Commission *2*009). Moreover, the problems of drought have the potential to intensify, with projected increases in the frequency and severity of drought across the majority of Australia as a result of anthropogenic climate change (Whetton et al. *2*005; IPCC *2*007).

While significant uncertainties are associated with climate change (e.g. whether it is naturally or anthropogenically induced, impacts at the farm scale, etc.), the fact remains that, regardless of the mechanism(s) causing the drought, improved strategies for adapting to drought are required in Australia and elsewhere. The need for more robust drought-adaptation strategies to be implemented is highlighted by the current drought in south-east Australia (known as the Big Dry (e.g. Verdon-Kidd & Kiem *2*009)). Verdon-Kidd and Kiem (2009) demonstrate that, with respect to prolonged periods with below average rainfall, there have been comparable droughts in Australia's history (e.g. the World War II and Federation droughts); however, these occurred at a time when population levels and industrial activity were much lower, and therefore the resulting environmental, social and economic impacts were smaller. Despite the prolonged nature of the current drought, and the occurrence of previous protracted droughts, drought-management and adaptation strategies across many Australian industries and regions remain inadequate. The vulnerability and adaptive capacity of rural communities whose economic and social viability is dependent on agriculture are of particular concern (Alston *2*006; Alston & Kent *2*008; Fragar et al. *2*010). Furthermore, numerous studies into drought related impacts have increased awareness of the social and community impacts of drought, particularly on small inland (rural) towns, where families and communities under escalating financial strain are experiencing worsening mental and physical health, and decreasing social well-being (Heyhoe et al. *2*007; Sartore et al. *2*008).

In light of this knowledge, existing and future vulnerability to drought under an ever changing climate is now the topic of government policy revisions and public debate. As such, there has recently been a shift in the scale, priorities and strategies of traditional climate and drought policy. For example, increasing attempts have been made to coordinate innovative, national and holistic approaches to climate change and variability through the establishment of a Department of Climate Change and Energy Efficiency[3] (DCC) in 2007. DCC's 2009–10 Corporate Plan outlines the delivery of the Australian Government's climate change framework, based on the three principles of: reducing Australia's greenhouse gas emissions; adapting to impacts of climate change that cannot be avoided and; contributing towards a global solution to climate change (DCC*, 2*009). More specifically, DCC's actions in relation to adaptation have included:

[3] The Department of Climate Change and Energy Efficiency was established on 8 March 2010 as a result of Machinery of Government changes (www.climatechange.gov.au)

- the coordination of a national climate adaptation policy
- the development and coordination of a National Climate Change Research Strategy for Primary Industries (CCRSPI)
- establishing a Commonwealth Scientific and Industrial Research Organisation (CSIRO) Climate Adaptation Flagship, and
- the establishment of NCCARF – managed by Griffith University and designed to improve understanding of the impacts of climate change in Australia and to develop appropriate adaptation responses (Nelson et al. *2*010).

This research project represents one initiative funded under the NCCARF Synthesis and Integrative Research Program: Historical Case Studies. Through these specific case studies, NCCARF aims to develop an understanding of the impacts of climate change in Australia and to develop appropriate adaptation responses (Nelson et al., *2*010). In this project, the focus is on the impacts of drought, including existing and potential adaptation strategies, in two exemplar rural communities. This study attempts to provide answers to questions that remain highly uncertain, including:

- What are the effects of long-term drought on rural communities?
- What are the critical issues likely to affect the future of rural communities?
- What options do rural communities have in terms of drought adaptation and/or mitigation?
- Do rural communities have the capacity to implement adaptive strategies and remain viable into the future?

The research adopts a case study approach that acknowledges recent calls for more connected and participatory approaches to studying drought impacts in agricultural regions (see Senate Standing Committee on Rural and Regional Affairs and Transport *2*008). In this way, the project respects the strong connections that farming communities have with the land and its cycles, and acknowledges farming communities as the people who are at the forefront of creating, facilitating and enacting successful drought-mitigation and adaptation strategies.

This project examines Mildura and Donald, two inland, predominantly rural communities located in regional Victoria, Australia (see Figure 1.1). These 'towns' have differing water sources, rainfall/climatic patterns, sources of water, economic bases, population sizes, types of agriculture and water resource-management practices. Importantly, both have been strongly impacted socially and economically by the current drought. This project investigates both the hydroclimatological and socio-economic impacts of drought, in recognition of the fact that drought is more than just a lack of water. We also attempt to address the existing gaps in information transfer between knowledge-generators and knowledge-users.

In Section 1, drought policy in Australia is reviewed and the current drought (the Big Dry) is also placed into context with respect to historical and projected future climate conditions. In Section 2, the drought-related issues affecting inland (rural) communities are reviewed. Section 3 then outlines the data and methods used in our analysis of the hydroclimatological impacts of the Big Dry in the case study sites. We consider how the impacts of the Big Dry compare with the impacts of previous droughts. Based on this comparison, we consider how possible changes in the frequency and severity of droughts in the future might impact on the region. We also consider how local water supply systems currently operate and how reliable

these might be in light of future drought projections. Section 4 also describes the interview and workshop processes we followed to obtain information from members of the case study communities with regard to the socio-economic impacts of drought, current drought adaptation/mitigation strategies and their view on options for the future. In Sections 5 and 6, we present the results of the analysis for each of the two case studies.

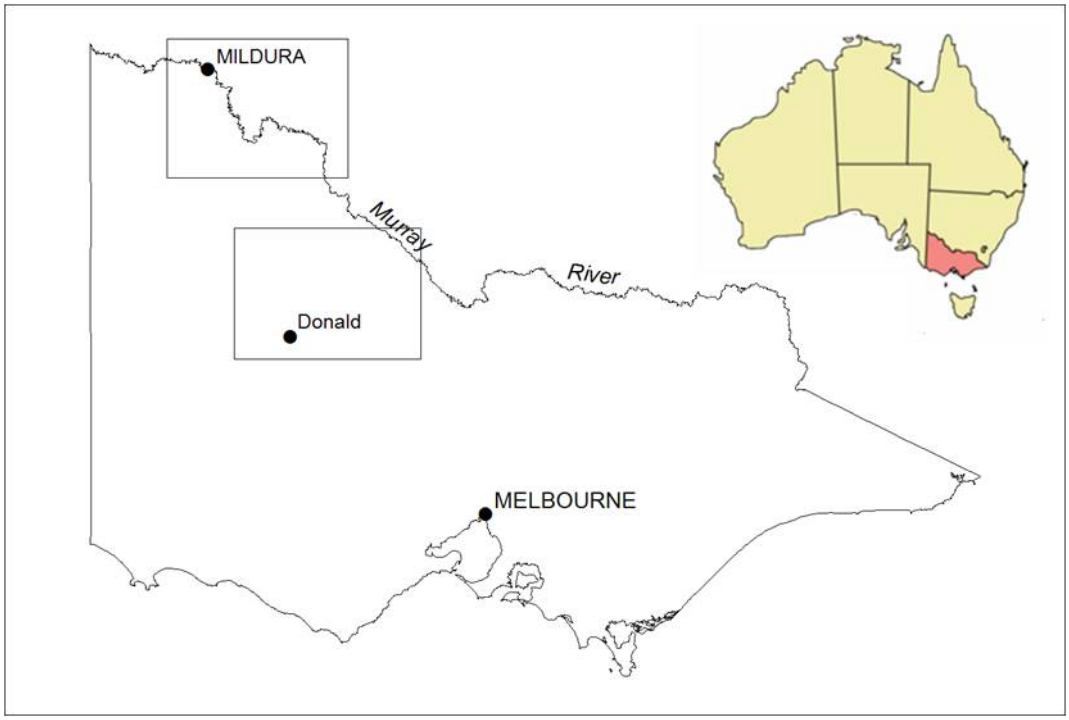


Figure 1.1: Location of the two case study communities

Although the case studies have been chosen as exemplars of the local impact of drought, they can also be used to provide significant insights into what is occurring 'on the ground' in the region as a whole, and also in other locations within and outside Australia. Importantly, this study focuses on strategies of adaptation that are already occurring, and the opportunities that exist for the future. It is clear that adaptation in the face of existing climate variability and future climate change is needed. A place-specific study such as this, combining both qualitative and quantitative approaches, allows for a holistic consideration of the complex issue of drought, how it is manifested and managed locally, and how these experiences may assist in supporting other rural locations in their adaptation to drought. Accordingly, Section 7 summarises the site-specific findings emerging from this study but, importantly, also uses these insights to make recommendations that are applicable to adaptation to drought in other locations (both nationally and internationally).

2. Drought: the Australian context

Drought is a familiar and influential part of Australia's landscape and history (Smith *2*003). The Australian landscape has been shaped by successive droughts of varying lengths and magnitudes that simultaneously have affected patterns of settlement, migration, agriculture and production. It is important to be aware that drought is not an occasional one-off event but a normal part of variability in the ocean-atmospheric system that drives Australia's climate.

It is also important to note that there are different types of drought (e.g. meteorological, hydrological, agricultural, socio-economic, irrigation), and that the regional characteristics of drought vary significantly. As a result, there is no single definition for drought. In this report we have defined drought as a deficiency of precipitation from expected levels over a season or longer, which affects water supply to the extent that it is insufficient to meet the demands of human activities and the environment (Wilhite & Buchanan-Smith *2*005; Anderson 2008). By approaching drought in this way, we aim to influence outcomes that avoid short-term drought-management approaches which fail to recognise the relative nature of drought events and the longer-term patterns of drying – acknowledging that future dryness will occur and it is not a short-term crisis (Wilhite & Buchanan-Smith *2*005). In addition, consistent with the recommendations of the 'Kenny Report' (Drought Policy Review Expert Social Panel *2*008), we acknowledge that to understand and plan for drought effectively, it is vital to investigate both the natural and social dimensions of drought. Consideration of those areas and people most at risk is particularly important, as they will be hardest hit (McMichael et al. *2*008). Research of this kind enables a proactive and adaptive response to drought, supporting more effective policy decisions and sustainable management practices.

The following section provides a review of drought in an Australian context in terms of current and future hydroclimatological conditions and government policies. First, we discuss key conceptual frameworks for understanding and analysing drought, particularly those analysing vulnerability, mitigation and adaptation strategies. Second, we describe the current and possible future drivers of drought in Australia. Finally, the government context is examined to provide detail about the trends and practices in drought response currently supported and adopted at different scales of government.

2.1 Understanding the impacts of drought and climate change: vulnerability, mitigation and adaptation

Concepts of vulnerability, mitigation and adaptation have become prominent in current debates around drought, particularly when associated with projected climate change. All three concepts are intertwined and fundamental to understanding drought-related impacts and effective responses to climate-driven events such as drought.

Understanding and quantifying vulnerability to climate change provides the foundation for developing effective mitigation and adaptation strategies. Vulnerability can be defined as 'the susceptibility of a system to disturbances determined by exposure to perturbations, sensitivity to perturbations and the capacity to adapt' (Nelson et al. *2*007). Vulnerability to climate change can be examined through analysis of the exposure to climate variability and change, sensitivity to this exposure and the capacity to adapt (Alwang et al. *2*001; Wilhite & Buchanan-Smith *2*005; Adger *2*006; Fussel & Klein *2*006; Nelson et al. *2*010). In this way,

vulnerability is not an absolute measure of harm itself, but instead is constituted by micro and macro factors whose expression is shaped by locally idiosyncratic social, economic, cultural and political contexts. This approach also permits consideration of protective processes – such as increased community connectedness – that may be available to support adaptation.

In relation to drought, understanding the vulnerability of people and environments is vital for developing and supporting effective drought preparedness. By taking a holistic view of vulnerability as socially differentiated, dynamic and contextual, determinants of drought vulnerability include a range of socio-economic, political and cultural aspects such as household assets, productive labour, social capital, farming practices, local governance structures and the ability of the state to provide effective support (Wilhite & Buchanan-Smith *2*005). While the field of vulnerability research traditionally has been dominated by hazard/impact modelling and risk-management assessments (e.g. Hammer et al. *2*000; Kiem & Franks *2*004; Meinke & Stone *2*005; Adger *2*006), there is a growing sentiment that these approaches need to be expanded to account for the previously mentioned diverse determinants that are known to significantly influence vulnerability. Indeed, previous research has noted that vulnerability may have as much to do with perceived vulnerability as it does with resource scarcity, and that the social conditions of vulnerability often develop more rapidly than environmental changes (e.g. Adger, 1999; Dow et al. *2*007; Few *2*007; Marshall *2*010).

Social capital may also be a key concept in this evolving debate. Made up of: (1) frequency of, breadth of and satisfaction with different forms of community participation; and (2) the social cohesion (norms, trust, reciprocity, sense of belonging) engendered by high levels of participation (Berry & Welsh *2*010), social capital is one key mediator of the relationships between drought, climate change, social impacts, and health and well-being (Berry, Bowen et al. *2*010; Berry, Butler et al. *2*010). Social capital is also socially patterned, with higher levels of participation, social cohesion and access to resources predominant among the advantaged, while noticeably lacking among the disadvantaged (Berry *2*008*, 2*009a*, 2*009b). We therefore argue that to capture the dynamic and locally specific nature of vulnerability to drought, an in-depth and integrated consideration of local environments, individuals, communities, institutions and governance frameworks is required. Practical outcomes can be achieved through influencing these types of contexts and processes to enhance the ability to cope and adapt to climate change.

The concept of mitigation (i.e. minimising the causes of human-induced climate change) is also fundamental in dealing with climate-related impacts such as drought. Mitigation, with respect to the reduction of greenhouse gas emissions, emerged as a central concept in early climate change research, and is perceived as a manageable approach to addressing the unequal distribution of contributions to human-induced global warming. It has been argued that successful mitigation strategies can result in global, equitable and cumulative benefits over time: aspects that have aided the ascendancy of climate-change issues and management into the global political sphere (Hayes *2*008). The emphasis of mitigation strategies on global greenhouse gas emissions reduction means that, in Australia, the uptake and development of mitigation strategies have been limited and that the agricultural sector, which bears much of the burden of drought impacts, has largely been excluded or suspended from inclusion in national or global emissions mitigation strategies (Gunaskera et al. *2*007a*, 2*007b). Despite this separation at the national policy level, the agricultural and farming sectors have adopted key mitigation practices in farming approaches. For example,

recent research in Australia and the United States has resulted in 'win–win' or 'no regrets' strategies that reduce emissions and provide cost savings to farmers. These include practices such as minimum tillage, more efficient use of fertiliser and improved grazing regimes (ABARE *2*007). Many Australian farmers have been quick to adopt these strategies, with adoption hastened further in areas under increasing pressures of prolonged drought, and they are now viewed as a significant part of best-practice farming for the future (see further discussion in Sections 5 and 6).

While greenhouse gas emission-reduction strategies are important, mitigation cannot replace adaptation as a response to anthropogenic climate change or drought and their anticipated impacts (Yohe et al. 2004; Adger et al. 2005). Adaptation must be a significant part of any climate-change policy, as no matter how successful a greenhouse gas-mitigation or emission-reduction strategy is, some degree of adaptation will still be needed to deal with the as yet unquantified climate variability inherent in the earth's system (e.g. Verdon-Kidd & Kiem*, 2*009).

Adaptation consists of strategies to reduce the impacts of climate change on human and natural systems, with adaptive capacity referring to the necessary preconditions for adapting (Janssen & Ostrom *2*006; Marshall *2*010). Interest in adaptation to climate change has grown significantly since the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) provided, for the first time, compelling evidence of anthropogenic climate change and stated that 'adaptation to climate change is both vital and complex' (Smit & Pilifosova *2*001). Research has explored adaptation to climate change through the adaptive capacity of regions (e.g. Young & Lipton *2*006), organisational and institutional adaptation (e.g. Berkhout et al. *2*006; Young *2*010), the adaptive elements of international agreements (e.g. Thompson et al. *2*006); and community level adaptation (e.g. van Aalst et al. *2*008). Together, these studies point to the diverse characteristics and agents involved in current adaptation strategies, and the potential for robust and creative future adaptation strategies.

Adaptation is a particularly effective and favoured strategy for dealing with climate-change impacts, as it involves existing and feasible practices that are industry and place focused, and often participatory in approach. The latter is of great significance because (successful) participatory approaches help build social capital. As stated above, not only is social capital associated with an enormous array of social, economic, educational, political and health benefits (e.g. see Putnam 2000), it may also be a key mediator of the relationship between adverse climate change and its impacts, especially on vulnerable people and places (Berry, Bowen et al. *2*010). Indeed, it has been proposed (Berry *2*009a*, 2*009b) that anthropogenic climate change impacts might be of sufficient concern in communities to initiate collective action on mitigation and adaptation. While not all farmers believe in anthropogenic climate change, most are acutely aware of the need to adopt sustainable practices (Hogan et al. 2010), and these may have co-benefits for climate change and wellbeing (Berry, Butler et al. 2010).

The extent to which Australians have already adapted to difficult and changing climates and climatic extremes means that they potentially are well placed to provide capacity to manage the expected impacts of anthropogenic climate change (Heyhoe et al. *2*007; Nelson et al. *2*010). In the agriculture industry, for example, recurrent drought events have spawned a variety of adaptive strategies, including diversification of crop species and livestock breeds, pest management, changing crop and livestock management practices, and

longer-term initiatives such as enterprise mix and investing in non-farm assets (Heyhoe et al. *2*007; Gunaskera et al. *2*007a). With the considerable natural climatic variability that has been faced by the Australian agricultural industry since settlement, particularly with respect to regular drought, many adaptive strategies have already been trialled and some are now ingrained in routine farming practice. Yet it is important to recognise that the advantages provided by recurrent exposure to challenging and changing climates and extremes may prove difficult to realise. The extent to which adaptation strategies are understood, utilised and practised effectively depends on complex and shifting socio-economic, cultural and political systems. Moreover, these changing contexts occur not just as part of known climatic changes and extremes, but among the inherently new and unfamiliar risks of future climate change. Adaptation, then, while often taken as a more comforting and achievable approach to climate change than mitigation, requires considerable effort and understanding to ensure that adaptation strategies support changes that build resilience (Stokes & Howden *2*010). That is, adaptation strategies must move beyond 'just coping' to fundamentally be responsive to the socio-economic, cultural and political contexts in which they are developed and practised (e.g. Barnett & O'Neill *2*010) – and which inevitably shape, and even constrain, them.

The concepts of vulnerability, mitigation and adaptation are central to understanding the current responses and impacts of climate change and drought in Australia. In the following section, these conceptual understandings are drawn together within the contexts in which they have been developed, adopted, manipulated and put into practice – first, by outlining the hydroclimatological contexts of drought both currently and in relation to future projections; and second, by discussing from a national perspective the current political contexts of drought policies and strategies adopted across various scales of government. This discussion provides the basis for further contextual discussions of drought and its impacts on inland rural communities (see Section 3).

2.2 Hydroclimatological contexts of drought: current conditions and future projections

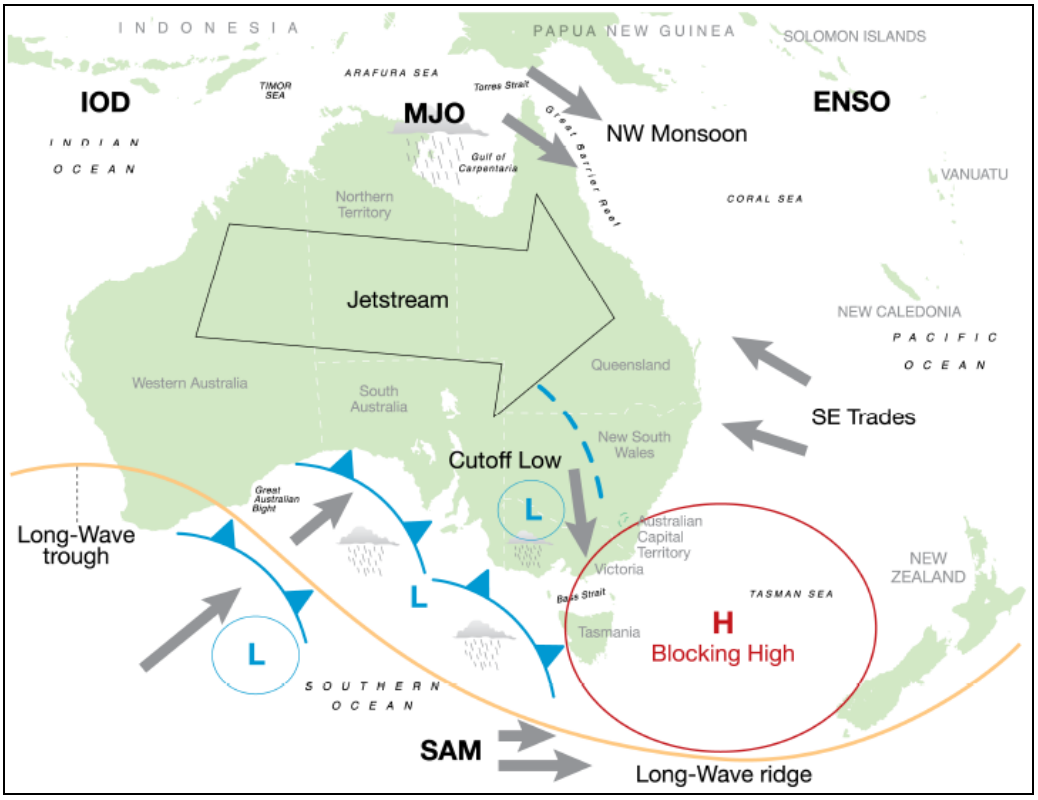
Australia experiences a high degree of inter-annual to multi-decadal hydroclimatic variability, and as a result is no stranger to climate-driven extremes such as drought, flood, bushfires and heatwaves. The source (i.e. the drivers) of this variability lies in the fact that Australia is surrounded by three major oceans – the Pacific, Indian and Southern Oceans. These three oceans (and their surrounding atmosphere) are associated with several ocean-atmospheric phenomena that act, either independently or in concert, to drive Australia's climate. These phenomena are described below and illustrated in Source: Risbey et al. (2009).

Figure 2.1.

The drivers of Australian hydroclimatic variability can be defined as either local-scale (i.e. synoptic) weather patterns or large-scale climate modes. Local-scale weather patterns are the actual synoptic systems that bring the weather to a certain place. Local-scale weather patterns that influence Australia – particularly south-east Australia (where the case study sites are located) – include:

- **East coast troughs**: stormy conditions often occur along this trough line during warmer months due to an enhancement of vertical motion just ahead of the trough, resulting in intense rainfall in eastern New South Wales and Victoria.

- **Offshore-trough/inland trough**: the offshore trough is often associated with the development of particularly heavy rainfall along the east coast of Australia. Some offshore easterly dips can lead to the development of east coast cyclones (i.e. cutoff lows/Tasman lows) during the cooler months, which are associated with intense rainfall events in New South Wales and Victoria.
- **Pre-frontal trough**: a pre-frontal trough allows rain-producing Southern Ocean cold fronts to penetrate into south-east Australia.
- **Blocking high**: an intense high-pressure system situated over the Great Australian Bight or the Tasman Sea that blocks the west-to-east progression of rain-bearing weather systems across southern Australia.
- **North-west cloud bands**: associated with rainfall over much of Australia during the winter months, this synoptic system forms when a high-pressure system over eastern Australia draws moist tropical air from the area around north-west Australia and Indonesia.



Source: **Risbey et al. (2009).**

Figure 2.1 Schematic representation of the main drivers of hydroclimatic variability in Australia

Large-scale climate modes originate in the oceans and/or atmosphere surrounding Australia and influence Australia's climate by altering the location, strength, and/or the frequency of occurrence of the local-scale weather patterns mentioned above. Large-scale climate modes that influence Australia include:

- **El Niño/Southern Oscillation (ENSO)** – coupled ocean-atmosphere variability that manifests as abnormal warming (El Niño) and cooling (La Niña) of the tropical Pacific

Ocean every two to seven years. El Niño events tend to result in lower than average rainfall and higher than average temperatures across eastern Australia.

- **Inter-decadal Pacific Oscillation (IPO)** (also known as the Pacific Decadal Oscillation (PDO)) – a low-frequency (15–35 years) pattern of variability of the tropical and extra-tropical Pacific Ocean (refer to Power et al. 1999 for details). Positive IPO phases (e.g. since the mid-1970s) are associated with a reduced frequency of La Niña events, and as a result are associated with multi-decadal periods of below average rainfall (refer to Kiem et al. (2003) for details);
- **Indian Ocean Dipole (IOD) –** a coupled ocean-atmosphere climate mode that occurs inter-annually in the tropical parts of the Indian Ocean. Typical of climate oscillations, the IOD experiences a 'positive' phase and a 'negative' phase, with anomalously cool (warm) sea surface temperatures (SSTs) near Indonesia associated with lower (higher) winter rainfall in eastern Australia;
- **Southern Annular Mode (SAM)** – the leading mode of atmospheric variability over the southern extratropics. Also known as the Antarctic Oscillation and the High Latitude Mode, the SAM represents an exchange of mass (sea-level pressure see-saw) between the mid latitudes (~45°S) and the polar region (> 60°S). The SAM modulates westerly winds over the southern extratropics and embedded frontal weather systems. When the SAM is positive phase, these frontal weather systems are located further south than usual resulting in below average rainfall in the southern parts of Australia (e.g. southwest Western Australia, Victoria, South Australia);
- **Subtropical Ridge (STR) –** a ridge of high-pressure detectable in daily and monthly mean sea level pressure fields over east Australia. The latitude of this STR has long been suspected of influencing seasonal Australian climate, particularly in the east. More recently, Larsen and Nicholls (2009) showed that the decline in southern Australian (including the southern Murray-Darling Basin (MDB)) rainfall in recent decades appears related to increased 'intensity' of the STR, rather than a trend in the latitude of the STR.

2.2.1 The recent drought – the 'Big Dry' or 'Millennium Drought'

As mentioned in the Introduction, a prolonged drought has affected south-east Australia since the mid-1990s. Known as the Big Dry or Millennium Drought, it has had serious impacts on agricultural production (due to decreased irrigation allocations), biodiversity (due to prolonged changes in habitats), bushfire regimes and water availability for industrial use and consumption. However, Australia has had similar droughts in terms of both the magnitude of rainfall deficit and duration of dry conditions (e.g. the Federation (1895–1902) and World War II (1937–45) droughts). Verdon-Kidd and Kiem (2009) compared these three iconic droughts in Australia's instrumental history and found that they exhibited different spatial extent, seasonality and severity. The reason for the differing nature of these droughts is linked to their underlying cause. The Federation Drought was predominantly an El Niño-driven drought, resulting in the largest decreases in rainfall being experienced in spring/summer across the eastern half of the country. During the World War II Drought, the Pacific, Indian and Southern Oceans were locked in their dry phase for most of the time, resulting in below-average rainfall in all seasons and across most of Australia. The recent Big Dry drought has coincided with positive SAM (i.e. dry phase) and several El Niño events. This combination of conditions has caused the southern and eastern parts of Australia to be very dry. However, the drought in the north-east of Australia has been less severe and of shorter duration than

the southeast. This is due to the few relieving La Niña events (i.e. wetter than average) that have occurred more recently. Unfortunately, the rain produced by these La Niña events has not been able to penetrate into SEA due to the 'blocking' effect of a positive SAM. While the south and the east have been experiencing drought conditions during the Big Dry, northwest Australia has been significantly wetter than average. This is due to warm SSTs dominating the Indian Ocean to the north-west of Australia, which has been conducive to rainfall in that region.

The relative severity of the three iconic droughts in Australia's instrumental history for the two case studies sites is further examined in Section 5.1.1 (Mildura) and Section 6.1.1 (Donald). Importantly, the work by Verdon-Kidd and Kiem (2009), along with many other studies on previous droughts in Australia, emphasises two critical points: (1) drought is a routine occurrence in Australia; and (2) droughts differ in their causation, characteristics and impacts. Therefore, insights into climate variability tell us that, in order to be successful, adaptation strategies must be: (a) flexible enough to take into account the variable nature of droughts; and (b) long-term and proactive (as opposed to a reactive, short-term, emergency response), given that drought is more insidious than other natural disasters (e.g. floods, bushfire, earthquake).

2.2.2 Anthropogenic climate change: projected impacts and uncertainties

In addition to the natural variability described above, anthropogenic influences are also projected to contribute to future multi-decadal scale climate variations in Australia (CSIRO-BoM *2*007; IPCC *2*007). With respect to anthropogenic climate change, a wide range of impacts have been projected for the Australian climate (i.e. from 'wetter and warmer' to 'drier and warmer') and unfortunately there is no clear signal of the direction of these changes. The uncertainties primarily stem from differences between general circulation models (or global climate models, GCMs) and/or differences in the future greenhouse gas emissions scenarios. The uncertainties are further magnified at the sub-continental scale, given current limitations in all GCMs' ability to accurately simulate processes that drive regional-scale variability. Without doubt, the potential for droughts to become more frequent and severe (e.g. IPCC *2*007) under a warmer climate needs to be taken into account; however, this just reinforces the points made above relating to the characteristics of successful adaptation strategies (i.e. adaptation strategies should be flexible, long term and proactive so as to successfully alleviate related impacts, regardless of what actually causes the drought).

It is this developing picture of significant, multi-decadal historic and potential future climatic changes (either naturally and/or anthropogenically driven) that has, over the last decade, propelled a large amount of research into climate change vulnerability, mitigation and adaptation. This drive in climate change research has also provided a basis for government decision-making and political debate, as discussed below.

2.3 Drought and water policy in Australia: an historical overview

As a familiar and recurrent climatic extreme in Australia, drought has elicited an extensive and long-running response from successive governments. Drought policy existed in various guises throughout the 1900s, largely as a focus of broader agricultural policy frameworks (see

James 1973). Until the late 1980s, drought was thought to be a climatic abnormality and was treated with disaster-relief policies and Exceptional Circumstances (EC) payments in a similar way to floods, earthquakes and cyclones (Botterill & Wilhite 2005). During the late 1980s, however, the view of drought as a one-off, unpredictable and unmanageable natural disaster began to be questioned in scientific and policy circles. Drought subsequently was removed from national disaster relief arrangements, and a task force was initiated to shape the most appropriate response to these changing perceptions of drought.

Subsequently, the National Drought Policy (NDP) was established in 1992 through collaboration between the states and the Commonwealth government. The NDP was based on principles of self-reliance, risk-management and an understanding that drought is an inherent feature of the Australian environment (Nelson et al. 2010). Despite a focus on the agricultural sector assuming greater responsibility for climate risks, provisions were included for EC whereby applications for assistance could be made in times of severe drought. The primary avenue for government assistance was the Rural Adjustment Scheme (RAS, previously termed 'the Farmers' Debt Adjustment' and also 'the Rural Reconstruction Schemes') and 'the Farm Household Support Scheme' (FHSS). The RAS adopted structural adjustment initiatives to improve farm productivity, profitability and sustainability. These initiatives included interest rate subsidies, commercial borrowings and small grants, all of which were subject to substantial increases under a provision of EC. The FHSS, however, was aimed at encouraging unviable farmers to exit the industry (Botterill & Wilhite 2005). As a whole, the policy framework was viewed as a holistic response to recurrent and extreme drought events.

During the 1990s, drought policy faced considerable challenges and debates, resulting from both the accumulated effects of decades of inadequate drought response and the most recent concerted attempts to address policy shortcomings and establish farming self-management and sustainability. Along with considerable political pressures from welfare, academic and influential industry groups, governments were facing a combination of conditions and challenges, including:

- prolonged, expanding and worsening drought conditions across significant agriculture-producing regions
- widespread inconsistency, abuse and normalisation of EC declarations
- an increasing focus on government intervention rather than self-management and sustainability
- a situation where EC payments artificially kept unviable and/or poorly managed farm businesses afloat – this view of EC payments as 'money wasted on people that shouldn't be farming anyway' emerges frequently throughout our case study interviews and workshops (Sections 5 and 6), and is consistent with the current views of Burke (2010), and
- evidence of widespread welfare gaps in the farmer support system (Botterill & Wilhite 2005).

Successive reviews and amendments of the NDP and RAS occurred throughout the late 1990s and 2000s. Changes included further clarification and separation of EC declarations and processes; adjustments to interest rate subsidies; exit grants; income support; and increasing access to social and economic support services. However, despite these changes,

many of the issues surrounding drought policy in the 1990s have continued to plague government approaches to farm management and drought support into the twenty-first century.

More recently, the IPCC has focused on establishing a substantial scientific base for climate change, and in the process has set the tone for many government policies on climate change mitigation and adaptation across the globe (Arvai et al. *2*006). In Australia, the scientific case for climate change has only recently been accepted and developed as part of a national policy framework, largely following the election of the Rudd Labor government in 2007. Following international climate change rhetoric, Australia's policy debates have centred primarily on the mitigation of climate change, with an attempt to set up a Carbon Pollution Reduction Scheme (CPRS), including national emission targets, trading schemes and renewable energy targets. However, the CPRS remains the subject of vigorous political debate (see DCC *2*010) and, as of May 2010, the CPRS had been postponed until at least December 2012 (with further debate likely following the instalment of the new Labor Prime Minister, Julia Gillard, in June 2010). While action on strategies to mitigate the emission of greenhouse gases is currently stalled, the Australian government has invested considerable funds into climate change adaptation research as one of three pillars in the Australian government's approach to climate change (along with mitigation and global policy participation). The investment into climate change adaptation includes:

- the Climate Change Adaptation Program (represented partially by NCCARF), which identifies adaptation, mitigation, research and development (R&D) and awareness and communication as the four key areas for climate change management
- Australia's National Agriculture and Climate Change Action Plan (NACCAP)
- Water for the Future (a water supply adaptation framework) (see Section 2.4.1), and
- Australia's Farming Future (a program to specifically support the adaptive capacity of the farming industry).

Recently, the Australian government's approach to addressing drought impacts – particularly the NDP – was subjected to another government review across three key areas:

- an economic assessment of drought support measures by the Productivity Commission (2009)
- an assessment by an expert panel of the social impacts of drought on farm families and rural communities (Drought Policy Review Expert Social Panel *2*008), and
- a climatic assessment by the CSIRO and Bureau of Meteorology (BoM) of the likely future climate patterns and the current EC standard of a one-in-20-to-25-year-event (Hennessy et al. 2008).

As a result of these reviews, the government is now faced with a number of recommendations that, in line with strengthening focus on climate change adaptation, recognise more than previous efforts the critical importance of moving beyond crisis management towards supporting long-term, sustainable and coordinated drought policies. Importantly, the three reviews have reinforced the urgent need to rethink the NDP and particularly the EC provisions, which they argue are ineffective and inequitable, perversely encourage poor management practices, create unnecessary stress for families, and provoke resentment between farmers and farming regions based on inclusion criteria in the scheme (Drought Policy Review Expert Social Panel *2*008; Productivity Commission *2*009). The reviews

emphasise the urgent need to help farmers improve their self-reliance, preparedness and drought-management and/or adaptation practices.

In addition, the three reviews suggest that the government programs used to support an adaptive response need to affirm that prolonged periods of drought are natural and routine, as opposed to an unexpected event. It is also necessary to ensure that decision-making on drought response is undertaken independently of extreme drought events when public emotions and political effects are heightened. Similarly, drought adaptation strategies should not be shelved during periods of above–average rain. Drought- and flood-adaptation strategies need to coexist – one should not replace the other as the climate oscillates between its wet and dry phases. This coexistence of strategies is especially important given the anthropogenic climate change projections for Australia, which suggest that increases in the frequency and duration of droughts will be associated with increases in the frequency of short-lived but intense rainfall events (i.e. the type of weather that leads to flooding) (IPCC *2*007; Tubeillo *2*005).

The government is advised, as part of the reviews, to produce coordinated programs of support that move beyond overlapping and short-term initiatives towards long-term, sustainable, proactive and flexible approaches to drought and equitable distributions of drought-support services across regions. Drought policy needs to focus on early intervention by investing in and planning for the well-being of farming families and rural businesses under drought. For example, the Productivity Commission Review (Productivity Commission *2*009) suggests the replacement of the NDP with an extended version of Australia's Farming Future – which focuses on adaptation, research and building the skills of farmers. As another example of a way forward, from July 2010 to June 2011 the Australian government, in partnership with the Western Australian government, is conducting a pilot of drought reform measures in part of Western Australia that will test a package of new measures developed in response to the national review of drought policy. The measures are designed to move from a crisis management approach to risk management. The aim is to better support farmers, their families and rural communities to prepare for future challenges, rather than waiting until they are in crisis to offer assistance.

The recent drought policy reviews also recognised that similar recommendations on the NDP approach have been made previously but are still largely to be adopted. Intergovernmental agreement across all scales of government will be vital to finally advancing these long-running recommendations for drought policy. In addition, social dimensions of climate change adaptation and resilience will need to be escalated as part of revised drought policy. Examples such as the Drought Mental Health Assistance Program in New South Wales represent attempts to support communities in responding collectively to their social and emotional needs with respect to the current drought, and also to plan ahead for the next one (see Hart et al. *2*010). This program is consistent with the growing emphasis on the social and emotional dimensions of climate change adaptation, the subject of the 'Kenny Report' (Drought Policy Review Expert Social Panel *2*008), which recognises that better understanding of social impacts and outcomes will mutually support improved economic and environmental outcomes.

Policy is one key mechanism for driving mitigation and adaptation to climate change, and to extreme climatic events such as drought. Yet for policy to be effective, it needs to be flexible enough to persist through the various scales and sites of government, NGOs and businesses,

and as part of diverse local contexts within which policy aims may become confused and conflict with existing practice. Research on various forms of environmental management and adaptation consistently point to the significance of local governments and communities in achieving policy aims and effectively shaping policy to local contexts (O'Toole *2*001; Brunckhorst & Reeve *2*006; Hayes *2*008; Urwin & Jordan *2*008). It is imperative, then, that drought policies such as those to emerge from the abovementioned reviews set the tone for adaptation, yet provide the flexibility and openness to local contexts that will build the foundations for robust and effective drought-adaptation strategies and support programs.

2.4 Current water policy in Australia: preparing to exist with less

In recent years, existing Commonwealth, state and local government drought policies and adaptation strategies have been revised, with a view to preparing all sectors of the community to exist in a future with less water. This section outlines the main policy frameworks and programs governing water security and use across the three levels of government (refer to http://www.nwc.gov.au/www/html/7-home-page.asp for further details). Summaries relating to the broader regional policies, in which Mildura and Donald are located, are also provided.

2.4.1 Commonwealth government water policy and programs

The Australian government's national framework, Water for the Future, comprises the *Water Act 2007* (DEWHA *2*010b) and advances the previous implementation of the National Water Initiative (NWI *2*004) by the Council of Australian Governments (COAG). The framework recognises the four key priorities of: (1) taking action on climate change; (2) using water wisely; (3) securing water supplies and; (4) supporting healthy rivers (DEWHA *2*009). These priorities will be delivered through a $12.9 billion investment over a ten-year (2010–20) period of strategic programs, improved water-management arrangements and a renewed commitment to deliver a range of water policy reforms in rural and urban areas.

Several policies and programs within this national framework (DEWHA *2*010a) focus specifically on the Murray-Darling Basin (MDB), or have direct application to the MDB (which is relevant to both case studies, but in particular Mildura):

- The 'Driving Reform in the Basin' program supports contributions from the Australian Government to the operation and water reform functions of the Murray-Darling Basin Authority (MDBA).
- A total of $5.8 billion has been committed to the Sustainable Rural Water Use and Infrastructure Program to assist irrigation communities to upgrade irrigation systems, increase water use efficiency and make early adjustments in anticipation of caps to water extraction.
- 'Restoring the Balance in the Basin' has been allocated $3.1 billion to purchase water entitlements to return to the environment to protect or restore environmental assets.
- The Commonwealth Environmental Water Holder (CEWH) manages the water entitlements acquired by the Commonwealth to be used for environmental watering.
- Managed by the MDBA, the 'Living Murray Initiative' focuses on six icon sites of international significance in the improvement of the health of the Murray River.

- Some $200 million has also been committed to the 'Strengthening Basin Communities' program to assist local governments in the MDB to conduct community-wide planning for a future with less water and to deliver water-saving initiatives.
- The 'MDB Sustainable Yields' project, conducted by the CSIRO, provides estimates of current and future water availability in the MDB.
- The development and uptake of smart technologies and practices in water use across Australia has been accelerated through 'Water Smart Australia' projects, including the Wimmera Mallee Pipeline project (completed April 2010).
- The efficiency of water registers, transaction and market information functions will be improved by the development of a National Water Market System (NWMS) as part of the NWI (NWI *2*004).
- The newly released (October 2010) Murray-Darling Basin Plan (draft), and associated Sustainable Diversion Limits are projected to significantly shift water allocation towards the environment at the expense of irrigation. This has potentially profound effects on the viability of irrigation enterprises and other industries that rely on water from the Murray, but was not available for review at the time of writing this report.

2.4.2 State government water policy: Victorian context

Enacted by the Victorian government in 2004, Our Water Our Future is a long-term plan detailing 110 actions for sustainable water management, securing water supplies and sustaining growth over the next 50 years. In 2007, the Our Water Our Future plan provided for a new desalination plant in Melbourne, modernisation of the irrigation system in the 'food bowl' (i.e. the Northern Region of Victoria, discussed further in Section 2.4.3), expansion of Victoria's water grid, and increased recycling and conservation of water (DSE *2*007). The Victorian government's Growing Victoria Together prioritises the need to cease the degradation and increase the restoration of Victoria's natural resources.

Figure 2.2 illustrates the four regions encompassed by the Victorian Government's Our Water Our Future regional Sustainable Water Strategies (SWS) (http://www.ourwater.vic.gov.au/programs/sws). The SWS are run by the state government, but with considerable regional stakeholder engagement. The Northern Region of Victoria (which includes Mildura) and the Western Region (which includes Donald) contribute significantly to national agricultural production. Based on the gross value of agricultural production, the Northern Region is mostly irrigated agriculture with some dryland farming while the Western Region relies almost totally on rain-fed surface water (45 per cent of total water supplied) and groundwater (52 per cent), with the balance made up from alternative sources such as recycled water (DSE *2*010).

The SWS were developed via partnerships between the DSE, water corporations, Catchment Management Authorities (CMAs) (figure 2.3) key regional stakeholders and community and interest groups. The strategies outline the enhancement of policies and the delivery of programs as mechanisms for more efficiently managing the available water supply whilst protecting and reducing risks to agriculture, the environment and communities in preparations for a future with less water (DSE*, 2*010).

Source: http://www.ourwater.vic.gov.au/programs/sws.

Figure 2.2 The four regions encompassed by the Victorian government's Our Water Our Future regional Sustainable Water Strategies (SWS)

Figure 2.3 Victorian Catchment Management Authorities (CMA)

The Future Farming Strategy, launched by the Victorian Department of Primary Industries (DPI) in April 2008, while not specifically focused on water policy, is another state-led policy initiative aimed at improving the productivity, competitiveness and sustainability of farm businesses (http://new.dpi.vic.gov.au/about-us/publications/future-farming). Future Farming outlines new support and services for farm businesses and rural communities, to help them make decisions about their future and meet the challenges of uncertain prices and demand, climate change and competitive global markets. The Future Farming strategy will invest $205 million over four years across seven broad Action Areas to build a strong and secure future for the farming sector. The Action areas are:

- *Action 1:* Boosting productivity through technology and changes in farming practices
- *Action 2:* Building skills and attracting young people to farming
- *Action 3:* Understanding and managing climate change
- *Action 4:* Strengthening land and water management
- *Action 5:* Helping farming families to secure their futures
- *Action 6*: Developing new products and securing new markets, and
- *Action 7:* Transporting products to market.

2.4.3 Regional government water policy: Northern and Western Regions of Victoria

As mentioned (and illustrated in Figure 2.2) the Northern Region SWS is relevant to Mildura and the Western Region SWS is relevant to Donald. Given the significance of their contribution to national agricultural production, several strategies have been developed to address water supply security in these regions, including:

- Sustainable Water Strategies: as discussed, these are state-led strategies but with significant regional/local stakeholder engagement
- Loddon Mallee Regional Strategic Plan (RMCG, 2009a 2009b): As part of Phase 2[4] of the Loddon Mallee Regional Strategic Planning project, the challenges faced by the Northern Loddon Mallee Region (encompassing Mildura and Donald) are defined as a result of the reliance on industries dependent on rainfall and/or water allocations (RMCG 2009a). The drying climate was identified as the major and continuing driver of change in the Northern Loddon Mallee Region[5]. The region has been affected by drought conditions since 1994, with no recharge to groundwater since 1993. Farmers have faced increasing financial, physical and mental pressures as a result of lower rainfall and decreasing water allocations. These challenges have resulted in farmers spreading their risk through diversification of their enterprises; locations and times of sale; drawing down equity; delaying retirement plans; and reducing spending. These have resulted in a reduction of access to services and social activities. Three of the 10 aspirations identified during the Loddon Mallee Regional Strategic Planning project relate directly to water security and the irrigated and dryland agricultural and horticultural sectors in the region. In order to face the challenges of a drier climate, it was determined that the region must develop a more diverse economic base to reduce the reliance on agricultural and horticultural sectors. In response to concerns raised during community workshops as part of the Loddon Mallee Regional Strategic Planning Project, the following four regional priorities were identified: (1) establish a social contract (i.e. transitioning away from funding models) with inland rural communities to increase access to services and social opportunities; (2) develop a robust and diverse economic base so as to reduce the reliance on rainfall and water allocations; (3) connect people and services through improvements to transport and

[4] As of October 2010, a Phase 3 has been added to the Loddon Mallee Regional Strategic Plan (developed by Sinclair Knight Merz); however, at the time of writing the contents were not publicly available and so have not been discussed in this report.

[5] The newly released (October 2010) Murray-Darling Basin Plan (draft), and associated Sustainable Diversion Limits (discussed in Section 2.4.1), are probably as (or more) influential now as the drying climate, especially for areas such as Mildura that are heavily reliant on irrigation.

telecommunications; (4) support diversity through coordination and the sharing of experiences.

- the Wimmera Southern Mallee Drought Report (RMCG *2*007): In response to the current drought (the Big Dry) the Wimmera Development Association (WDA), on behalf of several local municipalities including Buloke Shire (which includes Donald), commissioned a report to assess impacts associated with the Big Dry and to make recommendations for the future of the region. Recommendations were classified into three categories: immediate response to drought; medium- to long-term response to drought; and overall regional growth (RMCG *2*007). Several of the objectives set by the steering committee mirror those for this project, resulting in common themes, focuses and recommendations.
- Regional Catchment Strategies, developed by the state's 10 statutory CMAs (Figure 2.3) as 'regional sustainability blueprints', are also emerging. This network governance approach has transformative potential but there are significant challenges ahead: the complex task of aligning of national, state, catchment and local government strategies through an outcomes focus; the scarcity of mechanisms and tools to assist in translation of strategies into integrated investment priorities; gaps in knowledge and understanding of natural resource management problems; limitations in the capacity of regional and local bodies; and getting the policy tools right within the framework (Whittaker et al. 2004).

Despite these and many other drought-adaptation strategies and sources of information, SKM (2009) identified that a major constraint preventing Australia's 56 natural resource management (NRM) regions from incorporating climate change adaptation into their planning and programs was not access to available and relevant climate change information, but rather a lack of understanding of potential adaptive responses and their effectiveness. This limitation was exacerbated by minimal specialist skills and a limited number of resources (supporting the earlier findings of Whittaker et al. *2*004). Clearly, the agricultural, economic and social impacts of drought are highlighting and accelerating changes in the agricultural sector and demographic makeup of regional and agricultural areas. This creates a complex and challenging environment in which to undertake drought adaptation.

The next section elaborates on the local contexts of inland rural communities as settings in which drought and future climatic change will have significant adverse impacts. It is vital to comprehend these specific contexts in order to understand how policies of drought mitigation and adaptation might work.

3. Drought: the inland rural community context

Small towns and regional communities in rural Australia[6] are undergoing significant changes. A continuing loss of young people and an ageing population have been linked directly with declines in economic viability, business opportunities, agricultural production, health status, educational attainment and key services (Forth *2*001). Many of these small inland towns, largely dependent on agriculture, have populations on the cusp of viability. Within these already strained local contexts, it can be difficult to identify the exact impacts of climate-related extremes such as drought from the longer-term socio-demographic trends contributing to decline (Drought Policy Review Expert Social Panel *2*008). Although the relationship between drought and decline is difficult to disentangle, it is clear that drought has created recurrent and ongoing damaging effects on the viability and well-being of rural communities, many of which will be exacerbated by projected impacts of anthropogenic climate change. It is therefore crucial to research rural communities as the settings in which the impacts of drought are often the most severe, and where government programs addressing drought will be targeted. It is in these drought-sensitive locations that insights into what to change, what to cease, and how to think and learn about drought are most likely to be developed (Golding & Campbell *2*009).

Many rural communities not only experience significant environmental changes under drought, but also undergo changes to their culture and identity. Such communities often exhibit strong social connections, community values and local knowledge that can present both stubborn and productive contexts within which to deliver drought policies and develop on-the-ground adaptation practices (O'Toole *2*001; Leahy & Anderson *2*008). In the following section, the contingencies of drought in rural communities are discussed from environmental, agricultural, economic and socio-cultural perspectives. First, the availability and supply of water within the case study areas is discussed in broad terms. Second, in the context of limited water supply, the report outlines the impacts of drought on agricultural production in inland (rural) towns, the economic impacts on farming businesses and rural employment, and the socio-cultural impacts on farming communities, families and individual well-being.

3.1 Issues of water supply and availability in inland (rural) towns

The issues surrounding water supply and availability are crucial, but very different, for the two case study sites. Mildura is almost entirely dependent on water from the Murray River for its town water supply. Local rainfall is insufficient to sustain town water supply, and the only significant local groundwater resource is highly saline. Mildura town water is a high-security resource, and only in the most recent stages of the Big Dry were severe water restrictions in place. The implications of severe water restrictions for Mildura go beyond the farming sector (e.g. the amenity of the town, one of the drawcards for tourism, suffers significantly if it is not possible to irrigate public parks and gardens).

Donald is almost entirely dependent on water piped from Grampians storages (via the recently completed Wimmera Mallee Pipeline) for its town water supply. The Pipeline was

[6] In this report, we define small regional towns in rural Australia as those consisting of population levels of approximately 50,000 or less, which contribute disproportionately to Australia's agricultural productivity.

constructed to reduce high leakage and evaporation losses associated with the previously used earthen channel system. Due to these loss reductions, the Pipeline has, to some degree, helped secure town water supplies and also some of the water used for stock and domestic use in nearby rural areas. It should be noted that Donald was on the verge of emergency supplies prior to completion of the Pipeline. Water for amenity use (i.e. irrigated parks and sporting fields) is primarily sourced from key local lakes (e.g. Lake Buloke – see Figure 6.1 – and Lake Batyo Catyo – just below the bottom left-hand corner of Figure 6.1), which have been dry for most of the last decade; hence water from the Pipeline has been used for this purpose.

With increasing water supply pressures and the exacerbating effects of drought, rural communities have been confronted with a series of devastating impacts, which in some cases threaten the future viability of small inland (rural) towns. It must be recognised that issues associated with water supply and security to small inland (rural) towns are different from issues associated with water supply and security for agriculture – not everyone in a small inland (rural) town is a farmer. In this project we concentrate on the issues associated with water supply and security for agriculture and the resulting impacts on the 'rural community' as opposed to the 'rural town'. Investigation into the impact of drought on inland towns (as opposed to rural communities) and the dependence (or not) on agriculture of people in inland towns – especially large centres like Mildura – is required, but is beyond the scope of this project.

3.2 Agricultural impacts: macro-economic change and the farming sector

The agricultural sector in Australia has undergone significant changes in recent years, although many are *not* directly related to recent drought events. The contribution of the agricultural sector to the Gross Domestic Product (GDP) has decreased significantly over the last 50 years, with agricultural exports falling from 24 per cent of all exports in 1974–75 to 13 per cent of exports in 2007–08 (Estlake *2*006; ABARE *2*008a). Despite this trend, agricultural output has almost doubled since its 1974–75 level (albeit showing high variability over time, and between drought events and industry sectors) (ABS *2*009a).

Australian Bureau of Statistics (ABS) figures also show a decline in the number of farms from 200 000 in the mid-1950s to just over 110 000 in 2000. However, over the same period the average farm size increased from 2000 hectares to almost 4000 hectares (ABARE *2*002). The key drivers of these changes are the increasing reliance on export markets in light of small domestic markets (around 61 per cent of all agricultural output is exported) and decreasing terms of trade (defined as the ratio of the index of prices received by farmers to the index of prices paid by farmers), or simply, the total profits gained through export minus the costs spent on imported materials to produce those exports (Roberts et al. *2*009). As the cost of imported materials has increased, the imperative has been to increase productivity faster than increases in demand. This scenario has a long history in agriculture, and has meant that farms have gradually become larger, primarily through farm amalgamations. As Table 3.1 shows, the largest farms capture the greatest agricultural share of outputs with this share increasing from 1996–97 to 2005–06. Such increases in productivity on larger farms are supported by an ability to redirect resources into technological advances, to capture economies of scale, and to increase real income flows (ABARE *2*008a*, 2*008b). As Barr

(2005) states, the phrase 'get big or get out' has generally summed up this trend in agriculture, with the inevitable consequence of a reduction in the number of and increase in size of individual farms.

Table 3.1: Output concentration in agriculture* (% share of total value of agricultural operations)

	1996–97	2005–06
Largest 30%	76.5%	82%
Smallest 50%	9.8%	7.2%

*Farms with an estimated value of agricultural operations (EVAO) greater than $5000
Source: ABARE *(2*008b).

Employment levels have also declined across the Australian agricultural sector, decreasing from approximately 430 000 in 1966–67 (9 per cent of total national employment) to 360 000 in 2007–08 (3 per cent of total employment) (ABS *2*009b). Throughout this period, employment was also highly variable in response to short-term factors such as drought, while longer-term factors such as the rising real price of labour, increasing technology, increasing farm size and the competition for labour in other sectors of the economy were responsible for the continual downward trend. In addition, off-farm incomes (including off-farm wages and salaries, investment dividends, rents and other business incomes) have increased in real terms since the 1970s for broad-acre farmers, and continues to do so (ABARE *2*008b). This increase suggests a greater shift towards income diversification, which has been viewed in the agricultural sector as a fundamental strategy for coping with the recent economic impacts of drought and changes to the agricultural sector (ABARE *2*008b) – albeit often with detrimental social effects (see Section 3.2 for further discussion).

While these over-arching changes within the agricultural sector (i.e. to farm size, farm numbers, agriculture related employment and off-farm income) cannot always be related to drought, there are a number of trends that have been attributed directly to drought. For example, as a result of drier than average conditions in 2002–03, agricultural output dropped by almost 30 per cent and, as a result, Australia's GDP growth was reduced by approximately 1 per cent (Adams et al. *2*002). These macro-economic effects are significant when considering that the farm sector now accounts for only 3 per cent of GDP (ABS *2*009a). In addition*, 2*002–03 was associated with the largest declines in employment on record (note that reliable records only existed for two previous droughts: 1982–83 and 1994–95), costing around 100 000 jobs, with almost three-quarters of these jobs lost in the grain, sheep and beef cattle farming industries (Lu & Hedley *2*004).

Despite the challenges confronting the agricultural sector, Australian farmers are among the most efficient and least dependent on government support in the world, with government subsidies and support to primary producers accounting for just 4 per cent of Australian farmers' income in 2001 (ABARE *2*008b). In 2007–08*, 2*3 per cent of farmers received EC drought assistance totalling over $1 billion, with some receiving income support continuously since 2002 (Productivity Commission *2*009). Yet, as shown in Table 3.2, most farms in drought-declared (i.e. fitting the EC definition) regions are sustained without government assistance. On average, 68 per cent of dairy and broad-acre farms received no drought (EC) assistance from 2002–08. However, it should be noted that low levels of tax and high tax incentives for the agricultural sector are not taken into account in these measures of self-

sufficiency and assistance (see ATO *2*008). In addition, farmers who did not receive assistance also generated higher farm cash incomes, had higher levels of off-farm investment and higher off-farm wage income, and faced lower debt levels than farmers who did receive EC assistance (Productivity Commission *2*009).

Table 3.2: Drought assistance recipients*

	2002–03	2003–04	2004–05	2005–06	2006–07	2007–08	Annual Average
Farms on EC payments	9 094	12 508	11 143	19 243	21 791	25 517	16 549 (32%)
Farms in EC areas not on EC payments	46 696	41 980	34 971	28 597	25 378	31 438	34 843 (68%)

*Only includes broad-acre and dairy farms.
Source: Productivity Commission (2009).

Overall, analysis of the agricultural sector suggests that, despite significant challenges, the sector has been able to respond and adapt, with varying success, to changing environmental and economic conditions. However, it appears that the longer drought conditions continue, the greater the number of farms on EC payments, suggesting a correlation between decline across the sector and drought. This correlation has been most evident in the context of the recent drought event (the Big Dry), which has been associated with prolonged and severe rainfall deficits and also with a much higher demand for water than the two previous comparable droughts – that is, the Federation and World War II Droughts (Verdon-Kidd & Kiem *2*009). As a result, the Big Dry has stretched agricultural resilience to the limits of viability in some cases (Productivity Commission *2*009). Historically, though, there has been relatively rapid recovery in the agricultural sector following drought, which provides some confidence with regard to coping with the impacts of drought under future climatic changes. However, it must also be realised that under anthropogenic climate change droughts are projected to be more frequent and severe, and that factors beyond drought (e.g. the global economy, rural demographics, water trading markets) are very different now from what they were in the past.

3.3 Economic impacts of drought: farming households and rural communities

The effects of drought on the agricultural sector as a whole are evident. Yet these sector-wide impacts also resonate across individual farms, farming (and related) businesses, households and rural towns. Consequently, the negative economic impacts of drought are often experienced through the significant financial hardship of families, the deterioration of household incomes and the reduced economic base of rural towns. These effects on households, families and rural communities are due to the close connections between farming businesses and families in Australia, with the overwhelming majority of farms in Australia traditionally family owned and operated (Botterill *2*000). These interconnections can multiply the economic impacts of drought across communities.

Despite the inseparable nature of agriculture and family farming businesses in Australia, there are surprisingly few studies detailing the impacts of drought on financial living standards and employment at the household level. Existing studies, as outlined in the previous section,

generally produce analysis and estimates of the impact of drought at an industry, or at best regional, level.

In recent estimates, the Australian Bureau of Agricultural and Resource Economics (ABARE) found that the current drought reduced farmers' average income by $29 000 between 2005 and 2007. They also found that farms with negative cash income increased from 24 per cent to 42 per cent over the same period, and that employment had declined across the sector (ABARE *2*008b). Farm businesses have been forced to cut costs as a result, most often through restricting labour and local spending and investment. Table 3.3 shows that the experience of financial hardship throughout drought particularly affects farmers and farm workers. The loss of employment in agriculture, resulting in now severe shortages in skilled labour, also contributes to a more general loss of employment and services in rural towns (Drought Policy Review Expert Social Panel *2*008). This in turn contributes to the loss of younger people, who move away to pursue economic and educational opportunities in regional centres and other competing industries (Productivity Commission *2*009). Hence the financial hardships experienced through drought not only affect farming families but also significantly impact local rural businesses and services (Drought Policy Review Expert Social Panel *2*008).

Table 3.3: Experience of financial hardship by drought status (defined by rainfall received) and type of employment (% of each employment group)

Drought Status	Severe drought	Drought	Below average rainfall	Above average rainfall
Farmers	45%	45%	41%	35%
Farm workers	36%	25%	28%	23%
Employed but not in agriculture	23%	24%	22%	22%

Source: Edwards et al. (*2*009).

In light of these shifts in farming income and the economic base of rural towns, there has been a noted increase in secondary or off-farm household income. Farming families are diversifying their economic base by finding employment in other sectors and regional centres – though it should be noted that off-farm employment opportunities can be quite limited in more remote farming areas without any nearby major town. In many cases, these efforts to diversify income are an effective adaptation strategy to changing farming incomes; however, such practices are not yet acknowledged adequately in policy or government support arrangements (Drought Policy Review Expert Social Panel *2*008). Indeed, increasingly diversified farming incomes combined with the intertwined nature of farming families, businesses and rural towns render assessments of farming families' economic well-being extremely difficult. These challenges are multiplied by the continual changes in farming incomes between years, not just due to drought but also as a the result of other adverse weather events, input pricing and commodity price fluctuations (Edwards et al. *2*009) – in recent seasons, insect outbreaks (e.g. locust plagues) have also been a serious issue. In addition, farming families are most often asset rich and income poor, and receive significant tax concessions, welfare support and in-kind consumption (e.g. family consumables labelled as business costs) (Botterill *2*000). These characteristics also combine with broader economic and social declines in rural and regional areas that are both long term and largely independent of drought events, though exacerbating their impacts (Barr *2*005).

In a study of economic impacts of drought on households, Edwards et al. (2009) avoid some of these challenges of analysis by examining 'perceived' economic impacts using the Rural and Regional Families Survey conducted by the Australian Institute of Family Studies (www.aifs.gov.au/institute/research/rural-families.html). The survey encompasses a large sample size (approximately 8000 people living in rural and regional Australia), and includes areas experiencing severe drought conditions, moderate drought conditions, average rainfall and above-average rainfall. This allows useful comparisons of perceived economic well-being of families across rural and regional Australia. The analysis confirms that drought impacts significantly on the experiences of financial hardship and deterioration in household financial position. For example, 42 per cent of farmers stated that if drought conditions persisted, their property would not be viable in the short term (i.e. one to two years), with a further 13 per cent stating that their property would not be viable in the longer term (i.e. five years or more). However, 47 per cent of farmers who were experiencing drought said that their property was not viable even under normal weather conditions – assuming that there is such a thing as 'normal' weather in Australia. Edwards et al. (2009) suggest that this reveals farmers' increasing reliance on off-farm incomes, and also confirms that the subjective definition of drought is not straightforward. Indeed, the survey makes clear that the proportion who said they were currently in drought (61 per cent) is much higher than the proportion who, according to rainfall deficits, are currently in drought (44 per cent). Therefore, the subjective definition of drought is not always directly tied to the experience of hardship, with farmers frequently attributing deficient farming outputs to drought without also assessing the impact of farming and business practices.

The most recent review of drought policy and relief programs recognises some of these key economic challenges of drought. Previous shifts in drought policy attempted to address these challenges by advancing farmers' self-reliance and business-management skills, largely through ad hoc and inequitable crisis-response, structural adjustment schemes and poorly managed welfare support (Botterill *2*000). Yet farming poverty is not new: it has been a consistent feature of Australian agriculture (Mauldon & Schapper 1974; Rolley & Humphreys 1993). It is only under pressures of extreme drought that many of these economic issues come to the fore, both in the experiences of farming families and in the responses of government.

Increasingly, however – as mentioned in Section 2.3 – it is acknowledged that a 'crisis or emergency response' to drought can produce a negative long-term economic impact on farming practices and on the perceived financial viability of farmers, in both drought and non-drought conditions (Botterill & Wilhite *2*005; Edwards et al. *2*009). As a result, recent reviews of drought policy recommend social and economic investment in farming businesses and families rather than crisis-based welfare (i.e. maintaining drought-adaptation strategies through all climatic conditions, rather than just during extreme drought events). Such an approach advocates a more productive, equitable and long-term government response to supporting the economic viability of farms, farming families and the rural towns in which they reside (see Drought Policy Review Expert Social Panel *2*008; Productivity Commission*, 2*009), and also prevents sustaining agricultural businesses that are unviable without financial assistance.

3.4 Socio-cultural impacts of drought: communities, families and well-being

The above discussion of agricultural and economic impacts of drought hints at the complex socio-cultural contexts and challenges confronting rural communities. It is not only that drought is connected with certain socio-cultural contexts, but also that it is within the already changing social and cultural contexts of rural and regional towns that drought events and experiences most often unfold. Although making up a relatively small segment of Australia's population, farmers manage the majority of the land. Examining the changing socio-cultural contexts and futures of these farming communities is critical for shaping more effective management of natural resources and the formulation and delivery of rural policy – particularly under the challenges presented by natural and anthropogenic climate changes (Barr *2*005).

As discussed previously, the already changing socio-demographic contexts of rural communities are providing serious challenges to the viability of some inland (rural) towns. Overall, the population of farming regions is declining, with the fastest population declines in Australia experienced in rural areas (Barr *2*005; BRS *2*008). Population decline is most evident in indicators such as the closure of schools and businesses (Forth *2*001). Yet emphasis also needs to be given to other indicators of decline, such as an ageing population (with the majority of rural populations aged between 35 and 64 years), decreasing family incomes, increasing proportion of the rural population with low educational attainment and opportunities, a drifting workforce and skills to regional centres and cities, and a deteriorating quality of life and well-being in drought-affected rural communities (Forth *2*001; BRS *2*008).

In the contexts of close-knit rural towns dominated by family farms, these shifting socio-demographic profiles can seriously confront the identity, values and connections of communities. Many of these same communities were once the centre of vibrant local agricultural production, resource distribution, communication and transport, yet are now faced with a slow decline and in some cases an impending extinction (Forth *2*001). In some towns, this has inspired local response in the forms of economic and community development initiatives to stave off population decline, with varying degrees of success. In other locations, the attraction of a rural lifestyle and landscape (e.g. hobby farms, rural residential properties, bush retreats) has encouraged migration of usually retired city-dwellers, often referred to as 'tree-changers', which has stabilised or sometimes increased populations in rural areas – a trend that remains highly dependent on the protection of amenity features, landscapes and place identity (Barr *2*005) and does nothing to halt the ageing of the population in rural areas. In other rural locations, however, the decline of population continues with some respite from inward migration of low-income families and new immigrants seeking affordable housing – a trend that has created its own social issues for rural areas in terms of service provision and support (Barr *2*005). In many instances, it can be difficult to separate these general socio-demographic trends from the social impacts of drought in rural areas. However, it is clear from previous studies that drought exacerbates social decline in these areas (ABARE *2*008b; Drought Policy Review Expert Social Panel *2*008).

The duration, insidiousness and pervasiveness of drought events (as opposed to other major climatic extremes such as floods, bushfires or cyclones), and the characteristics of the geographical areas, businesses, communities and families commonly affected by drought, results in unique social impacts. Rural and regional towns and farming communities most often constitute the majority of drought-declared areas. These areas and the families who

reside in them are commonly distinguished by specific social ideals and norms that mean that they experience drought differently from others (Crosby 1998; Drought Policy Review Expert Social Panel 2008), including:

- the intimate connection between the farm as a place of work, residence, family tradition and identity
- a desire to pass on the farm to the next generation
- a high regard for self-sufficiency and independence
- the maintenance of traditional gender roles, and
- negative attitudes towards alternative occupations and non-farming lifestyles.

In Australia, these characteristics of rural towns and farming practices are deeply and historically ingrained in 'country-mindedness' (Aitkin 1985), or 'agrarianism' (Botterill 2009) – whereby agricultural pursuits are viewed as inherently worthwhile and wholesome, while non-farm life is framed as artificial and morally inferior. While not always apparent, this agrarian sentiment inherently shapes the identity of rural towns and farming life, mythologising through history the notions of 'rural battlers' up against the 'harsh' and 'unpredictable' Australian climate. As Williams (2003: 42) argues, 'the critical need is not to drought-proof the inland, for that is impossible. It is to myth-proof Australians'.

There remains a significant connection between these ideals of rural life and farming, and how drought is experienced. These key experiences of drought can be identified from existing social analyses of rural and regional areas. In 2008, the Social Atlas of Rural and Regional Australia (BRS 2008) outlined the common impacts of drought on family life including:

- strengthening migration away from rural and regional areas, particularly by young people
- affecting membership of households and the availability of family members to work on-farm
- decreasing support and encouragement for young people to take over farms
- increasing pressure on women to work off-farm to supplement on-farm income, thus challenging traditional gender roles
- expanding family workloads on the farm due to the costs of paid labour, and
- erosion of community networks as farm families' social interaction decreases, contributing to feelings of social isolation.

These trends are supported by demographic data that indicate the number of farming families in Australia declined by 9 per cent from 2001 to 2006, and farming households' adjusted average weekly income of $605 was less than the national average of $649 (e.g. ABARE 2008b; ABS 2009b). Lower incomes and increasing debts associated with drought and commodity price pressures subsequently extend family workloads, with many children working both on and off the farm to the detriment of other educational and training opportunities. Many schools and educational providers are noting the decrease in student numbers, which in some cases has resulted in the closure of schools and other educational providers (Drought Policy Review Expert Social Panel 2008).

Women have also taken on more labour responsibilities, working both on- and off-farm to contribute to the household income and to the survival of the farm. This is despite women

often retaining a secondary status to men as part of traditional farming families and communities (Alston *2*006). While the diversification of income sources can be an effective adaptation measure in many cases, the time spent away from families, farms and communities can result in a lack of family and community cohesion and feelings of isolation. Families are often the first line of defence against the challenges of drought, with women and children bearing the brunt of many hardships (Stehlik et al. 1999).

To add to these family pressures, the farming demographic continues to age with the proportion of farmers over 65 years of age increasing by 3 per cent from 2001 to 2006, while the proportion of those aged under 35 years continues to decrease (ABARE *2*008b). Older farmers may be reluctant to retire or pass their farms on to younger generations, as this is often seen as an acknowledgement of a loss of independence and strength synonymous with the 'farmer' identity. In addition, many of the older farmers who remain on farms may be inflexible in their farming practices, have serious ailments and have relatively low levels of formal education, which can contribute to a lack of resilience and adaptability in confronting the future (Drought Policy Review Expert Social Panel *2*008).

Moreover, family succession of farms has been distorted by drought. Traditionally, farmers who retired often remained on the farm as younger generations undertook the day-to-day operations and management of farming activities. Yet the costs of supporting two generations on one farm are increasingly difficult under the financial pressures of drought – a trend that is compounded by the general exodus of younger generations out of rural areas and farming life. In addition, increasing debts associated with drought, including the cost of maintaining water supply and adaptive technologies on farms, inhibits the ability of farmers to retire and pass on the farm, with concerns about passing on debt to future generations. This change in family succession is also exacerbated by current government drought-support and exit strategies, which in some cases prevent family takeover of farms with provisions that the farming land not be used for five years after exit (see further discussion and details in Sections 5 and 6).

The effects of changing family life on the broader rural community are also increasingly evident. The social review of drought impacts (see Drought Policy Review Expert Social Panel *2*008) indicates that drought often results in rural families focusing on their own circumstances and stresses, which can impede the ability of the local community to work together, to engage in community activities including recreational, sporting and volunteering activities, and to engage in local spending and support of local services – the aspects that help keep rural communities alive, well and prosperous. Moreover, there is some indication that rural areas can become split between farmers and non-farmers, with many non-farmers feeling isolated from services and programs directed at farmers (Drought Policy Review Expert Social Panel *2*008). These factors can combine to seriously erode the social capital and vitality of rural towns.

Rural people's experiences reveal a complex and entrenched set of concerns and challenges that often go well beyond the immediate effects of drought. Financial and personal concerns, community activity, access to services and support, land and environmental management decisions are intertwined and equally important, making it difficult to address any one issue. In addition, these contexts often create stresses that impact on decision-making, planning and adaptation for the future.

Together, these rural experiences of drought are beyond the scope of ad hoc government responses. Indeed, the ad hoc nature of government and NGO responses to date have created disproportionate drought-support networks, with a lack of services in some areas and an overlap and excess in others – in many locations, cynically labelled as the 'drought industry' (Drought Policy Review Expert Social Panel *2*008). This scepticism and lack of trust of government and support services in rural areas is becoming a major issue for service providers (see Leahy & Anderson *2*008). In the social services sector particularly, the lack of trust of government, combined with the entrenched notions of rural self-sufficiency, has meant that many farmers and their families in critical need of support are not seeking out help, or in some cases rejecting assistance at the expense of their families' health and well-being (see further discussion in Sections 5 and 6).

At the same time, access to services – particularly health services – remains an ongoing difficulty confronting rural and remote areas, which compounds the stress on health and well-being experienced under conditions of drought. Women and non-farmers in particular are often overlooked as part of government programs, and can experience severe declines in health and well-being as a result. The extra physical and mental health services provided during drought have proven to be ad hoc and often ineffective in dealing with rural families and communities as a whole, and in providing the basis for planning for future droughts and building the capacity of rural people to identify health risks at an early stage.

The Drought Policy Review Expert Social Panel's (2008) review of drought policies argues that there needs to be a renewed focus on long-term sustainable approaches, and early intervention and prevention across all government services – particularly health services – to better support families and rural communities. As part of this type of drought policy, the review draws on the assertions of academics working in this area, which call for a change in thinking around drought – a shift that will be vital to developing and maintaining effective government policies and programs (e.g. Gibbs *2*006; Anderson *2*008; Botterill *2*009). While the work has been done academically in redefining myths of drought and rural life, it is crucial that these shifts in understanding are incorporated and established in government policy. Improved understandings of natural climate variability, anthropogenic climate change, dryness and farming investment, as opposed to drought as an unusual climatic event that requires emergency welfare, are proposed as one way to change thinking around conditions of drought and provide more effective and sustainable services to support farming families (see Gibbs *2*006; Drought Policy Review Expert Social Panel *2*008; Botterill *2*009). This approach recognises that climate variation and drought are normal in Australia, as are production and income fluctuations, and the associated stress on farming families (Caldwell & Boyd *2*009).

The significant challenge, then, is to design programs to directly address the social dimensions of well-being essential to farmers and farming communities, to improve their capacity to live with dryness, and to support better environmental and economic outcomes. Rather than solely treating problems with rafts of economic adjustments, this type of investment in farmers and farming families (not just farming businesses and the agricultural industry) will avoid the emotive imagery and political pressures of extreme drought events by providing incentives for economically and environmentally responsible farming under variable climatic conditions.

It is vital to understand the complex and entrenched social norms and problems associated with rural areas in drought in order to build and strengthen the adaptive capacity of rural communities. As Gray and Lawrence (2001) note, the traditional rural identity of the 'battler'

may not be enough to equip rural communities to survive the onslaught of climatic and socio-economic changes confronting rural Australia. These rural areas are confronting extreme uncertainty and, in some cases, an identity crisis that threatens their existence. Rural areas thus present a series of challenges and opportunities for drought adaptation. While they may sometimes present conservative and inflexible conditions for drought adaptation and change, small rural towns can also be productive and creative hubs, informed by traditional knowledge, trust and strong community bonds, which may provide the techniques, skills and strength by which to create productive agricultural and social systems in the face of future changes.

4. Methodology

This study draws on the literature discussed in the previous sections to formulate and direct a range of climate analyses, projections and socio-economic research for two case study sites: Mildura and Donald in Victoria, Australia (see Figure 1.1). While both towns are located in regional Victoria, they have differing rainfall and climatic patterns, water supplies, resource-management policies, economies and demographic profiles. These rural communities have also experienced varied social and economic impacts as a result of the current drought. The use of case studies provides the capacity to examine the complexities of drought as part of dynamic social and economic settings (Golding & Campbell *2*009). In addition, while the case studies are adopted as exemplars of the local impacts of drought, they are also used to provide fundamental insights into what is occurring in other drought-affected locations in Australia (and perhaps globally). As adaptation is needed in the face of existing climate variability and future climate change, a place-specific study such as this, combining both qualitative and quantitative approaches, allows for a holistic consideration of the complex issue of drought, how it is manifested and mitigated locally, and how these experiences may assist in supporting other rural locations in their adaptation to drought.

4.1 Historical climate analysis

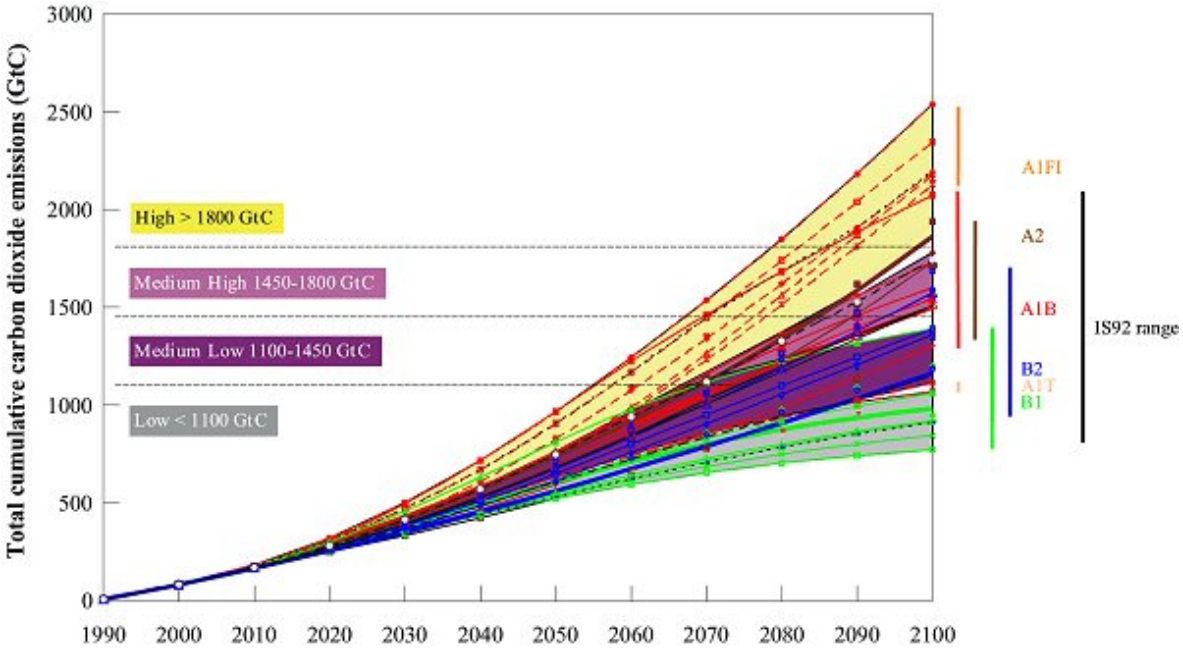
The historical climate analysis was performed using observed, station-based (as opposed to gridded) rainfall, temperature and evaporation data obtained from the BoM. The stations from which data were obtained were chosen on the basis of length of record, quality and completeness of the data, and location (i.e. stations as close as possible to the two case study sites).

4.2 Projected impacts of anthropogenic climate change

Human induced global warming is driven by long-lived greenhouse gases (e.g. water vapour, carbon dioxide, methane, nitrous oxide, ozone and chlorofluorocarbons). Emissions of greenhouse gases due to human activities have grown by 70 per cent between 1970 and 2004 (IPCC *2*007). It is generally acknowledged that, regardless of the actions that we take now to reduce the emission of greenhouse gasses, changes to our climate are still likely because about half of the carbon dioxide emitted by human activities is absorbed by the oceans and biosphere, leaving half in the atmosphere where it has a lifetime of approximately 50–100 years. In 2000, the IPCC published a series of projected greenhouse gas emissions scenarios that could be used to assess potential climate change impacts. The Special Report on Emission Scenarios (SRES) (IPCC *2*000) grouped scenarios into four families of greenhouse gas emissions (A1, A2, B1 and B2), which explore alternative development pathways, covering a wide range of demographic, economic and technological driving forces (Figure 4.1):

- A1 assumes a world of very rapid economic growth, a global population that peaks mid-twenty-first century and the rapid introduction of new and more efficient technologies. A1 is divided into three groups, which describe alternative directions of technological change: fossil intensive (A1FI), non-fossil energy resources (A1T) and a balance across all sources (A1B).

- B1 describes a convergent world, with the same global population as A1, but with more rapid changes in economic structures towards a service and information economy.
- B2 describes a world with intermediate population and economic growth, emphasising local solutions to economic, social, and environmental sustainability.
- A2 describes a very heterogeneous world, with high population growth, slow economic development and slow technological change.



Source: IPCC (*2*000).

Figure 4.1 Scenarios from the IPCC Special Report on Emission Scenarios

Information on climate change projections for areas that include the case study regions is available from a number of sources:

- the IPCC Fourth Assessment Reports (www.ipcc.ch)
- the CSIRO's *Climate Change in Australia 2007* (www.climatechangeinaustralia.gov.au; CSIRO-BoM*, 2*007);
- the Murray-Darling Basin Sustainable Yields project (www.csiro.au/partnerships/MDBSY), and
- the Victorian Department of Sustainability and Environment's (DSE) series of reports on climate change impacts in Victorian catchments (www.climatechange.vic.gov.au).

Projections tend to be given for average climate at some time in the future (e.g. 2030*, 2*050), relative to the period 1980–99 (referred to as the 1990 baseline for convenience). Individual years will show variation from this average. The 50th percentile (the mid-point of the spread of model results) is often provided as the 'best estimate'. Based on a literature review of the

abovementioned resources, a picture of future climate has been produced for the areas that include Mildura and Donald (see Sections 5.1.1 and 6.1.1).

4.3 Stakeholder interviews

During March 2010, 35 individuals identified as representing local and regional organisations, government agencies, local councils, private business, the community and farming enterprises within one or both of the case study areas participated in interviews for the project (refer to Appendix A for participant details). Participants were involved in the project via either individual face-to-face interviews, interviews via telephone, contribution of reports or other relevant information, or a combination of these processes. Due to the interlinked nature of rural communities, several participants were able to represent more than one organisation, agency or sector. The interviews were used to investigate current approaches to drought management from an adaptation perspective, how drought is perceived and experienced by the people living in these areas, how the community is impacted by drought and how it copes with these impacts. The interviews were undertaken through semi-structured questions, as a means of effectively engaging diverse people from various agencies, groups and backgrounds and also to insure consistency and comparability across the data gained through the interview/workshop process (see Appendix A for the details on the interview questions). Prior to conducting the interviews/workshops, ethical approval was obtained from the University of Newcastle Human Research Ethics Committee. Informed consent was also obtained from all participants.

The interviews were undertaken as trusting and personal engagements, or 'conversations with a purpose' (Minichiello et al. 1995), allowing people to talk about their experiences of drought, often evoking very emotive, heartfelt and personal stories. They also allowed people to explain the ways in which they made sense of their everyday work and lives as part of rural communities in the context of drought. The interviews deliberately avoided the scientific and political debates surrounding human-induced climate change, although these sometimes arose in discussions. Both case studies are located in conservative rural regions, where there remains considerable scepticism about anthropocentric climate change (see Section 6.2.4). In general, beliefs about issues of global climate change were not necessary to elicit the lived experiences of farming communities confronting the impacts of climate changes on a day-to-day basis (see also Golding & Campbell 2009). As a whole, the interviews and focus groups were used primarily to place water supply, security and drought into local contexts, providing better understandings of the ways in which people living in rural locations actually experience drought and the possibilities for developing effective adaptation strategies for drought conditions in the future.

4.4 Stakeholder workshops

In addition to the interviews, a Sustainable Livelihood Analysis (SLA) workshop was undertaken in Mildura as part of a different CSIRO project. 'Scenario planning' workshops were also undertaken in both Mildura, as part of a different Victorian Department of Primary Industries (DPI) project, and Donald, as part of this project.[7] The SLA conducted during the CSIRO Mildura SLA workshop allowed the complex and multidimensional relationships

[7] Mildura workshops were performed as part of previous studies (Treeby et al. 2008; Park et al. 2009), while the Donald workshop was conducted as part of this project.

between the social and physical environments to be considered, especially in the context of vulnerability, by linking different types of livelihood assets to the transforming structures and processes (i.e. the market, the state and culture) (Castro *2*002).

Scenario planning is a process that involves a creative, forward-looking search for patterns that might emerge in the future (Blake 1999; Duerden *2*004). These scenarios then can be used to construct specific strategies to adapt to change. The key influences (referred to as drivers) in the scenario planning workshops were categorised using the INSPECT (Imagination–Nature–Society–Politics–Economics–Culture–Technology) process (refer to Appendixes C and D for further details).

The objectives and outcomes for the CSIRO Mildura SLA workshop and scenario planning workshops are summarised in Section 5.3. The Donald workshop (see Section 6.3), performed as part of this project, was intentionally structured to be similar to the DPI scenario planning workshop in Mildura so that the outcomes were comparable. The workshops were aimed at identifying the main future challenges for Mildura and Donald and what actions are required to successfully adapt to these challenges. The identification and prioritisation of assets, in terms of human, natural, social and financial capital, enabled us to examine current and future adaptation options for both Mildura and Donald, which also assists in projecting future viability and identifying areas where support is required.

The structure of the Donald workshop was as follows:

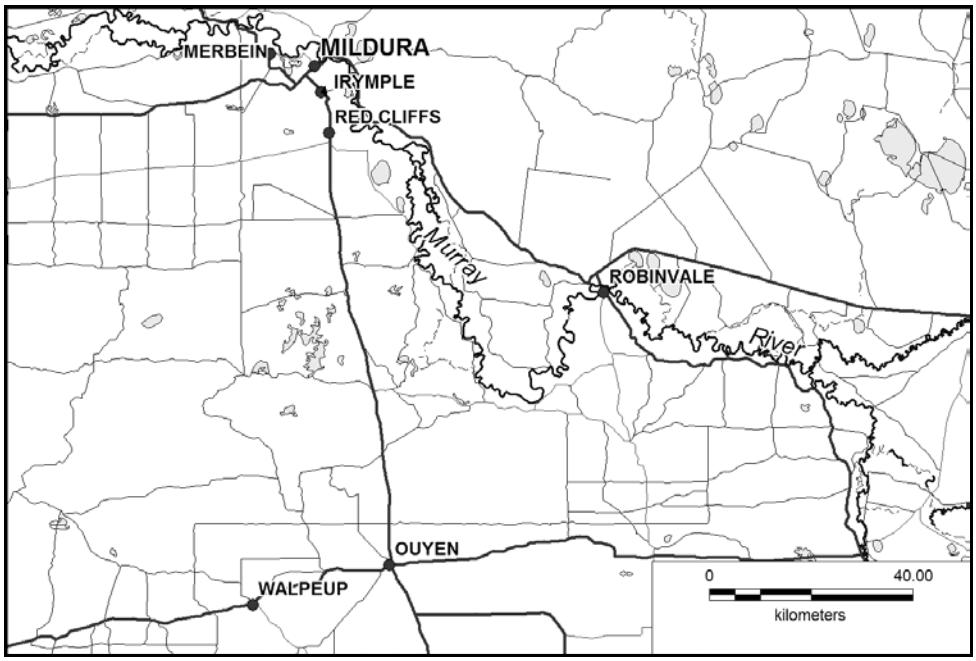
- Select a small group of 10 to 15 participants who represented various drought-sensitive components of the local community.
- Explain the use and purpose of scenarios to the participants (as per Treeby et al. *2*008; Park et al. *2*009).
- Introduce three broad future scenarios: ‘mild’ climate change (i.e. within the realms of natural variability); pathway to ‘high’ climate change (i.e. unprecedented climatic events consistent with the scenarios predicted under the highest greenhouse gas emission scenarios); and climate ‘step change’ (i.e. that the climate experience during the Big Dry is the new normal).
- Ask the workshop participants to expand each of the three scenarios for the 2015 and 2030 time horizons, considering how the impact of each scenario would manifest locally in terms of water supply and availability, agricultural impacts, ecological impacts, community impacts, economic impacts, social impacts, mental health impacts, and planning and policy response from local, state and Commonwealth governments.
- Ask the participants to identify, for their town/community, the top risks and opportunities associated with each scenario.
- Discuss what can be done (in a practical sense) to avoid (or mitigate) the risks and take advantage of the opportunities.
- Develop other scenarios that may be: (1) more realistic within the local context; (2) already developing; or (3) more catastrophic and to be avoided at all costs, then repeat the above process to determine regionally specific impacts and adaptation strategies.

Such an approach ensures regionally specific outcomes in both the identification of the impacts associated with the future scenarios and also the development of appropriate adaptation strategies. It should be noted that while the workshop outcomes are regionally specific, some significant insights are transferable – namely, what local stakeholders see as their biggest threats and the adaptation strategies developed to deal with drought-related impacts. The workshop outcomes, combined with the information gained through the interview process, allows assessment of the capacity of Mildura and Donald to adapt to drought, both now and in the future. Importantly, the assessment is done by local stakeholders (i.e. those with the most knowledge as to what is feasible and what is most important), thereby increasing the likelihood that successful policies and/or adaptation strategies will emerge. For further information on the workshop process, refer to Appendix C (Mildura) and Appendix D (Donald).

5. Case study 1: Mildura

5.1 Mildura: Regional overview

Mildura is a rural region of approximately 58 000 people,[8] located in north-west Victoria (see Figure 1.1). The Mildura region encompasses the city of Mildura itself, together with the key townships of Ouyen, Merbein, Red Cliffs, Irymple, Meringur, Nangiloc and Walpeup (see Figure 5.1). Located at the intersection of Victoria, New South Wales and South Australia, the Mildura region (also known as Sunraysia) has a long history of agriculture and irrigation. Sheep runs began in the region in the 1840s, with the town of Wentworth established in 1860 as one of the largest inland ports in Australia. In 1886, the Chaffey brothers set up the first private irrigation settlement in the region on the banks of the Murray River; this was later nationalised. Further state-owned irrigation settlements followed, together with substantial post-World War I and post-World War II soldier settlements in Red Cliffs and Robinvale (MDC *2*009).



Note: For location of Mildura within Australia and in relation to Donald, refer to Figure 1.1.

Figure 5.1 Mildura city and region

Unlike the dryland farmers in Donald, the irrigation settlements traditionally have avoided many of the stresses of water supply and drought. However, the recent prolonged drought conditions and dependence on the stressed Murray River system have forced rapid changes to attitudes and practices in irrigation and agriculture in the region. Irrigation settlements have seen trends towards privatisation, aggregation and modernisation of infrastructure to maintain efficiency of the system. Moreover, water allocations continue to decrease and fluctuate, and producers increasingly are opting to exit their landholdings.

[8] Population figures are extracted from the 2006 Census, Australian Bureau of Statistics (ABS).

Indeed, in the Campaspe irrigation district south-east of Mildura, 70 per cent of irrigators recently voted to sell their water, with the Northern Victorian Irrigation Renewal Project (www.nvirp.com.au) now likely to decommission the irrigation network. Most irrigators in this region have not received any water allocations in five years, and so have opted to sell their water shares (about 12 000 GL in total), and either invest in other dryland and/or groundwater-based farming, or take an exit grant and leave the industry entirely (Fletcher 2010). Similar options are being explored in some New South Wales and South Australian irrigation areas.

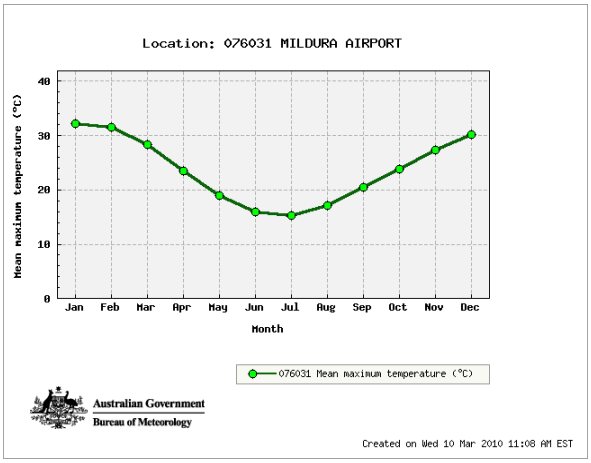
It is plausible that the closure of irrigation districts will continue as a result of severely depleted Murray River flows and reduced water allocations to irrigators. Such trends, if they continue, could have serious impacts on the agricultural and tourism sector and on the social and economic well-being of the Mildura region as a whole. While the dryland areas have a history of confronting and managing drought conditions, the tradition and belief in irrigation supply are ingrained in the Mildura region, and are associated with a sense of security. As noted in the Productivity Commission Review (2009), 'irrigation drought is uncharted territory', and with this comes rapid change, uncertainty and fear.

5.1.1 Historical and projected climate

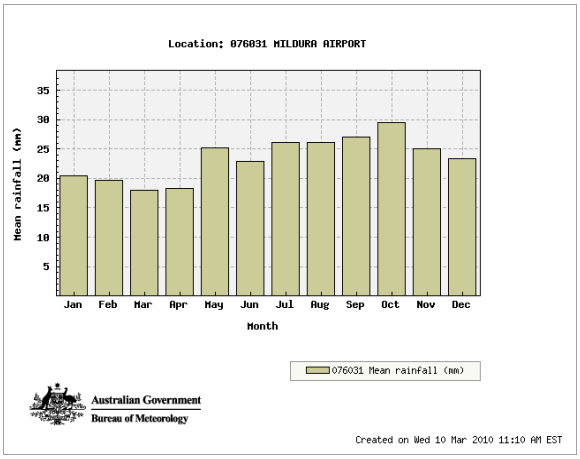
Figure 5.2 shows the monthly climate statistics for Mildura, which has hot summers with an average maximum temperature of 30ºC. Winters tend to be mild with an average daily temperature around 10ºC, and frosts are common. The semi-arid nature of the region results in high levels of evaporation (annual evaporation is seven times the annual average rainfall). Annual average rainfall is only 331 mm, which mainly falls in the winter and spring (i.e. June to November). On average, there are 61 days each year where at least 1 mm of rain falls (DSE 2008a).

It is evident from Figure 5.3 that the annual average rainfall since the mid-1990s has been lower than the long-term average. In fact, rainfall in all but one year (2005) of the last 10 years was below the long-term average. Also apparent from Figure 5.3 is that, while conditions during the Big Dry have definitely been dry at Wentworth, and by inference Mildura, there are other similarly dry epochs in the historical record (particularly ~1935–45 and ~1895–1905, which correspond to the Federation and World War II droughts). The relative severity of the Federation, World War II and the Big Dry droughts for Wentworth (i.e. Mildura) is examined in Table 5.1.

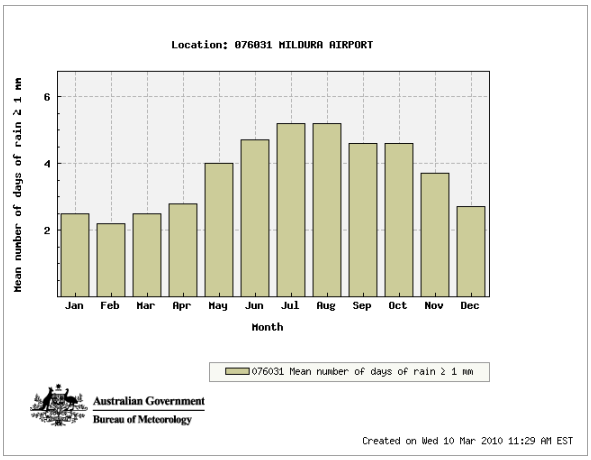
Table 5.1 demonstrates that, of the three extended drought periods, the World War II drought was by far the most severe (in terms of annual rainfall deficiencies) for the Mildura region. In fact, in terms of annual rainfall deficits, the current drought (i.e. the Big Dry) is the least severe of the three droughts. It is also interesting to note that all three droughts have been worse (in terms of rainfall deficits) for Mildura compared with Donald (see Section 6.1.1). However, annual rainfall reductions do not tell the whole story. Often it is the timing of rainfall that is most important for agricultural production. Therefore, Figure 5.4 shows the seasonal rainfall totals during each of the three major droughts Australia has experienced.



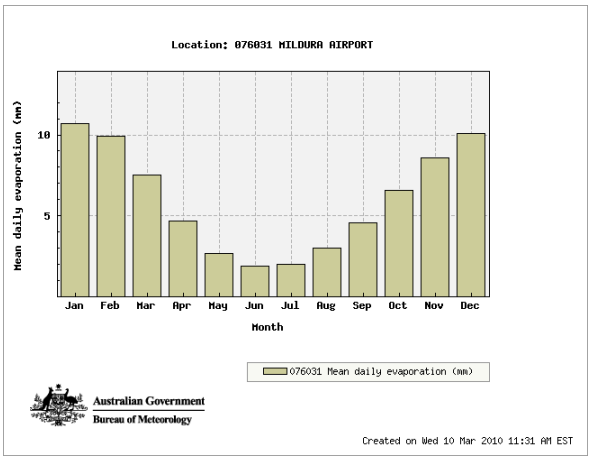
a) mean daily maximum temperature per month



b) mean monthly rainfall

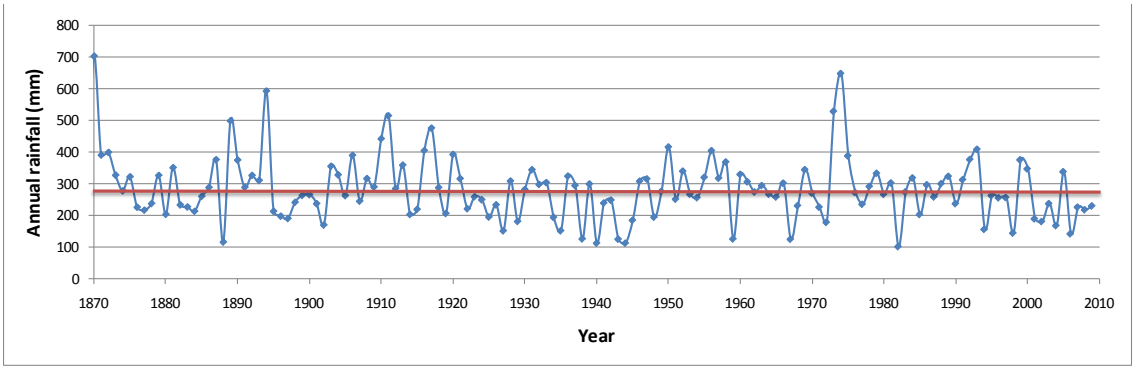


c) average number of days with rainfall > 1mm



d) average monthly evaporation

Figure 5.2 Monthly climate statistics – Mildura



Note: The red line indicates long term (1870–2009) mean (284 mm).

Figure 5.3 Annual rainfall time series for Wentworth (BoM station no. 047053) near Mildura

Table 5.1: Annual average rainfall deficiency compared with long term (1870-2009) mean during the Federation, World War II and Big Dry droughts for Wentworth (BoM station no. 047053) near Mildura

	Wentworth (near Mildura)	
	Average annual rainfall	**Percentage change in annual rainfall compared to the long term mean**
Long-term record (1870-2009)	284 mm	–
Federation Drought (1895–1902)	229 mm	–19%
World War II Drought (1937–45)	195 mm	–31%
Big Dry (1997–2010)	235 mm	–17%
Lowest five-year running mean	169 mm (occurred 1940–44)	
Lowest ten-year running mean	205 mm (occurred 1935–44)	

Figure 5.4 shows that the Federation Drought was due to a severe reduction in spring rainfall, with some reduction in summer and autumn rain. The failure of spring rainfall in this region would have had a devastating impact on agriculture, as this season is crucial in establishing spring/summer harvests. The World War II Drought also exhibited a reduction in spring rainfall, though not as severe as that during the Federation Drought. In fact, the World War II drought resulted in a reduction in rainfall across all seasons, which explains why the annual rainfall decreases are much worse for this drought than the other two. Consistent with previous studies (Section 2.2.1), the Big Dry is confined primarily to autumn rainfall declines in the two study regions. Note that this seasonal breakdown as to when the main rainfall deficits were experienced is also consistent with the links to the large-scale drivers explained in Section 2.2.1.

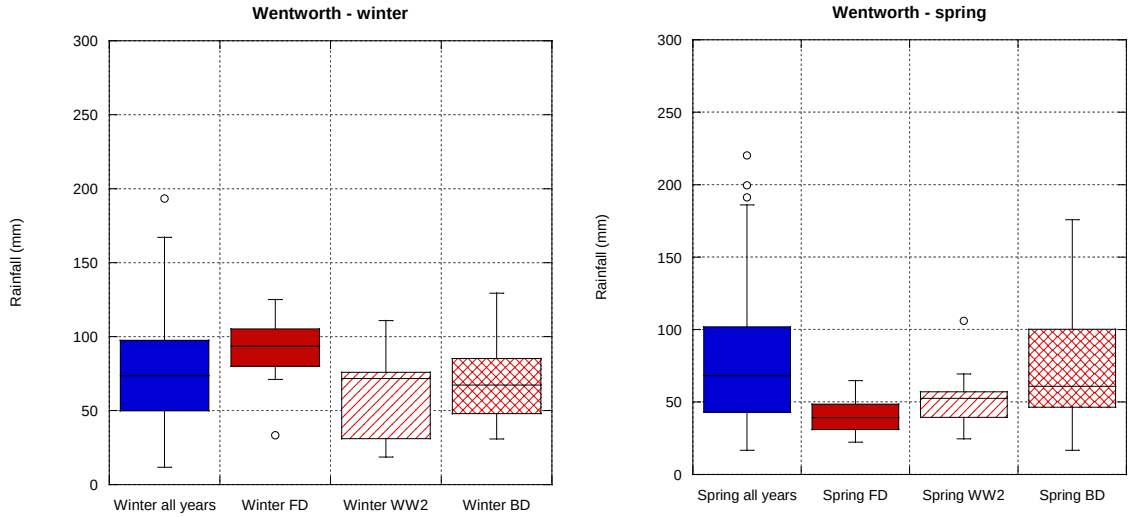


Figure 5.4 Seasonal rainfall totals at Wentworth (near Mildura) during the Federation Drought (FD), World War II Drought (WW2) and the Big Dry (BD)

It should be noted that, as discussed in Section 3.1, the Mildura water supply comes almost entirely from the Murray River. Rainfall in and around Mildura is completely inadequate in almost every year to sustain the types of irrigation crops that the economy has been and is now based on. Therefore, while the rainfall analysis presented above is relevant, from an economic perspective, to dryland agriculture in the Mildura region the key driver of water availability in Mildura is rainfall in the upper Murray system (e.g. Hume, Dartmouth etc.). Rainfall is of interest, but from an economic perspective, it is really only relevant to dryland agriculture. Importantly, as demonstrated by Verdon-Kidd and Kiem (2009) the upper Murray region has also been severely affected by the Big Dry (with similar rainfall deficiencies as that experienced in Mildura) resulting in an 'irrigation drought' as well as a 'rainfall drought'. However it should be noted that this is not always the case – that is, there can be a 'rainfall drought' in Mildura but, provided the 'rainfall drought' does not extend to the upper Murray system there will still be plenty of water for the Mildura community.

The Victorian DSE has investigated the impacts of anthropogenic climate change on rainfall, temperature, and evaporation across several regions of Victoria. Table 5.2 summarises the results for the Mallee region (where Mildura is located). As indicated in Table 5.2, the Mallee region is projected to become warmer, with more hot days (over 30 degrees) and fewer frosts. Days are projected to be hotter over all seasons, but the greatest warming is likely to be in summer and the least in winter. It is also projected that rainfall will decrease in all seasons and that this decrease is expected to be the greatest in spring and winter, while smaller decreases are expected in summer and autumn. Potential evaporation is also projected to increase across all seasons, with the most significant change occurring in winter. Lower rainfalls and higher evaporation rates would result in less soil moisture and lower river flow. This could potentially mean more frequent 'rainfall droughts' for the Mildura region, and also 'irrigation droughts' given that similar scenarios are projected for the upper Murray system.

5.1.2 Agriculture and economy

The Mildura economy is driven primarily by agriculture, which accounted for 17% of the Gross Regional Product (GRP) in 2007-08 (see Figure 5.5). In addition, manufacturing contributes to the region's economy at 11% of the GRP (MDC*, 2*009). The region is also characterised by the smaller industry sectors of transport, mining, property and business services. Therefore, agriculture is closely linked to economic development and decline in the region.

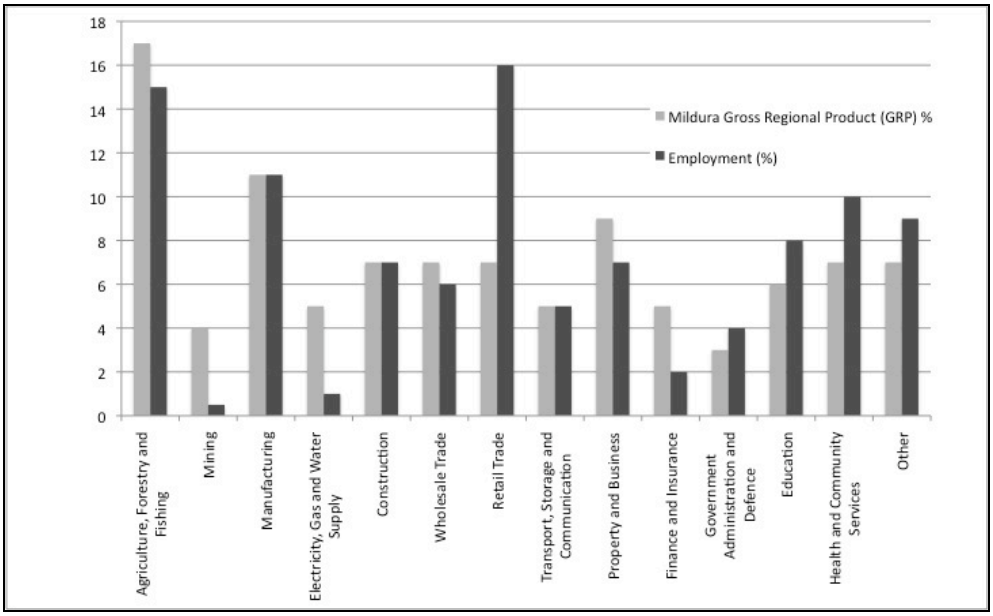
Currently, the main crops for the region are wine grapes, dried vine fruits, table grapes, citrus and other fresh fruits, and vegetables. These agricultural crops have been part of the landscape since early agricultural and irrigation expansion into the region, albeit with varying scope and success. The very first crops in the region were stone-fruits and citrus, followed by non-perishable crops of dried fruits, wine and brandy, which presented more practical options for river transport. The early settlements (e.g. Merbein and Red Cliffs) focused on dried fruits and citrus and as early as the 1920-30s were confronted with significant economic difficulties such as low export prices and the Depression. The growers and the government intervened with extensive industry regulation for dried fruits comprising protections on marketing and pricing arrangements that lasted over half a century. At the end of this period of regulation, many growers were forced out of business, or stripped and replanted land with crops of primarily wine grapes, table grapes, and nuts. The later settlements such as Robinvale featured much larger blocks and saw a specialisation in the table grape market during the 1960-70s. Increasing farm amalgamations occurred throughout the region during this period as the traditional small block, family-based irrigators (locally known as the 'blockies') became increasingly unviable in an expanding trade and export market.

Table 5.2: Climate change projections for Mildura for 2030 and 2070 (relative to 1990)

Variable		2030 Medium	2070 Lower emissions	2070 Higher emissions
Annual average temperature		+0.9°C (0.6 to 1.2°C)	+1.4°C (1.0 to 2.0°C)	+2.8°C (1.9 to 4.0°C)
Seasonal average temperature	summer	+1°C (0.6 to 1.4°C)	+1.6°C (1.0 to 2.3°C)	+3.1°C (2.0 to 4.5°C)
	autumn	+0.9°C (0.6 to 1.3°C)	+1.4°C (0.9 to 2.1°C)	+2.8°C (1.8 to 4.1°C)
	winter	+0.7°C (0.5 to 1.1°C)	+1.2°C (0.8 to 1.8°C)	+2.3°C (1.5 to 3.5°C)
	spring	+0.9°C (0.6 to 1.3°C)	+1.5°C (1.0 to 2.2°C)	+2.9°C (1.9 to 4.2°C)
Annual average rainfall		–4% (–10 to + 2%)	–6% (–16 to + 4%)	–11% (–28 to + 7%)
Seasonal average rainfall	summer	–1% (–12 to + 12%)	–2% (–20 to + 19%)	-3% (-35 to + 38%)
	autumn	–1% (–10 to + 8%)	–2% (–16 to + 13%)	-3% (-28 to + 25%)
	winter	–5% (–16 to + 2%)	–8% (–21 to + 4%)	-16% (-36 to + 7%)
	spring	–7% (–18 to + 2%)	–11% (–27 to + 3%)	-20% (-46 to + 5%)
Annual average potential evaporation		+2% (0 to +5%)	+4% (0 to +8%)	+7% (0 to +15%)
Seasonal average potential evaporation	summer	+2% (0 to +5%)	+3% (0 to +8%)	+7% (0 to +15%)
	autumn	+3% (+1 to +6%)	+5% (+2 to +9%)	+10% (+4 to +18%)
	winter	+6% (+1 to +13%)	+10% (+1 to +22%)	+19% (+2 to +42%)
	spring	+1% (–1 to +4%)	+2% (–2 to +7%)	+4% (-4 to +13%)
Frosts (current average = 24 days/yr)		14 (18 to 11)	10 (14 to 6)	5 (8 to 2)
Days over 30 degrees (current = 81 days/yr)		92 (87 to 98)	101 (94 to 111)	123 (106 to 147)
Days over 35 decrease (current = 32 days/yr)		38 (36 to 42)	45 (39 to 51)	59 (48 to 76)
Days over 40 degrees (current = 6 days/yr)		8 (8 to 10)	11 (9 to14)	18 (13 to 28)
Annual average number of rain days		–6% (–21 to 0%)	–10% (–35 to +1%)	–19% (–65 to +2%)

**Note: the information above is based on a regional assessment for the whole Mallee region

Source: DSE (2008a).



Source: MDC (2009).

Figure 5.5 Industry contribution (%) to Mildura GRP and Employment (%), 2007–08

The challenges of agricultural production and constant industry adjustment have been an ongoing feature of the Mildura region. However, recent (i.e. the last decade) political, economic and environmental conditions are presenting the region with some of the most severe and confronting challenges to its agricultural and economic future yet. The region has been confronted with a rapidly changing irrigation system and water market, characterised by low (and unreliable) water allocations associated with ongoing and severe drought conditions, as seen in Table 5.3. The declining, and in some cases zero, water allocations from the region's river systems over recent years have had a serious impact on the viability of some farms in the region. Moreover, these changes to water allocations are combined with the Commonwealth government's proposed water buy-back scheme to increase environmental flows in the Murray River System (the final outcome of which remains uncertain)[9] (ABC *2*010a*, 2*010b). There have also been extensive changes to state government water management systems and authorities (across New South Wales, South Australia and Victoria), and the associated complexity of a burgeoning water market that comprises decreasing water allocations, fluctuating water prices and a vigorous water trading market, all of which are changing, inconstant, complicated and new to the irrigators of the region.

Table 5.3: Water allocation (%) from Mildura region river systems

	Water Allocations at end of season						
River System	*2002/03*	*2003/04*	*2004/05*	*2005/06*	*2006/07*	*2007/08*	*2008/09*
Murray	129%	100%	100%	141%	95%	43%	35%
Goulburn	57%	100%	100%	100%	29%	57%	33%
Campaspe	100%	100%	39%	31%	0%	18%	0%
Loddon	57%	67%	100%	100%	0%	5%	0%

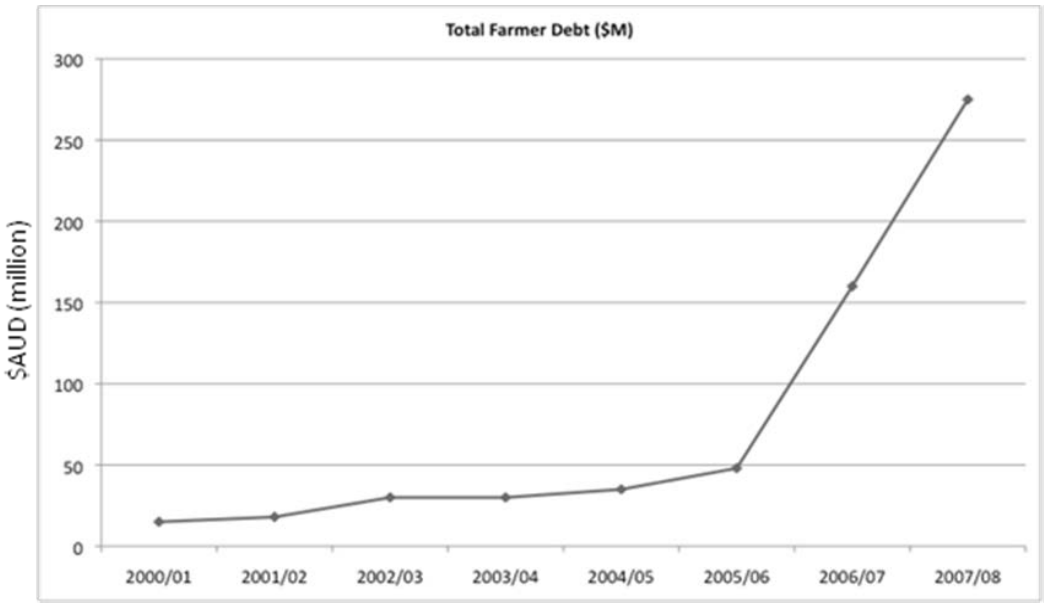
Source: RMCG (2009a).

[9] The new Murray-Darling Basin Plan (draft) was released in October 2010.

Moreover, this changing water context comes at a time of collapse in the wine and wine grape industries, which historically (since the 1980s) were very important for the region, particularly the small block farmers of the early irrigation districts. Indeed, following the dried fruit market deregulation, wine grapes were adopted extensively throughout these areas as a much-needed panacea to declining dried fruit prices and export markets. However, the historical characteristics and rapid expansion of wine grape farms and farming systems in the region, combined with the current wine grape glut and low wine grape market prices, have produced severe problems for the region's agricultural economy. Australia has little influence on international market prices, representing only 3 per cent of world wine production and 9 per cent of exports, which were mainly shipped to China, the United States, Hong Kong, Finland, Malaysia and Sweden (Winebiz *2*010). Furthermore, about a quarter of the Sunraysia wine grape crop was the Chardonnay variety, which in an already collapsed market (down 11 per cent in 2009) represents one of the most 'unfashionable' wine grape varieties (Winebiz *2*010). As a result, the Mildura region – particularly wine grape producers – increasingly is experiencing low incomes, unmanageable debts and an escalating number of grape growers leaving the industry.

In fact, research conducted by the Mallee Catchment Management Authority (MCMA *2*009) suggests that the area of crops (largely wine grape crops) across Robinvale, Red Cliffs, Mildura and Merbein that were deliberately left without irrigation reached a high of 26 per cent in 2008–09, with local reports of large amounts of crops left unpicked. A decision by growers not to irrigate crops is profound, and reflects the enormity of financial stress incurred by a combination of economic and environmental pressures. As a result, property prices are greatly diminished, as is the visual amenity of the area. Indeed, the visual impact of dead, dying and stripped crops in the area is grim, and has an immense impact on community well-being and outlook (see Figure 5.7).

The fact that many of these areas represented those recently transitioning from dried fruit crops to wine grapes means that these growers were only beginning to repay debts incurred from declining dried fruit prices, set-up and infrastructure associated with the transition to wine grapevines and the time lags involved in any transition of crops. These combined trends produced immense amounts of debt for farmers in the region, with no recourse for further borrowings or investments in other crops. The Rural Financial Counselling Service (RFCS) – Victoria Murray-Mallee, which covers the Mildura region, notes an increase from 190 clients in 2000–01 to 965 clients in 2007–08 (RFCS *2*008). As with all RFCSs, they provide free and impartial financial counselling and assessment advice to primary producers and small businesses in the region suffering financial hardship. Along with the rise in clients in the region, the RFCS (2008) has noted a steady rise in aggregated farmer debts from $15 million in 2000–01 to $48.2 million 2005–06, with a surge in debt to $275 million in 2007–08. The majority of clients are irrigation horticulturalists confronted by the combined impacts of declining commodity prices, poor yields and high historical debt levels. A primary concern is that few of these farmers have alternate investments, and the farm is widely regarded as their superannuation (RFCS *2*008).



Source: RFCS (2008).

Figure 5.6 Farmer debt ($ million) from RFCS clients in Mildura region

As a response to the crisis faced, particularly by small irrigation farms in the Murray-Darling Basin, the Commonwealth government introduced a 'small block' irrigator exit package in 2008 (ending on 30 June 2009). 'Small blocks' were initially defined as smaller than 15 hectares, but in February 2009 this was amended to smaller than 40 hectares. Grants up to A$180 000 were available to help owners of 'small blocks' cease irrigation, remove plantings and infrastructure, continue living in the family home, receive training and find other employment (DEWHA *2*010a). Although assisting some farmers to exit production, the scheme has been subject to criticism for a lack of future land use planning, with provisions that preclude neighbouring farms from buying the exited blocks, and controls that ensure the land is not farmed for five years after exit – leaving an empty, barren block of land open to the spread of dust, pests and diseases (see the following section for further discussion on this issue).

While the drought and changes to water supply and irrigation have had significant effects on the agricultural production of the region, it is widely recognised that the decline in commodity prices and export markets has also magnified the problems (e.g. MCMA *2*009, and see Section 5.2). Water use by perennial crops equates to approximately 15 per cent of annual irrigation water use across Victoria, with grapes used for wine accounting for about half of that again (DPI *2*010). Therefore, water supply – even under restricted allocations and increasing water costs – is not the foremost challenge for the region's agricultural future. Drought is a compounding influence on what is a collapsed market for a key agricultural product of the region.

For other crops, the effects of the recent Global Financial Crisis, declining commodity prices and export markets have not been as dire. Indeed, table grapes have experienced strong growth, with the region producing 74 per cent of all Australian table grapes (MDC *2*009). Table grapes have also been associated in recent years with relatively high prices, good quality and yield (MDC *2*009). The Robinvale area is where most table grape production has occurred, and reflects the relative success in the table grape markets with only 12 per cent of

crop area dewatered in 2009, compared with 25 per cent in Mildura and Red Cliffs, and over 30 per cent in Merbein (SunRISE *2*010).

Ironically, those producers who maintained dried fruit crops in the face of deregulated markets have experienced reasonable market performance, and maintain a 98 per cent share of Australia's dried fruit production (MDC *2*009). Citrus crops have also remained relatively stable with the region producing 24 per cent of the national citrus crops. Nut crops – almonds in particular – have been successful in the area and represent 65 per cent of total production volume in Australia (with solid growth anticipated). Vegetable crops make up only a small percentage of crops in the region but have also remained relatively stable in price and production. Dryland farming has been increasing, due to the combination of market and environmental (drought) pressures, however, this mode of farming remains dominant in areas south of Mildura (e.g. Donald – refer to Section 6) (MDC 2009). Sheep flocks have been declining in numbers due to pressures of drought and water supply, but quality and market prices remain extremely high (DPI *2*010).

5.1.3 Socio-demographic context

Mildura is experiencing relatively stable population growth as a result of in-migration, with an increase of 3.2 per cent in population for the Mildura region from 2001–06 (MDC *2*009). The area – often referred to as a 'sponge' regional centre – attracts workers due to a diversity of employment opportunities. More recently, the area has lured retirees from both cities and surrounding rural towns due to its amenity and rural lifestyle. Mildura has also attracted newly arrived immigrants over recent years, predominantly from Afghanistan, India, South Africa and Iraq, by offering a diversity of employment opportunities and low-cost housing. This feature also draws in many low-income families from smaller surrounding towns and centres (see Forth *2*001). In addition, Mildura has provided some security for those farming families affected by declines in local agricultural industries, with many families from farms moving to Mildura for employment and housing.

The result of the combination of in-migration and the general decline in younger people associated with regional and rural towns is significant changes in the region's population structure (see Table 5.4). The proportion of residents in the Mildura region who are aged 80–84 has increased by 30 per cent from 2001–06, with a similar increase of 25 per cent in residents aged 85 and over (MDC *2*009). The rate of increase in the proportion of people aged 80 and over in Mildura now exceeds that of both regional Victoria as a whole, and Melbourne. Simultaneously, the region experienced significant declines in the 0–4, 5–9*, 2*5–29, 30–34, 35–39 and 40–44 age groups from 2001–06 (MDC *2*009). This ageing of the population presents a number of challenges to the region in terms of providing appropriate support services in a relatively isolated location of the state.

Employment in the region has suffered from downturns in the agricultural sector, with a 5% decrease in agricultural employment for the region between 2001 and 2006, with indicators that this decline will continue (Aarons et al. *2*008). Decreasing employment in the sector has been directly associated with declining water allocations, with estimates that a 30% water allocation equates to the loss of 3,200 jobs for the region (RFCS*, 2*008). At the same time, the region is experiencing skills and labour shortages across many industry sectors.

Table 5.4: Change (%) in population by age group, Mildura region, 2001–06

	2001		2006		Change 2001-2006	
	No.	% Total	No.	% Total	No.	% Total
0-4 years	4,274	7.5%	3,812	6.5%	-462	-10.8%
5-9 years	4,621	8.1%	4,483	7.6%	-138	-3.0%
10-14 years	4,557	8.0%	4,748	8.1%	191	4.2%
15-19 years	3,868	6.8%	4,224	7.2%	356	9.2%
20-24 years	2,954	5.2%	3,065	5.2%	111	3.8%
25-29 years	3,468	6.1%	3,094	5.3%	-374	-10.8%
30-34 years	3,918	6.9%	3,662	6.2%	-256	-6.5%
35-39 years	4,180	7.4%	4,068	6.9%	-112	-2.7%
40-44 years	4,375	7.7%	4,201	7.2%	-174	-4.0%
45-49 years	3,819	6.7%	4,371	7.5%	551	14.4%
50-54 years	3,703	6.5%	3,793	6.5%	89	2.4%
55-59 years	2,863	5.0%	3,657	6.2%	794	27.7%
60-64 years	2,560	4.5%	2,840	4.8%	280	10.9%
65-69 years	2,194	3.9%	2,409	4.1%	215	9.8%
70-74 years	2,090	3.7%	2,054	3.5%	-36	-1.7%
75-79 years	1,603	2.8%	1,888	3.2%	285	17.8%
80-84 years	989	1.7%	1,285	2.2%	296	30.0%
85 years and over	792	1.4%	993	1.7%	201	25.3%
Total	**56,830**	**100.0%**	**58,648**	**100.0%**	**1,818**	**3.2%**

Source: MDC (2009).

Increases in employment have been experienced in the manufacturing and construction sector, and in government, health and community services. Overall, retail trade represents the largest employment sector at 16 per cent, with agricultural employment for the region sitting at about 13 per cent of total employment (MDC *2*009). While unemployment rates have lowered across all of the localities since the last census in 2006, Mildura city (6.3 per cent) is slightly above the rate for Regional Victoria (5.6 per cent).

Incomes for the region have remained relatively stable but lower than the average, with 52 per cent of household weekly incomes falling under $1000 compared with 43 per cent for Victoria as a whole. High rental stress (when rent equates to over 30 per cent of total income) has also increased across the region, ranging from between 3.7 per cent (Ouyen) to 14.7 per cent (Merbein) since 2001 (MDC *2*009). Rental stress is an important indicator of cost of living in the region, and indicates areas under combinations of income and housing pressures. Education and training levels in the region reflect more general trends in rural and regional areas, with lower than average completion rates. A third of the region's 17–24-year-old age group have not completed Year 12. In 2006, the percentage of people who had completed Year 12 or equivalent was just over 27 per cent for the region compared with 44 per cent for Victoria as a whole (Aarons et al. *2*008). This trend reflects limited training and educational opportunities in the region and, more significantly, presents challenges to the social and economic well-being of the region and the potential for adaptation and resilience into the future (Drought Policy Review Expert Social Panel *2*008).

Formal measures of social cohesion suggest that the region is faring relatively well in this regard. The ABS uses two indicators as proxies to reflect the social cohesion of a community: volunteering rates and rates of unpaid assistance to those with a disability, long-term illness or in old age (ABS *2*006*, 2*009c). The proportion of those volunteering and undertaking unpaid assistance in the region is significantly above that of Melbourne, although this varies substantially between localities and is higher in more remote rural locations in the region (e.g. Ouyen) (Aarons et al. *2*008). It is important to note, though, that volunteering is likely to be much higher than official measurements suggest, as a lot of volunteering in rural communities is not officially recorded.

Generally, Mildura's social profile is changing with an ageing population, declining workforce and younger population, and lower than average incomes and employment levels. Yet Mildura's position at the intersection of the three states and as a regional and transport hub has also produced reasonable in-migration of population and workers, with an industry base diversifying from its traditional agricultural reliance. The biggest challenges to be faced by the Mildura region, however, will be the transition away from certain agricultural pursuits in the face of changing rural demographics, ongoing climatic variability and potentially decreasing water availability due to both anthropogenic climate change and reductions in irrigation allocations.

5.2 Drought and rural communities: impacts, attitudes and responses

In order to uncover the ways in which these economic, environmental and social trends are actually experienced, it is necessary to examine the stories of those people living and working in the Mildura region. The interview approach outlined in Section 4.3 was used to investigate the everyday issues of living in a drought-affected region, and how people attempt to cope, manage and adapt to ensuing challenges. In talking with people across Mildura, many of the trends identified above are confirmed and elaborated on. More importantly, through connecting with those people at the forefront of change, such trends and challenges are given meaning in the context of everyday life for farmers, government and NGO representatives, service providers, family and community members.[10]

Through the interview process with Mildura representatives, six key themes emerged:

- **'It's not just drought':** water markets, commodity prices, and a changing farming industry
- **Economic impacts:** drought, drying and the family farm
- **Social stress:** rural communities, farmers and their families
- **Community sentiment and strength:** stoicism, scepticism, uncertainty, optimism
- **Government support:** alleviating and transitioning farming families
- **Future scenarios:** climate change, adaptation and mitigation.

These themes present a series of challenges facing the region, as well as possibilities and practices for the future. Perhaps the most prominent theme across the interviews is that the challenges confronting the region are not just a product of drought – to understand them as such would not only under-estimate the extent of the region's problems but also severely inhibit the ability to coordinate a sustainable and proactive approach to addressing them. Similarly, any drought-adaptation strategy that did not take into account the numerous other issues would be unlikely to be successful. As expected, some of the themes that emerged from the Mildura interviews were also reflected in subsequent discussions with representatives from the other case study site, Donald (Section 6.2). In other words, some of the issues uncovered in this study are common to rural areas, common to this drought-

[10] See Appendix A for details of interview participants. In most cases, each interviewee represented more than one group. For example, some interviewees worked for a government agency but were also farmers. This feature of the rural setting of Mildura elicited layered and multiple perceptions about the community and region. In addition, it is important to note that the term 'farmer' has been used as a generic grouping to cover all farming, growing and irrigating enterprises.

affected region of Australia and/or common to agricultural producers. The two case studies demonstrate the in-depth connections with place needed to gain a holistic understanding of the impacts of drought in rural areas. These rural areas also enhance the connections to broader issues confronting agricultural production and rural communities under a changing climate. The interview responses from the Mildura case study are summarised below under the six key theme areas outlined above.

5.2.1 'It's not just drought': water markets, commodity prices and the farming industry

For many people in Mildura, drought and the ongoing drying of the environment are viewed as a challenge that confounds an already changing agricultural and economic context. As discussed in Section 5.1.2, the Mildura region has been confronting a rapidly evolving situation with respect to water availability as a result of ongoing drying, decreased water allocations and an expanding water market. This change has come at a time of record low commodity prices for some of the main agricultural products of the region, particularly wine grapes, which have suffered a severe downturn due to global over-supply and market competition. In addition, producers of the region are confronting a series of fundamental changes to the farming sector including the expansion of farms and farm trade, declines in farm succession, and increasing uncertainty around crop selection and investment. Some of these issues are a direct result of drought and a drying environment; however, others are related to trade and agricultural markets well beyond the scale of the region. The complexity of the situation is illustrated in the following statements from government and industry representatives:

> What we've all been saying, and this is a consistent message … it's not just drought that has impacted this region … it is [water] allocations, the global financial crisis, its international commodity prices. There's also the rising cost of production, and farmers' declining capital. So I think water scarcity was the straw that broke the camel's back … but what really hit us equally as hard, if not harder, has been commodity prices … and everything else. (CEO, MDC)

> The farming community in this region have had a number of factors come at the same time, and that's never happened before. So you might of had a drought but you had reasonable commodity prices. Whereas now, we've had drought … there's been wine grape glut, and on top of that, there's generational change in the farming community. I feel it's very much a pivotal point in terms of where we go to from here in farming. (Senior Planner 1, DPCD)

> It's not just drought. You've got to understand it … in the context of all the other pressures. They could've coped with the drought, it would have been a lot of stress, but with the wine grape prices, then you can't afford to buy water to keep going. It's an unresolved, slow disaster. (Senior Social Researcher, DPI)

These statements show the need to understand the situation in Mildura as complex and 'more than drought'. In fact, such statements reflect a common view across interviews that it was a critical imperative to broaden our analysis. Hence this section attempts to capture and portray the sense of complexity that infuses the issues facing the region by addressing three key challenges identified in the interviews: water trade, allocations and security; commodity prices; and a changing farming sector.

Key Insight 1

The social and economic issues facing inland (rural) communities are not just a product of drought – to understand them as such would under-estimate the extent of the problems and inhibit the ability to coordinate the holistic, cross-agency approach needed to address them.

First, the region has been confronted with rapidly changing water security and supply. Water reforms, initially introduced under the National Competition Policy in 1994, have continued the process of unbundling of water from the land, to create a water market of tradeable and saleable water. The reforms were based on an unquestioning 'faith in markets' that would lead to water being allocated "*to its most valuable use, thereby ensuring a range of socially optimal outcomes"* (Quiggin 2007). The responses to this marketisation process, however, have been varied and range from confusion and outright resentment through to experimentation and learning to manipulate the water market.

Most often, interviewees identified the rapidity and volatile nature of water deregulation as presenting the primary challenge to producers in the region. Indeed, many changes have since been made to the 'unquestioning faith in the market' to better regulate the trade of water. In addition, producers are progressively learning how to best engage with the water market, without the significant losses of income that occurred through the early stages of unbundling. The following statements capture some of these diverse experiences:

> There wasn't the understanding of how you manage, all of a sudden, the security of water being threatened. We might be able to manage drought in some respects, it's been the policy issues and intervention in the [water] market which causes a whole range of other issues. (CEO, MDC)

> It's another set of rules and it's getting quite complex, but quite sophisticated. Some operators can really fine-tune the risk in line with their business. Others get very confused by it and caught out by the rules, which is understandable, it's a rapidly changing field. (Consultant, RMCG)

> I think a lot of the farmers that have lost their water would be critical of the unbundling of water. But there would be others that are more progressive … that would say that's an opportunity for them to use every asset that they've got … to be able to trade off excess water or buy in cheap water at appropriate times. (Coordinator, RFCS)

Engaging with this newly forming water market can be 'tricky' (CEO, MDC) and a 'nightmare' (Farmer, Mildura Region) for farmers. Yet it is the rapidity and unchecked nature of the reforms, and their coincidence with a range of other water supply and agricultural changes, that have presented the most significant challenges to farmers. In the early stages of reform, there were a number of producers who lost significant amounts of money in the trade of water (e.g. those who sold off water prior to unexpected and severe reductions in water allocations, only to have to buy water back at inflated prices; those producers who bought water to top up predicted water allocations, only for allocations to increase late in the season, thus leaving them with more than their 100 per cent allocation). Since then, changes have been made to ensure that excess water purchased can be carried over to the following year. Indeed, governments, across state and Commonwealth levels have been slowly developing 'more clarity and transparency in terms of the water allocation and trading rules' (Consultant, RMCG), a process that will need to be ongoing. Despite these revisions, many producers

suffered considerable losses and stresses in learning how to navigate an evolving and shifting water market, and have had to rapidly adjust their agricultural planning and mindset, weighing up potential water losses, the cost of water versus the value of crops and the declining value of land unaccompanied by water – a change that has seen many farmers exit the industry entirely. To some degree, this could be seen as 'a risk of business' (i.e. nobody forced people to sell or buy water); however, it highlights another challenge for rural communities (i.e. water trading) that did not exist in previous droughts and will have to be considered in the future.

A key part of water security, alongside water trading, is allocations. The sudden and unanticipated declines in water allocations over recent years (see Table 5.3) have seriously impacted on the viability of some farms in the region. Moreover, these changes to water allocations are combined with the Commonwealth government's proposed water buy-back scheme, or Sustainable Diversion Limits (SDLs), to increase flows in the Murray River system (the final outcome of which remains uncertain (ABC *2*010a*, 2*010b). This combination of changes has created uncertainty around water security and supply into the future, as illustrated here:

> We went from 100 per cent [water allocation] to zero. So it guaranteed that 96 years out of 100 they would have 100 per cent water allocation, with a worst case scenario of 60 per cent … and then suddenly, we went to zero which was huge in terms of how irrigators formulated their business. (Senior Planner 1, DPCD)

> The problem is that you can't bank on how much water you get at the start of the season, which is fairly important for permanent plantings. So at the start of the season we were looking at a grim forecast of 23 to 26 per cent maximum, so a lot of people bought water, and now we are sitting at 77 per cent. So a lot of people that bought the water didn't need to. (Project Officer, DPI and Farmer)

> Adding to the uncertainty of being able to plan at the moment is the pending release of the Murray-Darling Basin Plan which will include Sustainable Diversion Limits (SDLs) to determine how much water is available for consumptive use … the indications are that they are looking for a reduction in water availability. (Consultant, RMCG)

Water security is essential for producers to be able to plan, invest in and irrigate their crops. Currently, there a range of issues are creating uncertainty and confusion in the minds and practices of irrigators. Interviewees expressed frustration at the variability and ad hoc nature of allocations (e.g. between states, from season to season, from forecasts to actual allocations) and at the uncertainty surrounding future announcements about SDLs. Many farmers have invested considerable sums of money in new irrigation systems and on-farm technologies to cope with changes to the farming industry, yet are struggling to negotiate the uncertainties of water supply. Common across government, agency and farming representatives was the express need for a stable and secure water allocation and buy-back system that can be more readily and effectively negotiated, planned for and managed by farmers.[11]

[11] The newly released (October 2010) Murray-Darling Basin Plan (draft) attempts to address this issue.

Key Insight 2

In areas relying on irrigation, there is an immediate need for a stable and secure water allocation and buy-back system which can more readily and effectively be negotiated, planned for and managed by farmers. The new Murray-Darling Basin Plan (draft released in October 2010) may provide stability, but there will likely be stakeholders who are negatively affected by this 'stability'.

There is some resentment and much frustration, expressed by farmers around the emerging water industry, yet this sits – sometimes uncomfortably – alongside a deep attachment to the river, and respect for water and its role in community well-being. Many interviewees spoke of the emotional effects of seeing the river in decline, yet also spoke of the effects of dying crops, lawns and gardens on the well-being of the community:

> [The river's] been there for many thousands of years … we need to manage it so much better. We can be critical of allocations but somebody needs to take responsibility. We need to reduce the water harvested from the river and that's going to cause impacts to these farmers. With the government buying water back, they're spending all this money … and that's good for the river, but the farmers are saying 'well, we should be getting that water'. I think they're coming to grips with that and I think they do realise that the health of the river is essential, but it's pretty hard for them to take. (Coordinator, RFCS)

> When the water issues all started, there was lots of anger and emotion. And unless that emotion is dealt with, people stop being rational … there's that constant underlying resentment that just sits there. (Counsellor, Mallee Family Care)

> Whilst water restrictions have certainly taken a toll on rural environments, they have in urban areas also … for the elderly, watching their gardens die. And I speak to farmers who say, as they drive past block after block of abandoned, dried off land, 'I can't even bear to look because I know what it means to that neighbour'. And now it's all gone and dead, it's really big emotional stuff. (Project Manager, Rural Skills Connect, Mildura Rural City Council (MRCC))

> Without the river … we'd be just salt bush and rabbit burrows. The river is critical for all of our needs. It's critical for our food production, it's critical for our welfare, our social being, who we are, there's a lot of interaction with tourism … and recreation on the river. So it really features as an important part of the community. (CEO, MDC)

The emotions and values tied to water in the region are close and complex. There is considerable anger and resentment from some farmers who remain attached to traditions of perpetual irrigation supply (see also Golding & Angwin 2009). Yet there are also attachments to the river and a respect for water ingrained in this rural community that offer opportunities for adaptation and change in the region. Drawing on people's close relationship with the river and water – commercially, recreationally and emotionally – can offer capabilities in nurturing new understandings of water variability and change, which has been the subject of recent research (see Allon & Sofoulis 2006; Gibbs 2006). Through a change in understanding, it is possible to shift from notions of water as a taken-for-granted utility of a free market to notions of water as variable and lacking in the environment. Such a change in thinking around water, its value and its availability will be essential under the continued predicted drying of this region.

Key Insight 3

There are opportunities to engage people's love for rivers and respect for water in rural areas to promote adaptive responses. A shift in understanding and language around water is necessary to acknowledge its scarcity, variability and value for 'making a living', the environment and the community.

Another issue confronting the Mildura region, in addition to drought and water, is that of commodity prices. In fact, many suggest that commodity prices have been the primary factor driving decline and abandonment of farms. The fall in commodity prices – particularly for wine grapes – has been driven by over-supply in the global marketplace, the value of the Australian dollar and the absence of tariff protection. In a region dominated by bulk wine grape production, the effects of large declines in wine grape prices have been devastating:

> The traditional 20 to 30 acre fruit grower is having to compete with international markets. And then with the price of water … I've got friends who are just not watering their vines, they've said that they're not picking, it's not worth it, they're not covering costs. (Manager, Mallee Family Care)
>
> The wine grape industry is on its knees … huge over-supply, wine grape prices [are] the lowest they've ever been. So we've seen this boom, bust situation with the wine grape industry. (Coordinator, RFCS)
>
> It's sad because we're losing good growers still, with the commodity prices. There's a lot that have done everything they can in terms of water saving and still can't survive … they just haven't got the reserves. So people have learnt how to manage with less water to a degree, but the lower commodity prices was the killer. It's really sad to see, you drive through the place and there are so many dead vines. (Project Officer, DPI and Farmer)

Other producers have suffered commodity price fluctuations, such as citrus and dried fruits, whilst other sectors are flourishing, including table grapes and sheep producers. However, with the dominance of wine grape producers in the region, the severe downturn in the industry has had resounding effects on the productive capabilities of the region, as more farmers leave the land and cease farming entirely. Few producers have the financial reserves, due to the combined pressures of drought, water trading/allocations, and commodity prices, to shift to other industries as they may have done in the past. In addition, the widespread uptake of the Small Block Irrigators Exit Grant by wine grape producers has resulted in strips of land left dead, bare or barren, which has impacted severely on the local environment and on community well-being and outlook (see further discussion in Section 5.1.3 and Figure 5.7).

The Mildura region has also been confronted by shifts in the farming sector more broadly, some of which are related to issues of drought and commodity prices, and others which are part of the sectors' response to changing global markets and rural demographic shifts. In particular, interviewees discussed the rise of the large amalgamated farm and multinational agri-business, with the associated decline of the family farm and farm succession, as illustrated here:

> When the dried fruit industry went by the wayside 10, 15 years ago … we had to find something else, so the wine industry came along, and a bit like lemmings, we all went across to that. But into its development, the managed schemes came in because you had a 100 per cent depreciation allowance … for anything you put in, in a capital sense. So they could write their money off in 12 months. So all the sharks came in … and bought large holdings, a

> thousand acres at a time. And it was taken very quickly to an oversupply situation, because you had the Chilean and the South Africans booting up at the same time, so it became a very cluttered global market. The outcome of that is now just coming into play. (Farmer, Mildura region)
>
> There's not an obvious crop to convert to anymore like we used to. There's so much doubt in the industry that they're not game to, and it'll cost 10 to 13 thousand an acre to redevelop. On a permanent crop that usually takes seven to eight years to reach maturity and earn money. What do you do between now and then? It's just too much doubt, people don't want to take that risk. (Project Officer, DPI and Farmer)
>
> Smaller growers have limited capital and limited opportunity for change. They're the mum and dad partnerships … the children go off to tertiary education, good jobs in the city, and they don't want mum and dad's farm. Mum and dad are sitting there with their labour force gone … some just haven't got the will or the finances to do anything. The family farm has just about had it. (Coordinator, RFCS)
>
> They're not passing the farms on now, they are staying on longer and longer … that succession stuff is not happening as it was. The neighbours may not be buying you out which used to happen. (CEO, MDC)

Farmers in the region are experiencing a combination of industry and demographic pressures that they have not previously confronted. The farming sector is shifting between profitable crops, as it always did, but now there are limited financial reserves and too much doubt for many farmers to make those changes. Moreover, the traditional family farm is under pressure from the evolving farming industry and the broader rural demographic shifts involving the simultaneous withdrawal of younger people and an increasingly ageing population (see Section 5.1.3). The compounding nature of these transformations is progressively carving out a new and uncharted farming landscape across the region.

Source: Photo: Louise Askew, March 2010.

Figure 5.7 Grapevines in the Mildura region left to die due to the combined pressures of drought, water trading/allocations and commodity prices

The complex accumulation of rapid environmental, economic and social changes in Mildura introduces a series of challenges not previously faced by people living and working in the

area. These are recent phenomena confronting irrigation farmers that present a 'huge learning experience, in which there's no living memory to draw on' (CEO, MDC). For many farmers, the confrontation has been too much, with many leaving farming entirely. It should be noted that this is also occurring in non-drought-stricken areas for the same structural and social change reasons, reinforcing the idea that 'it is not just drought' that threatens the future of small rural communities (see Section 5.2.1). For others, they are learning and creating the practical knowledge base through which to adapt to living and working with less water and as part of an altered farming landscape. Across the experiences described here, there is a sense of immense change, doubt and a restless tension as people weigh up their future – presenting significant questions around the impacts such uncertainty has on the economic and social well-being of the region.

5.2.2 Economic impacts: drought, drying and the family farm

Mildura's economic base, as discussed in Section 5.1.2, is driven primarily by agriculture. Diversification into other industry sectors has been occurring, such as transport, property and mining, but agriculture and the services that support it are central to the economic viability of the region. In the face of current pressures – drought, water security, commodity prices and farming sector shifts – agriculture in the region is experiencing a severe financial downturn; one that is having resounding effects across the community, local businesses and farming families.

On the farm, financial returns and reserves are dwindling after many years of drought and low commodity prices. This has the combined effect of decreasing everyday spending income and increasing the strain of ongoing and accumulating debts. As noted in previous discussions, the RFCS is dealing not only with a significant rise in clients seeking financial advice, but also escalating client debt (up to $275 million in 2007–08 – see Section 5.1.2). As a result, many families are no longer in a position to borrow funds, which impedes their ability to change and adapt via new technologies or crops. In addition, many families are seeking to diversify their income base through secondary or off-farm employment; as discussed previously, this is often undertaken via jobs in the services sector. The financial position of farmers is such that, even if the pressures of drought and commodity prices were to break immediately, the financial stress on farming families would continue, as illustrated here:

> What's happening with farmers is that any asset capital that they've built up has been whittled away over a ten year drought. And a lot of people have second incomes because of the proximity to Mildura. You might have a small acreage with wine grapes that are not doing well, but your wife is working in town … but the question is whether that has held back some of the small blocks from getting out, getting bigger, doing something different, because they've got a fail safe. (Senior Planner 1, DPCD)
>
> The amount of money that people are making on lots of farms has declined, and there's been a lot more reliance on government support in the hope of getting through. (Senior Social Researcher, DPI)
>
> We're seeing families who've never applied for EC, a lot of them are only starting to apply now for the first time. And it's almost too late financially. (Counsellor, Mallee Family Care)

> The structure of family is changing … often the wives have not worked off farm before. They come from a family of irrigators and often from ethnic backgrounds that have to go through a mind shift, and that's really tough when you're under pressure. But they've run out of options, they can't put the banks off anymore. (Project Manager, Rural Skills Connect, MRCC)

The immediate financial pressures on farming families are immense. Their ability to borrow funds is declining, and with that so is their ability to change and adapt their farming practices. For many, their focus has been narrowed to economic survival – 'holding on', 'getting through'. The diversification into off-farm income may offer an effective short-term solution to some of these financial strains. However, off-farm incomes might also enhance the narrow focus on economic survival and limit more strategic financial and farm planning. Moreover, the adoption of secondary employment has impeded the ability of farmers to undertake training out of work hours and on weekends as they are often working second jobs (Project Officer, DPI and Farmer). Secondary incomes are also putting increasing strain on family relationships, as farming families (including, in some cases, children) are working more hours to cover daily expenses.

Government and NGO service providers are now familiar with the effects of declining farming family incomes, which are impacting on the ability of families to undertake everyday activities. There have been noted increases in rental distress and family income distress in the Mildura region (Project Officer, MRCC). As a result, their spending on everyday goods has decreased and there is an increasing reliance on government financial assistance and EC provisions, as described below:

> We're at a point now with some families where every cheque they write has to be cleared with the bank, including their groceries. They have to send a list of groceries to the bank to get approved. (Counsellor, Mallee Family Care)

> We're seeing it financially … schools ring us discreetly to ask for funding for young people who can't go to camp because the family can't afford it … and the kids' uniforms are looking dirty because they can't afford the washing powder. (Project Officer, Youth Planning, MRCC)

> It is affecting everyone right through, you know, trucking companies and harvesting and agribusiness … town spending. Socially everyone's sort of pulled back a little bit as well. (Project Officer, DPI and Farmer)

> The most spectacular financial impacts have been in the irrigation areas where we've basically got a welfare disaster looming in the Mildura district. (Senior Social Researcher, DPI)

Many of those working in support services describe a burgeoning 'welfare industry' in the Mildura region (Director, SMECC), created and sustained by reactive government support programs (see further discussion in Section 5.2.5). For a Coordinator within the RFCS, the 'welfare system' is providing much-needed assistance to farmers but is not the most effective approach, with farmers becoming increasingly reliant on government-funded financial support – 'you can't blame the farmers, if it's there you take it … but we do see it causing social problems' (Coordinator, RFCS). These social problems may indeed indicate the type of 'welfare disaster' described above, especially when combined with the increasing influx of low socio-economic groups to the area in search of low-cost housing.

Key Insight 4

Government support for farmers is crucial, but the traditional exceptional circumstances and welfare approach needs to be re-examined as this sustains short-term responses and creates further problems of dependence.[12]

Perhaps the most devastating economic impact on the farming families of the Mildura region has been the changing nature of farm assets. Traditionally, farmers were asset-rich, which buttressed seasonal and market-derived fluctuations in income (Botterill 2000). However, these traditional assets are being whittled away by a changing farming sector, shifting land and water regulations, and the increasing strain of farm debt. For many, the farm is regarded as their last asset, their superannuation, and for many this has become largely worthless, as illustrated here:

> The changing of the *Land Act* to do with the subdivision of land has impacted radically on farmers. There are lots of people who could have sold off the water to get themselves out of debt, and then could have subdivided their land for their superannuation, but that option's gone now. (Senior Planner 1, DPCD)

> [With the unbundling of water from the land], the land value is not in the dirt itself, it is in the water component. So things like loans with banks are based on value including the water, so there had to be a substantial shift in how farms are valued. (CEO, MDC)

The increasing financial pressures on farmers subsequently have been exacerbated by the combination of water reforms and unanticipated changes to land subdivision laws. The RFCS (2008) has acknowledged the issues posed by declining superannuation and farm assets, particularly as part of an ageing population in the region. Dwindling farmer assets and superannuation will need to be addressed as imminent problems and a potentially immense and unanticipated strain on pension-support schemes for those retiring or exiting from farming in the future.

Key Insight 5

Services for ageing populations (the norm for Australia but emphasised in small rural communities) need to be addressed, particularly in light of increased farm debt and/or decreasing superannuation (due to the global financial crisis) and, in some cases, the asset base of farms.

Although government has provided support to those wishing to cease farming through exit grant schemes, farm exiting also has significant economic and social impacts on the region that must be acknowledged. Indeed, the large number of farm exits in the Mildura region has created problems of unemployment and skills shortages, which several interviewees describe:

[12] As an example of a way forward, from July 2010 to June 2011 the Australian government, in partnership with the Western Australian government conducted a pilot of drought reform measures in parts of Western Australia to test a package of new measures developed in response to the national review of drought policy. The measures are designed to move from a crisis-management approach to risk management. The aim is to better support farmers, their families and rural communities in preparing for future challenges, rather than waiting until they are in crisis to offer assistance.

> A lot of growers who know nothing else but growing are suddenly standing there with nothing in their hands, which is pretty hard. And they won't all find work. Quite a few people I know have gone into trades, or sales. But I don't think they wanted to … there is not a lot of choice. Either you do that or you move, and lot of people don't want to move. (Project Officer, DPI and Farmer)

> There's people who have known nothing else having to go and get work doing whatever they can find … Even the successful ones who find decent work, I was speaking to someone the other day, and he said 'I'd still be much happier chasing the sheep around'. (Manager, Mallee Family Care)

> Mildura fortunately has a reasonable job market, so you had a lot of people that said, 'I'll go back, I'll go get a job'. But I mean, when you're 50-odd, that's a bit harder. (Farmer, Mildura region)

With increasing farm exits, the economic impacts on local businesses, agricultural support industries and remaining farmers will be immense. For example, many spoke of the burden of abandoned irrigation networks – 'all of a sudden you've got this pipe network that needs to be maintained, with less ratepayers and stranded assets' which places more financial burdens on remaining growers (Project Officer, DPI and Farmer). Even when exiting the industry, there are economic impacts on the region. Moreover, farmers are reluctant to give up their close ties with the land and community of Mildura, resulting in an increasing need to support those exiting to gain recognition of their existing skills so that they can use and adapt these to other employment locally. Both the RFCS and Technical and Further Education (TAFE) system in the region noted the importance of supporting skills accreditation for those farmers leaving the industry as well as the significant shortages of skills in the region that these farmers could fill (see later discussion on specific government programs in Section 5.2.4).

Key Insight 6

Exit grants can produce negative flow-on economic and social impacts to inland (rural) communities if they are not properly integrated with land use planning and assistance for redevelopment and restructure at the community and individual level. These impacts need to be acknowledged as part of more holistic government assistance schemes, incorporating reskilling and accreditation programs for exiting farmers. Further provisions are also required for succession and long-term land use planning.

5.2.3 Social stress: rural communities, farmers and their families

The complexity of issues confronting farmers in the Mildura region is creating and exacerbating a series of social problems for farmers, their families and the broader community. Those in the farming industry, and others associated with it, are now acknowledging the mounting social impacts as the pressures of drought and commodity prices continue to distress this very close and connected community. As one interviewee describes, 'in a community like Mildura, everyone wears five different hats, so we see the impacts of drought right across the community' (CEO, MDC). The social impacts are varied, but interviewees describe the severe and sometimes devastating effects on farmers' mental health, family structures and community well-being – effects that are best illustrated with the words of Mildura people:

> The effects I see are despair, suicide, poverty, unhappiness, angst and a general malaise in the horticultural and agricultural community because of the water situation and the problems with commodity prices. (Director, SMECC)

> We've seen an increase in referrals to mental health facilities, mainly through GPs or specific programs. We're seeing an increased level of stress in small communities. We're seeing an increase in concern amongst young people in terms of how their parents are travelling. There have been lots of requests to do activities with mums and dads, which I think is a 'strange' request from young people and makes me wonder how this community is actually travelling. (Manager, Community Development, MRCC)

> We had a lot of people out there shell-shocked, 'what happened here? Everything was going along nicely and then all my dreams are gone'. So there's been quite a significant amount of rural counselling, helping people mentally get through those things. (Farmer, Mildura Region)

> It's about self esteem … there is a lot of loss of face … particularly in the ethnic communities. And now they're not getting off the farm their focus is getting smaller and they're going inwards. They're losing that capacity to be rational because of the stress, the sense of shame, failure, blame. And almost thinking they're working harder, but they're actually not. Because their capacity to work harder is not actually getting a result … so the spiral just continues inwards. (Counsellor, Mallee Family Care)

> Most farmers tend to be good problem solvers and they network with one another, but when you're adding the element of depression, people isolate themselves. They tend not to solve problems that at another time in their life they may have been able to. And with isolation they don't share and talk about it. So that's the challenge, to engage them somehow … because they're withdrawing. There is a significant group of our community that need help and I don't think the resources are there … and they're not getting to the people who are critical. (Project Manager, Rural Skills Connect, MRCC)

These devastating impacts on farmers flow on to their families, who are increasingly stressed about the future of the farm and the health of their families, as illustrated here:

> We've had feedback that some men are withdrawing. Women saying we need to do something for the men to participate in, to break that monotony of thinking about the farm … and the kids, some of our younger people aren't going on to further education because they don't want to put additional financial pressure on their parents. That has social, psychological and long-term impacts on the community. (Manager, Community Development, MRCC)

> In the current crisis, it has been noticed that kids have been not attending school and staying home to help out on the farm to reduce labour. And there's also the issue of family structure being put under immense pressure. There's all these things that they can't control which puts a lot of pressure on the family unit, to the point of suicide, break-ups, kids coming to school without proper clothing and no food. (CEO, MDC)

Farmers increasingly are suffering from depression and emotional exhaustion from the uncertainty and pressures of farming, with many feeling overwhelmed and isolated in their own problems and on their own farms. As a result, professionals have been noting increased incidents of separation and relationship dissolution, grief and feelings of loss and shame, and withdrawal from the community and social activities. The impacts of these social strains are immense and critical, not only for farmers but for their families and the community as a whole. Children increasingly are deprived of essentials and educational opportunities, and are

experiencing the pressures placed on their parents. Indeed, a report by the Youth Affairs Council of Victoria (YACVic) showed that young people in the area are expressing fears about their future (e.g. opportunities to participate in education and sports), the future of the family farm, and the health and well-being of their parents (YACVic *2*008).

Moreover, the educational and training opportunities for farmers are also impeded under these strains, with increasing pressures of time, money and exhaustion limiting farmers' participation in workshops and training initiatives (see also RFCS *2*008). In a region already characterised by below-average income and education levels, these trends are worrying and 'not supportive of the educative process' required for community strength and adaptation (CEO, TAFE).

For the community, the social ramifications of increasing mental health issues, family pressures, and decreasing education, training and employment levels are immense and challenging. The withdrawal of farmers and farming families into their own problems can often result in decreasing participation in community events, sporting clubs and other recreational activities, and more serious problems described by a Youth Planner (MRCC) of noted increases in domestic violence throughout the region. Such harsh social impacts present significant challenges for the Mildura region when attempting to foster community strength and togetherness in the face of further long-term climatic and farming industry changes.

Key Insight 7

Increasing and critical cases of declining mental health, unmanageable emotional load and stress in farmers and farm families require immediate attention. Trained and supported mental health professionals with appropriate rural knowledge are needed to address these issues.

5.2.4 Community sentiment and strength: stoicism, scepticism, uncertainty, optimism

Notions of community resilience are common to studies of climatic change and adaptation, most often viewed as an effective measure of adaptive capacity – an antidote to the types of vulnerable conditions described above (see discussion in Section 2.1; Caldwell & Boyd *2*009; Stokes & Howden *2*010). In this context, resilience is key to enhancing adaptive capacity and therefore enabling communities to reconfigure themselves without significant declines in crucial functions in relation to primary productivity, hydrological cycles, social relations and economic prosperity. A decrease or loss of resilience (i.e. low adaptive capacity) is therefore a negative thing, as it is associated with loss of opportunity, constrained options during periods of reorganisation, uncertainty and renewal, as well as an inability of the system to do different things. For areas such as Mildura, community strength and pride are central to their rural identity and may present opportunities for engaging and facilitating change. In this section, the notion of community resilience and its potential for supporting adaptation – considering how community attitudes and influences may help to address the complex issues facing the region – are positioned as an adjunct to discussions of drought.

This research uncovered a complex picture of community attitudes and effects. Four predominant effects infused interviews: stoicism, scepticism, uncertainty and optimism – each offering an insight into how the community is feeling and how this may impede or support

adaptive capacity into the future. There was, however, some confusion (both in the literature and with the people to whom we spoke) as to the difference between resilience (as defined above) and stoicism (i.e. endurance in the face of adversity).

The traditional notions of the 'stoic' farmer are evident in descriptions of farmers and rural life in Mildura. As discussed previously (see Section 3.4), the ideal strongly resonates in rural areas, and Mildura is no exception, mythologising through history the notions of 'rural battlers' up against the 'harsh' and 'unpredictable' Australian climate (Botterill *2*009). This stoicism is often revered as the means by which farmers make it through the difficulties that they face: 'there is a sense of resilience … we've survived tough things before … we can survive this too' (CEO, MDC). However, this quote again illustrates the confusion between what is meant by stoicism and resilience – what the person was actually referring to was stoicism. As discussed, while aspects of stoicism can be useful, in this report we seek to challenge notions that stoicism is something for which it is desirable to strive, and instead suggest that resilience, as defined above, should be the goal. As counsellors in rural areas are aware, to aspire to be 'stoic' – which many farmers do – often has negative outcomes. It can impede farmers' ability to change, narrow their focus and limit strategic decision-making and more adaptable notions of strength, as a counsellor with Mallee Family Care explains:

> Generally speaking, you're dealing with a proud, stoic bunch of people who find it really hard to adapt, to sell the farm, to move into town – all the historical issues associated with owning land that come into play. The term 'resilience' meaning 'highly stoic' I'm starting to find really offensive. It continues I think, a very negative stigma to seeking help. To be stoic … can be a barrier for people to access or seek services because the perception is 'that they are stoic and therefore they don't need help'. Yet one thing I've observed is that if people seek services earlier, quite often they can make some changes positively; rather than a means of being forced upon them, rather than it becoming a last resort. So I think we need to accept and acknowledge farmers as great, strong, hardworking people, but they also need assistance to look at early intervention. (Counsellor, Mallee Family Care)

Notions of community strength, adaptability and proactive change are more useful concepts for engaging in discussions around drought and climate change. Strength and adaptability are most certainly evident in the behaviours and actions of farmers in the region (see Section 5.2.6), so a shift in language to acknowledge flexible and strategic notions of strength (i.e. resilience) would be more effective in facilitating service providers in their vital work to reach struggling farmers. Such a shift would also support a broader mind-shift for the farmers who remain, to acknowledge that strength through change and transition will provide the long-term resources to manage a changing climate and landscape.

Key Insight 8

The language used in climate change adaptation research and policy needs to be clear that the goal is to increase adaptive capacity through resilience (i.e. the ability of communities to reconfigure themselves without significant declines in crucial functions) as opposed to stoicism (i.e. endurance in the face of adversity). Reinforcing ideas of the 'stoic farmer' can prevent farmers from seeking help and undertaking change and therefore hinder adaptive capacity-building.

Second, sentiments of scepticism, particularly towards anthropogenic climate change, are abundant. As stated at the outset of the report, we sought to avoid debates around the existence or uncertainties of anthropogenic climate change, as this was not necessary to the discussion of everyday experiences of drought in rural communities. Indeed, where this scepticism was expressed or noted by others, it did not appear to impede change or adaptation in farming behaviours or practices. Many described the widespread nature of scepticism, but also its ability to be overcome by the practicalities of change:

> I think people are a lot happier talking about drought rather than climate change. Because there's too many people out there who don't believe or don't want to know. I think there's a lot of scepticism [about climate change]. And when there's been other things that have been more pressing and urgent and short-term, like these commodity prices, that takes all the attention away from climate change. And if all those other problems didn't exist, then climate change would be in everyone's faces. (Project Officer, DPI and Farmer)

> They are very practical and conservative people and a lot of them don't believe in climate change. They need the proof, and that's the problem with them believing, because there's been some controversy around it. A lot think it's just cyclical. They swear black and blue that it's not happening, but then, they're the first to use techniques to overcome what is in fact happening, and they're very good at doing it. (Director, SMECC)

> There are still two modes of thought: those saying 'we can see there is climate variability happening and we are concerned about what that might mean'; and those that say 'well it's just cyclical'. We've taken the tack – let's not get caught up in argument. Let's be energy efficient and reduce costs to industry on that basis. We know there's a market edge in being carbon neutral … and people want to be profitable. So forget the other debate and work on this criterion which will benefit everyone at the end of the day. (CEO, MDC)

Although scepticism around anthropogenic climate change may be seen as a 'dead end' for rural adaptation, the fact is that these same farmers are often taking up technologies and practices that could mitigate climate change impacts and assist in adapting to the long-term drying of this region. It is important to move beyond such debates, and engage farmers and farming families in the very real and day-to-day challenges they confront as part of a changing region, valuing and further developing the practical knowledge and experience of farmers to manage, mitigate and adapt to climatic changes (whether the cause be anthropogenic or natural).

In addition to climate change scepticism, we feel it is important to note the scepticism expressed towards research on this topic. Many rural communities, farmers and families from rural areas are tired of 'drought initiatives', 'drought workshops', 'drought research' and anything to do with 'climate change adaptation and/or mitigation'. The participants in this research were more than obliging when it came to providing information and sharing their stories, but at the same time felt that this would not necessarily lead to any positive change in their circumstances (see also Smith & Campbell *2*009). The views expressed by this project's participants were supported during the literature review for this project, where we found several independent, and separately funded, research projects, initiatives and/or workshop reports published over the last decade with similar objectives, similar case study areas, similar outcomes and recommendations – the other thing all the previous research had in common was that very few of the recommendations had been implemented or adopted. This issue needs to be recognised and respected by researchers, funding bodies and policy-

makers: there needs to be more coordinated research activities across governments, universities and NGOs, and more connected and tangible research outcomes for communities. At worst, research can be viewed as another unnecessary pressure on rural communities, but when facilitated in genuinely engaged and connected ways, it can offer hope and practical outcomes to communities confronting critical challenges.

Key Insight 9

Scepticism towards climate change is not necessarily a barrier to adaptation, since farmers adapt to much shorter time frame challenges and risks – both climate and market. However, scepticism towards research in this area (i.e. numerous studies doing similar things with few tangible benefits) is concerning and needs to be addressed through more coordinated and connected outcome-based research activities (see Recommendations 4 and 5 in the Conclusions).

Third, and counter to the fervent affects of stoicism and scepticism, is that of the wavering uncertainty that pervades the community. It is a potentially devastating impediment to adaptation and change, as illustrated here:

> The uncertainty is corrosive. Australia's only just got into quantitative long-term studies of well-being and income relationships. But from the studies … one of the biggest contributors to poor health outcomes is income insecurity. In a sense, if you've got low income, you adapt to it, and your expectations change. But if you're continually being disappointed, or you have crashes, it's perceived as a loss of potential future income. And that leads to the classic stress symptoms. (Senior Social Researcher, DPI)

> Psychologically people are dealing … with a continually changing and uncertain environment. The drought now has been ongoing for ten years, and what I see in terms of people's ability to cope, is the stress of change that is occurring all the time. So people are dealing, and even at a government level, we're dealing with a continually changing and uncertain environment. (Senior Planner 1, DPCD)

> There's a lot of negativity … because they're producing something that's not worth producing. And there's just too much doubt, people don't want to take risks. I guess the growers are so depressed that there's not the ideas and the enthusiasm. It's just as easy to walk away. (Project Officer, DPI and Farmer)

The detrimental effects of uncertainty are indeed '*corrosive*' – not only for farmers, but for a community in which the uncertainty seems never-ending. In such a climate, it is critical that as much certainty as possible is provided in the terms of government and NGO direction, assistance and response. When there is so much out of their control, government and other service providers need to provide solid and unwavering direction and guidance and not be caught up in the vagaries of policy debates and ad hoc service delivery responses.

Key Insight 10

The multiple uncertainties (e.g. climate impacts, water markets, commodity prices, demographic changes) pervading the farming community is detrimental and exhausting. Government policy and assistance schemes need to provide a strong and consistent response to service delivery and rural support.

Finally, despite everything, optimism remains in these depressed and uncertain contexts. Optimism is criticised in academic debates around climate change as 'not enough to counter the relentless effects of drought' (Mackinnon 2007). However, this view offers only a limited interpretation of optimism as an adaptive capacity. In Mildura, optimism was not only a vital and strong response to the detrimental vagaries of uncertainty, but was often applied in a strategic way, as a means of driving sometimes immense industry and behavioural changes in the region as a response to long-term climate changes:

> On a longer term basis with more droughts occurring, and prolonged droughts, we'll have to have a whole change in thinking in terms of 'okay, well this is the way it's going to be, we've got used to managing that in the past, we'll have to manage this into the future.' It can be done. (CEO, MDC)

> The farming community is eternally optimistic, because at one level they have to be, they don't have many choices. My mate … he's very well read, he goes to conferences, he's not on his farm drinking beer in his shearing shed worrying about the situation, he's over in SA or Germany or somewhere finding out what's happening. (Director, SMECC)

> I don't believe that it's a community that will just end up shrivelling because of climate change. I think that there's enough innovation that people will deal with it, and change and respond to that. (CEO, TAFE)

To deny the importance of optimism is to overlook its role in countering uncertainty, and in providing direction and strength in the face of change and adaptation. Optimism can be utilised and supported in strategic ways as a means of envisioning different futures and scenarios, however challenging and divergent they may be from current circumstances.

Key Insight 11

Supporting optimism in drought-affected communities can be important in countering uncertainty and envisioning alternative futures, however, it is important that this is not false optimism.

Although somewhat deviating from climatic and farming challenges in the region, this analysis of community attitudes and effects draws to the surface how the community is feeling as a result of these current changes, and how they are looking at the future. These trends can offer insight into potential barriers and impediments to climate change adaptation in the region and, importantly, highlight those attitudes which can be drawn on and developed to facilitate adaptation in farming behaviours, and build more targeted government support and service delivery.

5.2.5 Government support: alleviating and transitioning farming families

Australia has a relatively long and tumultuous history of drought-related policy and intervention (see Section 2.3). For the Mildura region, much of the context of government drought support emerges from the reforms to policy undertaken throughout the 1990s. The National Drought Policy (NDP), Rural Adjustment Scheme (RAS) and EC provisions are all ingrained in the region, with the entire Mildura region currently under EC declaration. In addition, the region has been subject to two major exit grants – the EC Exit Grant and the Small Block Irrigators Exit Grant for the Murray-Darling Basin. Like many drought-affected regions, farmers in Mildura have also had increasing access to associated social and

economic support services (e.g. Centrelink income support services, the Rural Financial Counselling Service (RFCS) and Youth Allowance). With current debates and major policy reviews questioning the effectiveness, equity and long-term outcomes of current drought policy (see Section 2.3), it is crucial to examine these policies and programs as part of everyday drought-affected contexts: what works, what is necessary, what needs to be changed or removed, and what is the most effective direction for future government support.

This section addresses some of these critical questions in the context of the Mildura region through the experiences of farmers, government workers and service providers working in the area. It describes the current government support context, highlighting the specific support schemes available and how they typically are viewed and engaged by farming families. It then discusses, from the perspectives of those working in the sector, the aspects of government drought-support that are successful, the critical elements that facilitate effective rural support and the approach that is recommended for the future.

For many farmers in the region, government assistance is largely encountered through an EC or Small Block Irrigators Exit Grant. The EC Exit Grant offer funds of up to $150 000 to exit farming production. Although the EC Exit Grant has been subject to recent controversy and political debate, in the Mildura region, there was little outright criticism of the scheme. Rather, most working in support services viewed the scheme as an imperfect mechanism for supplying a number of farmers trapped in a financial crisis a lifeline and a 'way out'. Yet all acknowledged that the EC approach is far from ideal in its longer-term outcomes for farmers, and in a context of declining land values, as described by a Coordinator of the RFCS:

> Most of the farmers I suggest would be pleased with getting the grant and ending their financial struggle, but they would still be remorseful at not being able to work that farm as a viable farm, so through no fault of their own in many cases … The other thing people don't acknowledge is that there's no buyers out there at the moment or very few buyers for a farm that has a diminishing land value. (Coordinator, RFCS)

The lack of direct criticism of EC Exit Grants noted in other studies (see Drought Policy Review Expert Social Panel *2*008) would seem to relate to the fact that the region is entirely covered by an EC Declaration, thereby limiting complaints about inequitable distribution. There is also a dominance in the uptake of Small Block Irrigators Exit Grants throughout the region, which was the subject of both more commentary and condemnation. The Small Block Irrigators Exit Grant was directed at irrigators in the Murray-Darling Basin, offering $150 000 for exiting farming production and up to $30 000 for removal of permanent plantings and irrigation systems, and undertaking succession planning. The scheme finished in June 2009, but received much interest and uptake by wine grape growers as a result of the immense financial and environmental strains of low commodity prices and fluctuating water security. The RFCS Coordinator for the region stated that 81 farms in Mildura alone had taken up the exit grants, with a further 80 farms opting to turn off irrigation supply to their crops. The primary criticism of this exit grant was the provision that all permanent plantings, irrigation systems and infrastructure be removed from the land, with no irrigated farming activity to be undertaken for a period of five years after exit – essentially leaving strips of bare land throughout the region, as illustrated by interviewees:

> With the advent of the Small Block Irrigators Exit Grant … those successful have now had all infrastructure, trees, plantings, irrigation infrastructure removed from the property … so you've got just bare land. Under the Exit Grant, land is not able to be farmed by irrigation for five years. They get to keep the land and get to still live on the land, but can only dryland farm … which is not a viable enterprise. So effectively those people are retiring, a lot of them are elderly anyway. But the community will suffer, because you take out up to 160 farms ... no longer buying all the farm inputs, no longer paying rates … the rest have to pick up all of this which impacts on the community. (Coordinator, RFCS)

> If you want this grant, you've got to pull your pump apart and turn your water off, and make it valueless for anyone who wants to come in. And it's not allowed to be irrigated for five years. It just doesn't make any sense. These vineyards or orchards are basically good breeding grounds for pests and diseases that might spread. And it is a burden for the rest of the irrigators around them because they have sold off their share in the system, so others have to pay. (Project Officer, DPI and Farmer)

> We question the logic of ripping everything out and leaving it bare for five years. What's the cost emotionally and financially? What's the environmental impacts of all that … pests, disease, bare land … erosion. Most of the properties have been flogged to death … irrigated for 100 years, so most of the soil structure is gone. When you dry them out, they just blow away. It's very hard to understand the logic … they should have been developed into something. (Manager, Environmental Services, MRCC)

The 'mosaic' (Coordinator, RFCS) and 'hotchpotch' (CEO, MDC) of dried-off farms in the region is viewed both as a severe environmental hazard and as having significant long-term economic and social impacts on the well-being of the region. Many also spoke of the emotional effects of seeing dried-off farms, and the frustration with the lack of planning and foresight to replant these strips with native vegetation, to address the environmental problems of the exposed land. Although the scheme has finished, there is a strong perception that the negative effects of the exit grant will be ongoing, with many wary of the outcomes in the long term.

In addition to exit grants, farmers in the Mildura region increasingly are coming into contact with social support services. As noted, indebted clients of the RFCS have expanded rapidly in the last year alone, with similar trends observed across the social services sector (see Section 5.1.2). Although welfare reliance is increasing in Mildura and viewed as problematic (a 'welfare disaster', according to a Senior Social Researcher at the DPI) most support workers acknowledge the fact that 'welfare' is relatively new to farmers, and that it is only recently that farmers have had to manage and negotiate the social support sector.

The most challenging aspect for farmers has been overcoming preconceptions about Centrelink and counselling and psychological support services, with many initially embarrassed and shameful about using such services. Workers in these sectors are only now noting a slow shift in people's perceptions of Centrelink, garnered largely through the efforts of Centrelink's Rural Services Officers, who have done much one-on-one work with farmers. Moreover, counselling services are observing an increase in the uptake of medical and mental health referrals, largely made by the RFCS, accountants and solicitors who are usually the first point of contact for farmers who are struggling financially and mentally. Several support workers describe this changing service context below:

> Normally if you mention Centrelink people cringe … but that's changing. The people at Centrelink, they do a wonderful job, they try and break down the barriers for the farmers. Those that don't wish to attend Centrelink physically, we can deal with them in the office here or we can do it with a farm visit. I've been to farms where any mail from Centrelink gets ignored … so therefore doesn't get managed, and payments get cut off … So the links between the paperwork and client and Centrelink are being handled so much better. (Coordinator, RFCS)

> Initially there was that scepticism around using counsellors. So it was bridge-building, community capacity-building around what we did and how we did it, and we're starting to see a lot more clients. Where it would have been an 80/20 split with community development/drought counselling, it has almost reversed…the majority of my clients come from referrals from RFCS or Centrelink. (Counsellor, Mallee Family Care)

Reaching and engaging farmers who are withdrawing and isolated is immensely challenging for support workers. Moreover, farmers are struggling with notions of their stoic identity; they constitute a group that generally has never needed income and social support services in the past. The economic and social services context in Mildura appears to be rapidly evolving, and workers and clients alike are learning how to negotiate and manage the system quickly, so as to assist farmers who are struggling and in critical need of assistance. Unfortunately, many workers note that those who are most in need are still suffering from isolation and withdrawal, and that engaging farmers in this category is the primary priority for the region.

In describing the economic and social support context in the region, interviewees commonly identified those practices and programs that they observed as 'successful' – those that were most effective at engaging farmers and providing useful, long-term assistance for the region as a whole. Four key factors were noted as fundamental to the provision of effective government support in the region:

- collaboration between service providers and practitioners
- undertaking community-led projects and programs
- supporting proactive, consistent and long-term approaches to service provision
- developing practice-oriented R&D schemes to support adaptation and future sustainability for the region.

First, collaboration and partnership between service providers was viewed as essential for facilitating effective and respectful service provision. Many interviewees noted the common criticisms directed at the 'drought service industry' that it creates short-term, overlapping and disconnected services. Workers then sought to counter these criticisms through promoting active connections between service providers and the community. This type of partnered working appeared largely to be innate to this rural town context, where most people know each other and 'where to go to' (Director, SMECC), as illustrated here:

> I think here we've done well, so all drought service providers met and worked in a collaborative way to identify what it is we can do. So it depends upon the ability of the people in a particular area to be able to work in a coordinated manner, and nine-tenths is communication, so as long as you've got that right, you can do some really creative things. (Manager, Mallee Family Care)

> When you're feeling stressed and fractured, the last thing you need is for someone to be giving you an inappropriate, out-of-date referral. So it's ensuring we stay on top of that information. So one of the most crucial [elements] is the networking, to keep those links open … so that there is no

> overlap in terms of the services provided. Because you go to a meeting and it's like 'oh, you're funded for the drought, and you're not funded for the drought' and people are confused. And there's a lot of criticism around that, so it's about proving the connections work. (Counsellor, Mallee Family Care)

> I think we've been working quite well up here together because it's very small. If we don't work together, then we go under. The other thing that's quite nice about this region, is that we don't see it as Victoria and New South Wales. It is Sunraysia … we've always had this ethic of working together. So I think it's quite a unique place. (Project Officer, DPI and Farmer)

Service providers note that partnership working is vital to engage in effective service delivery in the region, and that this type of working is occurring both between different service agencies and practitioners, and across state borders and regional areas. Perhaps of most significance to service providers is the referral network that supports the engagement of hard-to-reach farmers. It is important to note here that a lot of physical and mental health referrals are still coming from the RFCS, accountants, solicitors and banks – services and workers who are not professionally trained to deal with the critical health issues affecting these farmers. It will be of crucial importance for the government to address this deficiency of trained and supported mental health professionals through the provision of dedicated personnel throughout rural regions to feed into and support existing service networks.

Key Insight 12

Partnerships and connected working between service providers is essential to facilitating an effective referral and support network of practitioners. Existing pressures on rural financial advisers to confront mental health issues must be addressed through the inclusion of dedicated mental health professionals in this service network.

Second, support workers in the region noted the success and importance of community-led, creative and informal approaches to service provision and support. State and local governments are undertaking more collaborative approaches to service provision and programs, 'asking the community what they want' (Community Liaison Officer, MRCC), as illustrated below:

> There's no point rocking up at a field day or somewhere … with your colourful banner and pamphlets and literature. The point is that you need to engage with the community and think of creative ways in which to do that. And you can only do that if you've got some 'street cred'. It takes work to develop those relationships. (Manager, Mallee Family Care)

> [The council] has created informal opportunities to get together to support each other without actually saying 'we're here to support each other'. People are more reluctant to go to workshops with labels like 'depression'. Whereas having a cup of tea and piece of cake together, they are the sorts of things that seem to work and they are the things the community keeps asking for. It sounds so simple, but it's the break from the daily grind that really works. (Manager, Community Development, MRCC)

> The thing coming through events and programs is that people are sick of hearing the word 'drought' and 'water allocation' and 'climate change'. They just don't want to talk about it anymore. They just want to talk about something else, but if they choose to bring up what's happening at home, then that's their choice. And that's why those informal social opportunities, where they get out

> and have a chat, that's why they work so well. (Community Liaison Officer, MRCC)

The social and recreational opportunities presented by some support programs appear to be successful in engaging farmers, getting them away and off the farm – a practice that can be vital in gaining perspective on their issues and struggles. Although seemingly simple, workers consistently described this approach to community support as one of the most successful, as it not only provides a social outlet, but also builds strong service relationships between providers and the community.

Key Insight 13

People are tired of hearing about drought and depression. Community-led, informal and social activities (e.g. fire shed gatherings held monthly in the Buloke Shire, which includes Donald) are one way of offering opportunities to engage farmers and build relationships between service providers and communities. This micro-level engagement provides the opportunity to strengthen local networks and facilitate an effective information flow while at the same time building connectedness, which is strongly related to better mental health.

Third, service providers spoke of the need for a more proactive, consistent and sustainable approach to service provision and support in the region – one that promotes adaptation and self-sufficiency. Although policy reviews have been raising the issue of self-sufficiency for farmers for over a decade, the current drought-support system remains paralysed by reactive, short-term funding and programs. Interviewees express these issues below:

> Historically, drought funding has always been notoriously reactive, very slow. Whereas with climate change, they're putting people on and going on about pre-thinking, planning, 'what sort of services do we need in place?' So I think if we could focus on that, rather than 'oh, we've had a drought'. And the funding is always short term. I mean we're trying to attract good staff into those positions, but no-one wants a job that is for six months. And for the client base, there is no continuity for them either. (Counsellor, Mallee Family Care)

> There is a concept on the land called preventative maintenance, so regular services of machinery etcetera. We need this approach with drought, so when times are good, that is a time when this information and support should still be provided. There's a lack of good policy directing the how, where and why the money gets spent. It is very reactive. So at the moment there's the financial counselling to help people get out of financial strife, but there's nothing to go on with … during times of economic stability. So to be proactive, the funding needs to be continued through the periods of prosperity as well. (Manager, Mallee Family Care)

> The issue is continuity of funding. It's about providing the best service you can give to the community that's consistent. We ask farmers to do a five-year plan but we keep doing this short term stuff. (Counsellor, Mallee Family Care)

The need for proactive assistance in rural areas is critical for the future of these regions, and will involve a fundamental change in approach and language around drought – actively moving from notions of crisis to notions of ongoing drying and self-sufficiency. Proactive and long-term approaches are much more effective at helping those farmers undergoing change and those who wish to exit out of farming. Indeed, one of the most widely identified successful

programs was the Rural Skills Connect program, which helps farmers gain formal recognition of their existing skills, and also actively re-skills and retrains them in new trades. As noted by a Counsellor from Mallee Family Care, government service providers are expecting that farmers conduct long-term planning and sustainability strategies, yet continue to offer only short-term funding, programs and assistance from professionals. Aiding farmers to plan and transition between or out of farming in a respectable and professional manner is vital for maintaining the health and economy of the community and region.

Finally, another key element of effective government support identified by workers, and one that fits with a proactive sustainable approach, is that of practice-oriented research support services and programs. Again, despite the political debates and policy reviews emphasising strategic planning and research-based farming practices, Mildura and the surrounding region have been affected by a series of closures of government research facilities: a CSIRO agricultural research facility at Merbein and the DPI dryland research station at Walpeup. Interviewees described the effects of these closures:

> There's been a withdrawal of government in providing those research facilities. Government argues that there are now private providers who give the same service, but farmers without the dollars to pay for it, miss out. So the information that needs to flow through to farmers to make decisions is getting harder. Sometimes it just doesn't connect … you need to put it in the face of the farmer for them to start making decisions. (Coordinator, RFCS)

> With the shutdown of Walpeup research station, the whole community nearly closed down with that one action. And a similar situation occurred in Mildura, where the CSIRO research facility in Merbein decided it couldn't afford to keep going. Having those facilities just helps so much with an overall socio-demographic, when you've got people that have got their PhDs behind them and are engaged in that learning and passing that learning on to the community, and all of a sudden that's lost. We tried to place the argument that this area is at the heart of some of this climate change and variability, why wouldn't you start engaging that science in these areas? But, we didn't win. (CEO, MDC)

> Agencies such as DPI, they're losing their industry people on the ground and moving towards a user pays service. So where farming communities quite often had links with staff at DPI, they now have to source that privately and have to pay for their services, and that's an expensive service. We keep hearing the importance of R&D when you're adapting and changing, if you don't have that component then you start fall behind. (Senior Planner, DPCD)

Practice-oriented and industry-based research, training and education are all recognised as being fundamental to supporting adaptation and mitigation to climate change, particularly in attempting to engage practice-oriented farmers. Yet in an area at the forefront of such climatic changes, these readily accessible research and training services are dwindling, with significant effects on the future of farms in the region. Indeed, many interviewees noted the success achieved on farms in the vicinity of these research stations, which were constantly trialling and using new on-farm technologies promoted by research staff. In addition, the closure of these services has a largely unacknowledged effect on the morale of the community as 'yet another person or service leaves' (Project Officer, DPI and Farmer), draining the diversity and energy of the community and its leaders.

Key Insight 14

Proactive, long-term and practice-oriented support and funding schemes are the most effective ways of facilitating adaptation in farming communities. Research and training will be key factors in such an approach but it was stressed that this research should be relevant to the local area and be brokered at the local level (as opposed to the Commonwealth government level).

In light of impending revisions to the drought policy framework, it is vital to put current government programs and support practices in their rural, drought-affected and lived contexts. While it increasingly is recognised that ongoing welfare subsidies do not aid farmers in the long term, effective economic and social support services must continue as part of a more strategic framework that supports transition of farmers into new technologies, farming systems or out of farming entirely – in ways that raise self-esteem, develop and recognise skills and maintain dignity (see also RFCS *2*008).

In providing this service, government must look to funding dedicated and trained professionals, specifically mental health professionals, to take up some of the extreme pressures placed on the RFCS, and other financial advice services that seem to be at the forefront of encountering distressed farmers. These mental health professionals must be knowledgeable about rural people and practices, and the demands they face, in order to gain respect and trust and deliver a beneficial service. Allowing such services to work together through on-farm visits as well as professional support and service networks would allow more effective service provision for farmers in critical need. Important across all service provision in drought-affected and drying regions will be a shift in the language of policy, programs and practitioners – changing perspectives on what drought is and what it is likely to be into the future. At the same time, governments need to minimise the loss of knowledge that currently occurs between short-term programs and employment contracts, by supporting long-term programs and practitioners who are trained and skilled in their area, and are also familiar with the specificities of rural cultures and changing rural demographics (see also Young et al. *2*008).

5.2.6 Future scenarios: climate change, adaptation and mitigation

With adaptation forming the predominant response to climate change at present, research must begin to explore what future scenarios are likely for a rural town such as Mildura and its surrounding region. Research must consider the ways in which projected climatic changes are likely to alter the current economic and social base of small inland towns, and look at the responses of people living in these regions, particularly their openness, willingness and ability to adapt. Berkhout et al. (2006) suggest that in regions such as Mildura, where the direct impacts of climate change are being experienced, there is a greater likelihood of adaptive responses being undertaken and engaged with. This suggests it is vital to respect the local knowledge of the people and farmers who have been living in this region for generations and recognise that adaptation is already occurring. Adaptation then is 'not just about changing people's minds', but involves working with people to garner more knowledge about adaptation and the strength of communities to be responsive and creative in the face of future climatic changes (see Howden 2008; Stokes & Howden 2010). Indeed, it is often argued that the extent to which Australians already have adapted to difficult and changing climates should provide capacity to manage the projected impacts of climate change (Heyhoe et al. *2*007;

Nelson et al. 2010). This section highlights some of the ways in which the farming community of the Mildura region is already undertaking adaptation measures, the areas in which they are lacking adaptive capacity, and the ways in which they may be better supported in their efforts to change and adapt.

First, it is important to note how people perceive the future and how they imagine the current climate might change. Most people interviewed acknowledge that the future will involve less water and, as a result, a changed farming and irrigation landscape, as illustrated here:

> I think we're going to see an irrigation area that's much more concentrated. So we'll see some areas change … from an irrigated farmland system, to a dry farmland system. I think we're going to see, and we've already seen, bigger farms. You need a bigger farm to be more viable to deal with the uncertainty. The other thing that we're seeing is a need for farmers to be a lot more opportunistic, and make the most of what sort of conditions come about in any particular year. (Delivery Manager, North Central CMA)

> In the future I see certain areas becoming hobby farms, with horses and whatever, not permanent plantings, and they'll be small holdings. And then the remaining irrigators that are here for the long term, they'll just get bigger and bigger and have the economies of scale that you need to survive. (Project Officer, DPI and Farmer)

> Drought and less water, I think now people are used to it. They've accepted the fact that we might not get out of this rut, and that it is here to stay. So it's a shift in thinking. And the risk management strategies that they have implemented are different. I think too that they are now looking for alternatives. The people that are still in the game are keeping up, I think more than they used to which is good. (Project Officer, DPI and Farmer)

Ongoing drought and drying, and less available water, are widely acknowledged as a realistic climatic future for the region. Those working in and around the farming sector increasingly are undertaking scenario planning for a number of futures, from relentless drying through to flood, with strategic on- and off-farm planning for each scenario. The most challenging aspect of this process is the change in thinking required in order to envision and plan for different futures, and for the ways in which the land to which they are often deeply connected will change. Yet, as a Project Officer for the DPI noted, 'irrigators and farmers are starting to think more outside the square, starting to think about other things rather than just production issues, develop a strategic plan … get information and learning … but the next challenge is, what do we do now, where do we go from here?'

For many farmers in the region, the question of 'where do we go from here?' has resulted in experimentation and investigation of different crops (including niche crops), as well as the uptake of advanced irrigation systems and on-farm technology. Some examples are illustrated below:

> On-farm irrigation efficiency has really gone to a high level and I can't see much more water savings in the Mildura region in terms of megalitres per hectare. When you're spending that sort of money, you don't waste it. I mean there might be some savings with the Irrigation Modernisation Program … a fully pressurised system that will enable a lot of growers to irrigate without pumps. (Consultant, RMCG)

> Wine grape growers are diversifying into passionfruit commercially. We have seen people diversify from just purely wine grapes into fish farming as well,

> with some of the water they had sitting in ponds. Some people have started to look into dates and pomegranates. (Project Officer, DPI and Farmer)
>
> People are talking about more annual crops, which you don't necessarily have to plant if there's less water. So you have a mixture of permanent plantings that need water every year, and annuals that you vary according to the water availability. Also having production in other areas, and regions, so they can still supply their markets. (Consultant, RMCG)
>
> The other thing we're seeing, but not so much yet, is companies coming in to areas that are less attractive for farming and trying to generate a return from some of the environmental offsets they might get from the properties. As well as dealing with the good parts of the farms, and continuing those as a farming enterprise. (Delivery Manager, North Central CMA)

As many interviewees noted, farmers are often very practical people and, given certain challenges and scenarios, will try to experiment in order to facilitate change and adaptation, as described here:

> One of the good things about small irrigation communities is word spreads very quickly, and if you get some good results from some technology or crop, then the uptake is quick, especially in the middle of a drought. We've always had a good culture of adaptation. (Project Officer, DPI and Farmer)
>
> I think farmers learning from farmers and looking over the fence and seeing what's happening next door is the most effective way you can actually communicate within the rural community. We see … a lot of demand for [land and water] management techniques coming from people who saw what their next door neighbour had done. (Delivery Manager, North Central CMA)

Rural areas offer potential opportunities for effective adaptation, due to the innate nature of experimentation in farming activity and also the communication that occurs 'over the fence' between farmers. Most people interviewed acknowledged the importance of undertaking positive and practice-oriented activities in rural and farming communities, as a farmer from the Mildura region explained:

> You're less inclined to pick up the hype and excitement of some scientist saying, 'the world's ruined, now you've got to change'. We've had all the doom and gloom. They need something that's positive, they can pick up and go home to the farm and play with themselves. They want something, where if government really wanted to do something along those lines, they would be the facilitator for those types of programs and road show events.

Key Insight 15

Adaptive capacity and the ability to conceive of different futures are apparent – these capabilities can be built on and developed to create effective and locally responsive adaptation and mitigation strategies.

Key Insight 16

Programs, roadshows and events centred on technology, adaptation, and new crops and industries are the key to engaging rural communities and farmers in positive and proactive change. Birchip Cropping Group's model of adaptation, where there is a more farmer-centric perception of issues and needs, is also proving successful. Research conducted in this way addresses the community's priorities and is adopted because of this.

Naturally, individual farmers' ability to engage in these adaptive behaviours is influenced by the types of social and economic impacts they are experiencing. Those who are on the cusp of financial viability, and are experiencing severe health impacts as a result, do not have the financial or mental resources to be able to undertake such change, as described here:

> I think there's a fair number of people farming who haven't quite caught up with what's happening. And I suspect that part of that reason is financial. If you haven't got the financial backing then you can't really buy the equipment you need to expand. And for smaller growers, they have limited capital and limited opportunity for change. Some just haven't got the will or the finances to do anything. (Coordinator, RFCS)

> Some people here, in the grape industry in particular, are doing wheel spins at the moment because of the price of grapes … people are eating into their reserves. So the adaptation is minimal, because what do you go to? You have a few people around here who are young enough, have enough energy, and finance left to change. (Farmer, Mildura region)

It is vital to acknowledge that, while government and service providers can envision, and are supporting, adaptation to climate change and alternate futures, there are many who will not be able to keep up and will need assistance to make a transition out of farming in a dignified and supported manner.

Key Insight 17

Some farmers are not in a financial position to be adapt sufficiently. They must be assisted to transition to a more stable financial state, with its benefits for social and emotional well-being, or out of farming in a dignified and supported manner.

An important part of adaptation in response to future climate change is the place of the rural town within these scenarios. While for many smaller towns, the future can look grim, for Mildura, its size and industry scope have provided some buffering from the rapid changes and impacts on farming in the region. Moreover, many are looking to futures that are not as reliant on agriculture – futures that involve renewable energy production and international markets – as some interviewees explain:

> I believe the future will be one of expansion. Thirty years ago this place was just a small country town … it's all changed. It's big enough now to be able to cope with a downturn in horticulture … new buildings going up, new operations, the population slowly but surely expanding, I think we've got to the stage now where we can cope. (Director SMECC)

> Mildura, our area, is fortunate we have got other things propping the economy up. It's not just the farming sector. We've got infrastructure here already,

> we've got the shops, we've got some tourist attractions, and we've got housing and transport logistics. It's the smaller areas … that will struggle, because every time a farming family moves out, they take the kids with them, and there goes the school, don't need the post office, and so on. Mildura will be a sponge city, there will be people who move here from some of those small towns that may not survive. (Coordinator, RFCS)

> I believe the region will survive. So whilst it's certainly not devastated by drought, it's a reality here, and we're very conscious of trying to help people move to a different future with that in mind. We're changing now to a solar future. I think in the future horticulture will probably decrease. So we're looking at major large-scale solar investment, but we're also, through the Sunraysia Sustainability Network, looking at small-scale solar farms. So that people who are currently farming, and can't afford to buy water anymore, will be able to convert to solar farming. (CEO, TAFE)

Mildura is currently proposing to be part of the $100 million Commonwealth government Solar Flagships Program, as a means of diversifying the economic base of the town in a sustainable way. People from government representatives through to farmers are discussing a solar future in energetic and excited ways, viewing this as a sustainable adaptation measure that is well suited to the climatic future of the region. Discussions also include the expansion of other renewable energy industries, such as geothermal, and capitalising on a growing global food market as food security issues intensify. Most notably, interviewees discuss a range of these options as offering the way forward: 'We need to view all of these options as being parts of the possible solution … not seeing any of them as a magic bullet.' (Senior Planner, DPCD). In a similar way to farming, the ones that are successful are those who 'have not put all their eggs in one basket' (Counsellor, Mallee Family Care).

The Mildura region has experienced rapid and extreme changes in its key economic base – farming. The irrigation history on which the town is built has changed quickly, and continues to alter in the face of a drying climate. Irrigation areas are moving through 'uncharted territory' as they learn to live without water. As a result, farming has had to adapt to reduced water availability, an evolving water market and low commodity prices. Uncertainty has been abundant and severe, and resounding economic and social impacts are being felt throughout the region, and will continue to be experienced, as farming families are pushed to their limits. The traditional family farm is under pressure, and many have left the rural industry. Alongside this farming sector shift are demographic changes associated with an ageing population, the migration of young people out of rural areas, family breakdowns and existing support services being stretched – often beyond their role and capacity – to cope with the needs of the remaining community.

The problems facing rural regions like Mildura will require multiple service and support strategies, joined-up agency working and lots of learning, and most of this work will need to be done in the social domain. It is not only 'the time to confidently inform' those in the region 'what type of future they can expect' (Young & McColl *2*008: 32), but also the time to work *with* local people to gauge their immense practical knowledge – the local experience, insight, and understanding of people learning about the challenge of drought and climate change in very real and confronting ways.

Acceptance of different futures will be key to this type of approach to drought policy and programs, and from the discussion above it is clear that this is already well advanced in Mildura. The evidence of adaptation and openness to change offers opportunities with which

future proactive and practice-oriented government services and training programs can work. At the centre of this is the need for government and local communities and farmers in the region to work together to move beyond 'just coping' and reacting to drought, towards proactive, energetic and forward-thinking strategic planning for ongoing climatic change.

Mildura's historical irrigation region is confronting rapid changes to its economic and agricultural foundations as a result of a drying environment, a changing water industry and an expanding global trading market. These shifts have, in turn, amplified and presented many critical economic and social issues in the region as it confronts the uncertainties of a changing future. Those living in the region demonstrate a keen awareness and knowledge of these issues – how they might play out into the future, and how they may fundamentally and permanently change the region. Many of the people interviewed as part of this study also demonstrated an optimism and commitment to change and adaptation, fuelled by a strong and heartfelt attachment to the region, the land, the river and the people living there – some for many generations. An openness to fundamental and radical change in order to accommodate future environmental and agricultural scenarios presents opportunity and hope in what is often a picture of sadness, uncertainty and deterioration.

5.3 Workshops: Drought adaptation and the future for Mildura

In 2007–08, the Victorian DPI, as part of the 'Resilient Agribusiness Project for the Future of Sunraysia' project, facilitated a series of four workshops with stakeholders in the Mildura region. These workshops sought to identify and prioritise information for long-term planning under different water policy, climate change and socio-economic scenarios. The consideration of 'best'- and 'worst'-case outcomes resulted in four suggested future scenarios being formulated for 2018, namely: 'Utopia-Embrace the chameleon' (preferred scenario); 'Making an Effort'; 'Status Quo'; and 'Dystopia: "Modern Mungo"' (Treeby et al. 2008). Refer to Appendix C for a detailed description of each of these scenarios. When asked to consider the main outcomes from the workshop series, one participant (Project Officer, DPI and Farmer) agreed that the workshops provided a rare opportunity to bring together people who usually did not meet. There was a common view that the scenario planning process can be time consuming; however, participants recognised that the main beneficial outcome was in the process itself, rather than the scenarios formulated. It was agreed to revisit and continue to evolve the scenarios over time.

During November 2009, CSIRO Sustainable Ecosystems conducted a similar workshop, also in Mildura, entitled 'Planning for Community Sustainability – Workshop 1' (Park et al. 2009). The workshop was facilitated by the CSIRO, as part of the CSIRO Transformation project, with participants representing a range of stakeholders from the Sunraysia community. The CSIRO Transformation project aims to improve understanding of the economic and social conditions and the support required to allow primary industry businesses, communities and sectors to significantly change their practices in response to future challenges, including climate change. The CSIRO Transformation project includes a broad range of primary industry case studies. These case studies enabled similarities in challenges, processes of decision-making, information needs and response strategies to be identified and exchanged across industries and communities. It emerged from this workshop that the most significant

potential future challenges for the Sunraysia community could be grouped into the following themes:

- water and food security
- communication, information and science on climate change
- policy issues
- impacts on farmers (climatic and policy impacts)
- engagement with the community
- social identity and community well-being
- abandonment and loss
- connection between people and places
- delay in action.

A Sustainable Livelihoods Analysis (SLA) was also conducted as part of the CSIRO workshop in Mildura. Various 'assets' (e.g. human capital, natural capital, physical capital, social capital and financial capital) were rated according to their level of sufficiency to enable the existence of a sustainable Sunraysia community. Human capital scored the least adequate result and financial capital the most adequate result (Park et al. 2009). Further discussion recognised that the indicators used in the SLA may have been too arbitrary and that participants may have confused potential future (2030) and present status when rating indicators. It was agreed that the CSIRO Transformation project team and members of the Sunraysia community would continue to collaborate, and three immediate first actions were identified:

- conducting telephone interviews with the broader Sunraysia community to verify and build on the information and results obtained in the workshop
- increasing involvement in events such as strategic planning days and other data-collection opportunities in the Sunraysia community to again verify and build on the information and results obtained in the workshop
- exploration of the possibility of synthesising the SLA results with additional information sources, for example (e.g. the Mildura Region Economic Profile (MDC 2009)).

Other outcomes to emerge from the Mildura SLA workshop included the following:

- The workshop was viewed as a good opportunity to bring people together who do not usually meet.
- The workshop was viewed as a good opportunity to discuss challenges faced by the community.
- The SLA indicators used were seen as too arbitrary and it was felt that a less subjective approach was required.
- Several requests were made to interview individuals within the community, as well as the more senior representatives that were present at the workshops.
- Participants expressed a desire to receive feedback from the project team soon after the workshops – there was a sense that workshop participants regularly gave up their time to be involved in workshops, or similar, but rarely received any follow up after the workshop.

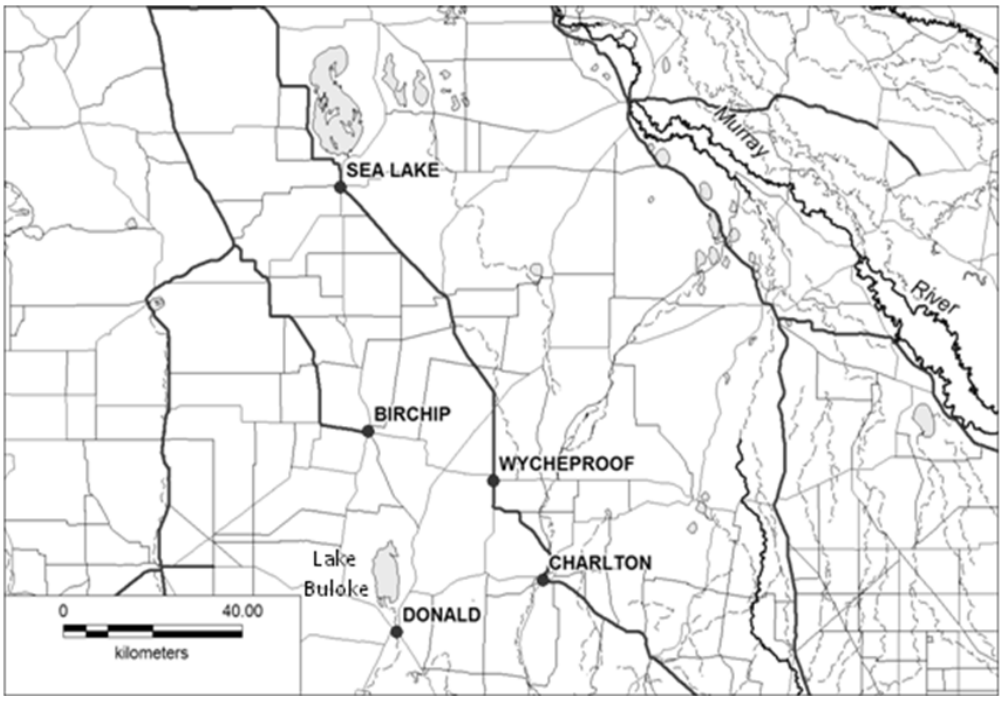
The insights gained from the Mildura workshops supported and extended the information gained through the interview process and, as a result, have been incorporated into the Key Insights listed in Section 5.2.

6. Case study 2: Donald

6.1 Donald: Regional overview

Donald is a rural town of approximately 1700 people located in the north-western Wimmera region of Victoria, to the south-east of Mildura (see Figure 1.1). The town is within Buloke Shire, which also includes the main townships of Birchip, Charlton, Sea Lake and Wycheproof (see Figure 6.1). The local economy is based on dryland agriculture, particularly grain (wheat, oats and barley) and some sheep grazing. The agricultural economy historically (i.e. before the Wimmera-Mallee Pipeline which was completed on 15 April 2010 (DEWHA *2*010a*, 2*010b) and is discussed further below) has relied on an open earthen channel system, which was associated with high leakage and evaporation losses (as discussed in Section 3.1) and rainfall to deliver water to farms throughout the region. While the town is located on the lower reaches of the Richardson River, the river system and the lakes are notoriously intermittent, undependable and saline (Smith & Campbell *2*009).

Traditionally, the economy was supplemented by tourism associated with the nearby Lake Buloke (north of Donald) and Lake Batyo Catyo (south of Donald). However, Lake Buloke and Lake Batyo Catyo have now been dry for around a decade, as a result of the Big Dry. Local amenities and associated tourism subsequently have diminished in the area. The primary agricultural activity of dryland cropping has also suffered under the recent drought due to a run of poor seasons, with late (or absent) autumn breaks and reduced spring rains. One benefit of the prolonged dry conditions has been reduced dryland salinity, which devastated the lower reaches of the Richardson River from the early 1980s to mid-1990s (Proust *2*008).



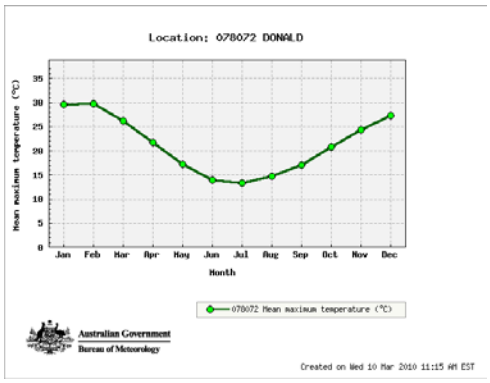
Note: For location of Donald within Australia and in relation to Mildura refer to Figure 1.1.

Figure 6.1 Donald and surrounding region

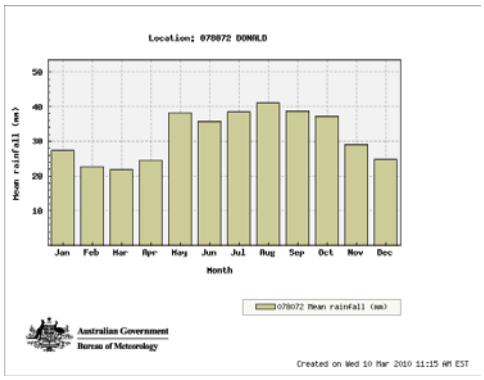
Water for this area is also sourced from storages supplied by streams flowing from the Grampians, approximately 50–100 km to the south. Unfortunately, these streams have been among the most critically stressed in Victoria under the Big Dry. The recent completion of the Wimmera-Mallee Pipeline, a joint project of the Victorian and Commonwealth governments and Grampians-Wimmera-Mallee Water Corporation, has resulted in some improvements in water supply to the area. The pipeline now supplies water directly to 36 regional towns and numerous farms in the Wimmera-Mallee area. The pipeline replaces traditional open-channel water supply systems, which lost approximately 80 per cent of their water through evaporation and seepage (with the pipeline now saving around 100 billion litres of water a year) (DSE, 2010). These water savings have allowed some farmers and towns to buy back water from savings made in the system. For example, Buloke Shire Council (which includes the town of Donald) has bought water to regenerate Lake Buloke and Lake Batyo Catyo in an attempt to improve amenity and stimulate tourism in the area.

6.1.1 Historical and projected climate

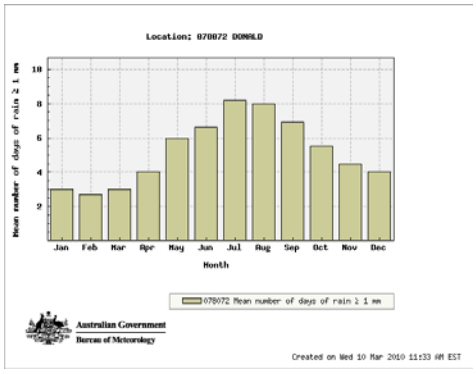
Figure 6.2 shows the monthly climate statistics for Donald, which has cool, relatively wet winters and warm, dry summers. Average maximum summer temperatures are typically around 30ºC, while in winter average maximum temperatures are mostly around 12–15ºC and frosts are common throughout the region. Annual rainfall averaged across the North Central region is 491 mm, and on average there are 82 days each year where at least 1 mm of rain falls (DSE, 2008b).



a) mean daily maximum temperature per month



b) mean monthly rainfall

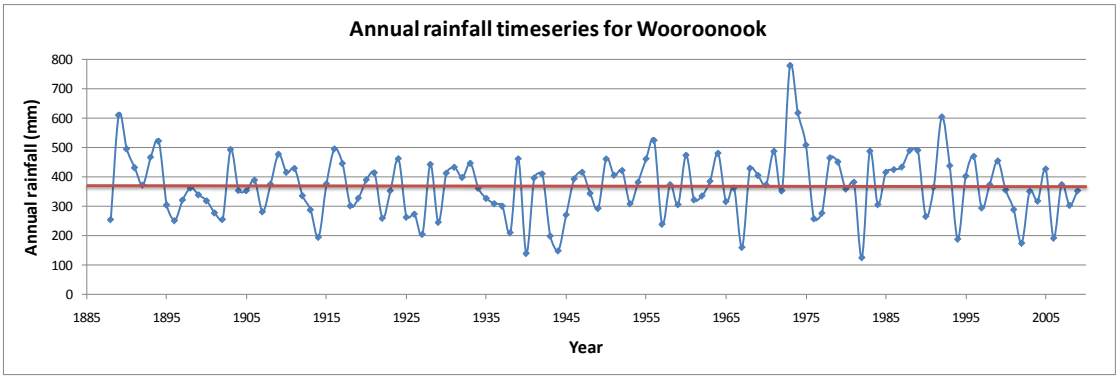


c) average number of days with rainfall > 1mm

Note: evaporation data is not available for Donald

Figure 6.2 Monthly climate statistics – Donald

As mentioned in Sections 1 and 5.1.1, a prolonged drought has affected south-eastern Australia since the mid-1990s. Figure 6.3 shows the historical time series of annual rainfall at Wooroonook (near Donald). This station was chosen because it was the closest station to Donald with a complete annual rainfall record that covered the three major droughts Australia has experienced (Federation, World War II and the Big Dry).



Note: The red line indicates long term (1870-2009) mean (369mm)

Figure 6.3 Annual rainfall time series for Wooroonook (BoM station no. 078041), near Donald

As with Mildura, it is evident from Figure 6.3 that the annual average rainfall since the mid-1990s has been lower than the long-term average in the broader Donald region (as represented by Wooroonook). Again, all but one year (2005) of the last 10 years was below the long-term average, but there have been similar dry periods in the past (e.g. around the time of the Federation and World War II droughts). The relative severity of the Federation, World War II and the Big Dry droughts for Wooroonook (i.e. Donald) is examined in Table 6.1.

Table 6.1: Annual average rainfall deficiency compared with long term (1870-2009) mean during the Federation, World War II and the Big Dry droughts for Wooroonook (BoM station no. 078041) near Donald

	Wooroonook (near Donald)	
	Average annual rainfall (1870-2009)	**Percentage change in annual rainfall compared to the long term mean**
Long-term record (1870–2009)	369mm	–
Federation Drought (1895–1902)	305mm	–17%
World War II Drought (1937–45)	283mm	–23%
Big Dry (1997–2010)	334mm	–10%
Lowest five-year running mean	260 mm (occurred 1940–44)	
Lowest 10-year running mean	286 mm (occurred 1936–45)	

Table 6.1 demonstrates that, of the three extended drought periods, the World War II drought was by far the most severe (in terms of annual rainfall deficiencies) for the Donald region, as it was for the Mildura region. Also like Mildura, in terms of annual rainfall deficits the current drought (the Big Dry) is the least severe of the three droughts. However, annual rainfall totals do not tell the whole story. Therefore, Figure 6.4 shows the seasonal rainfall totals at Wooroonook during each of the three major droughts Australia has experienced.

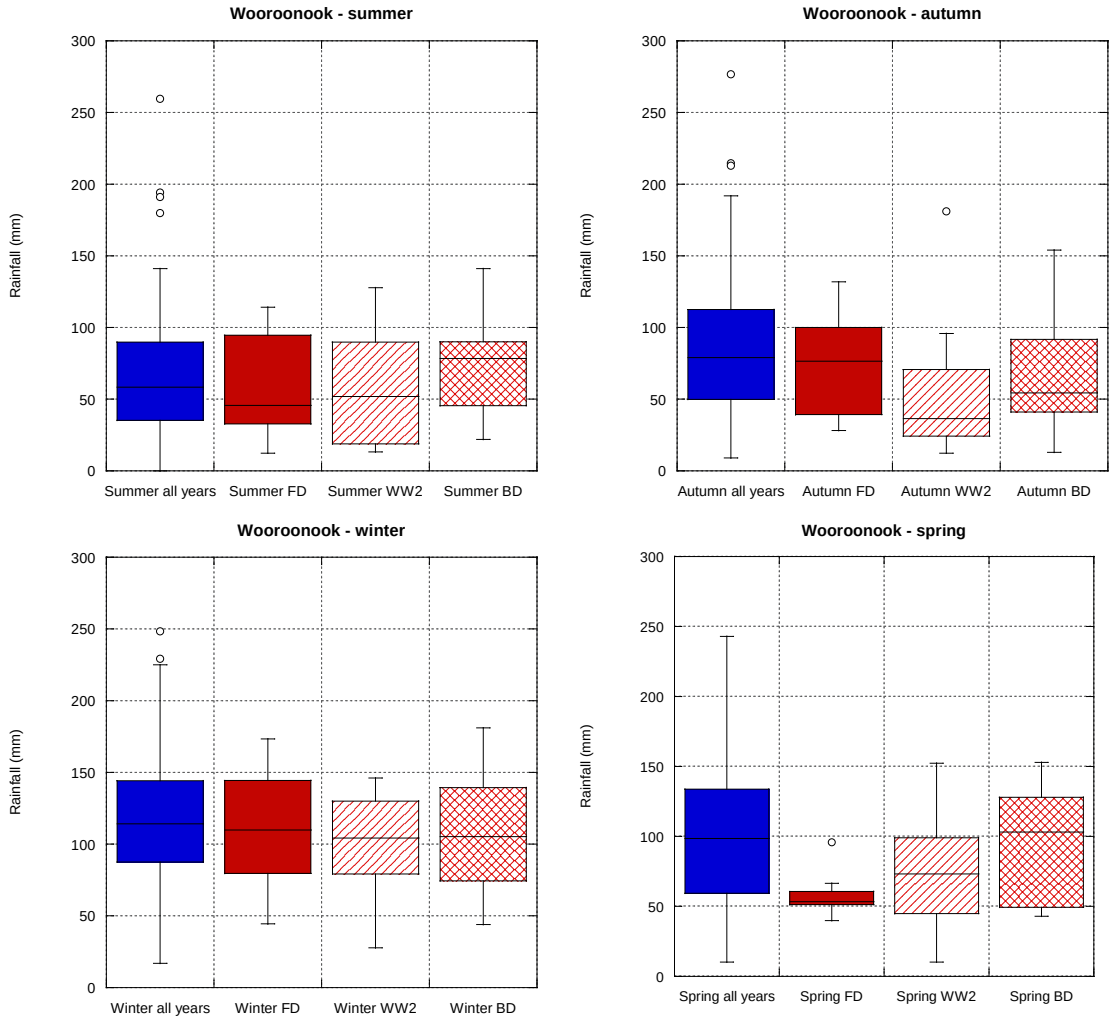


Figure 6.4 Seasonal rainfall totals at Wooroonook (near Donald) during the Federation Drought (FD), World War II Drought (WW2) and Big Dry (BD)

Figure 6.4 shows the same patterns that were observed at Mildura (Figure 5.4) in that the Federation Drought was due to a severe reduction in spring rainfall, with some reduction in summer and autumn, the World War II drought experienced rainfall reductions across all seasons, and the Big Dry is (up until 2009) predominantly due to a reduction in autumn rainfall.

The Victorian DSE has investigated the impacts of anthropogenic climate change on rainfall, temperature and evaporation across several regions of Victoria. Table 6.2 summarises the results for the North Central region (where Donald is located). As indicated in Table 6.2 (which is based on the information in DSE 2008b), the North Central region is projected to become warmer, with more hot days (over 30 degrees) and fewer frosts. Days are projected to be hotter over all seasons, but the greatest warming is likely to be in summer and the least in winter. It is also projected that rainfall will decrease in all seasons and that this decrease is expected to be the greatest in spring and winter, while smaller decreases are expected in summer and autumn. Potential evaporation is also projected to increase across all seasons,

with the most significant change occurring in winter. Lower rainfalls and higher evaporation rates would result in less soil moisture and lower river flow. This potentially could mean more frequent droughts for the Donald region.

Table 6.2: Climate change projections for Donald for 2030 and 2070 (relative to 1990)

Variable		2030 Medium emissions	2070 Lower emissions	2070 Higher emissions
Annual average temperature		+0.9°C (0.6 to 1.2°C)	+1.4°C (1.0 to 2.0°C)	+2.8°C (1.9 to 3.9°C)
Seasonal average temperature	summer	+1°C (0.6 to 1.4°C)	+1.6°C (1.1 to 2.3°C)	+3.1°C (2.0 to 4.5°C)
	autumn	+0.8°C (0.6 to 1.2°C)	+1.4°C (0.9 to 2.1°C)	+2.7°C (1.8 to 4.0°C)
	winter	+0.7°C (0.5 to 1.0°C)	+1.2°C (0.8 to 1.7°C)	+2.2°C (1.5 to 3.3°C)
	spring	+0.9°C (0.6 to 1.3°C)	+1.5°C (1.0 to 2.1°C)	+2.9°C (1.9 to 4.2°C)
Annual average rainfall		–4% (–9 to + 1%)	–6% (–14 to + 2%)	–11% (–26 to + 4%)
Seasonal average rainfall	summer	–1% (–11 to + 10%)	–2% (–18 to + 16%)	–4% (–32 to + 31%)
	autumn	–1% (–9 to + 6%)	–2% (–14 to + 10%)	–4% (–26 to + 20%)
	winter	–4% (–14 to + 2%)	–7% (–18 to + 3%)	–13% (–32 to + 6%)
	spring	–7% (–17 to + 1%)	–11% (–26 to + 2%)	–20% (–44 to + 3%)
Annual average potential evaporation		+2% (0 to +5%)	+4% (1 to +8%)	+8% (2 to +15%)
Seasonal average potential evaporation	summer	+2% (0 to +5%)	+3% (0 to +8%)	+7% (0 to +15%)
	autumn	+3% (+2 to +6%)	+6% (+3 to +10%)	+11% (+5 to +19%)
	winter	+7% (0 to +17%)	+11% (0 to +28%)	+22% (0 to +54%)
	spring	+2% (–1 to +5%)	+3% (–2 to +8%)	+5% (–3 to +15%)
Frosts (current average = 26 days/yr)		19 (21 to 16)	13 (17 to 9)	7 (12 to 3)
Days over 30 degrees (current = 52 days/yr)		59 (57 to 64)	67 (61 to 76)	85 (72 to 102)
Days over 35 decrease (current = 15 days/yr)		19 (17 to 21)	23 (20 to 28)	34 (27 to 46)
Days over 40 degrees (Current = 1 days/yr)		2 (2 to 3)	4 (3 to5)	7 (5 to 12)
Annual average number of rain days		–6% (–18 to –1%)	–9% (–31 to –2%)	–18% (–59 to –3%)

**Note:* the information above is based on a regional assessment for the whole North Central region (DSE 2008b).

6.1.2 Agriculture and economy

The agricultural economy of the Buloke Shire began around the 1840s, with early European settlement on land traditionally owned by the Jaara and Wemba-Wemba Aboriginal people. Growth in agricultural industries took place in the late 1800s, along with the creation of

townships and the construction of railway lines, with grain growing established as the dominant industry. By 2006, agriculture accounted for the majority of employment in the area, representing 32.7 per cent of the total. Yet this was a significant decline from 2001 where agriculture accounted for 38.5 per cent of employment in the region (see BSC *2*008).

Much of the recent decline in the agricultural economy of the region has come about due to a combination of climatic and market conditions – particularly for cropping, which continues to represent the dominant enterprise in the area. Since the agricultural producers of the Buloke Shire rely almost totally on rain, the issues and stresses associated with water availability are different from issues facing irrigated areas such as Mildura (the main concerns in irrigated areas are around water supply and trade). The introduction of the Wimmera-Mallee Pipeline has improved the supply and conservation of water for domestic use and stock watering; however, the critical issue in Donald during the Big Dry is lack of rain, more specifically the failure of autumn rains (a characteristic of the Big Dry) and often a lack of late spring rainfall. Other key challenges to the agricultural economy of the region have been hot weather, extreme crop-damaging rainfall events and diminishing commodity prices (e.g. decreases of approximately A$300/tonne when the February 2010 price for wheat is compared with the February 2008 price).

Grain farmers in the region have been suffering a succession of 'bad' years characterised by reduced yields and prices. The 2009 season was associated with a very poor crop due to below-average rainfall throughout late 2008 and early 2009 (i.e. time of sowing), followed by extreme hot weather and heavy rainfall in November 2009, which damaged an already poor crop. Together with the potential quality and yield issues, there are predictions of further reductions in grain prices internationally. The reduction in prices has been attributed to the likely over-supply of good-quality harvests from the Northern Hemisphere, and a low effective price due to a rising Australian dollar (DPI *2*010). As a consequence of the succession of poor seasonal conditions, many of the 2009 season's grain crops were cut for hay or grazed by livestock, with this trend likely to continue in 2010. Total winter crop production in Victoria for 2009–10 is estimated at 3.1 million tonnes, which is 21 per cent lower than the 3.9 million tonnes produced in 2007–08 (ABARE *2*010). Areas sown with wheat and barley crops have increased since the previous year, but the actual yield across both crops has dropped by 20 per cent and 35 per cent respectively following unfavourable weather conditions.

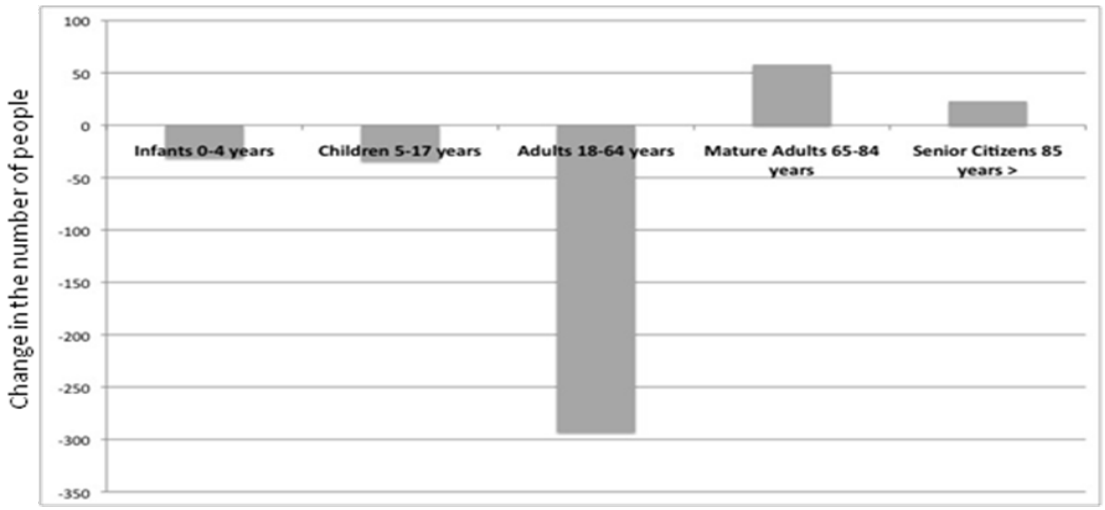
Unlike the Mildura region, the lack of dependence on irrigation throughout the Buloke Shire places it in a better position to recover from the recent drought. Recovery in dryland farming can occur rapidly once rain falls, provided the farmer has enough capital (or can meet the requirements needed to borrow enough from the bank) to put a crop into the ground (typically A$100,000 or more for the average Donald broadacre farmer) – when drought is prolonged and finances depleted (as with the Big Dry), this becomes more of an issue. Compounding this is the uncertainty about when and where rain will fall, and with what other weather conditions (e.g. heatwave, strong winds, flood), combined with fluctuating commodity prices, may prove the most challenging to dryland farmers in the Donald region.[13] The current uncertainty within dryland farming is depleting farming communities' emotional and social resources (BCG *2*008). This uncertainty, combined with a succession of below-average years of pricing and yields, has also created considerable issues of debt, anxiety and stress for

[13] Not to mention the looming locust plague (http://www.abc.net.au/worldtoday/content/2010/s3008434.htm).

farming communities in the region. The underlying stress in the region has had significant flow-on effects for local towns (including Donald) already facing general challenges of rural decline, and has also affected farmers' ability to invest in other crops and technologies – to diversify, improve resilience and introduce adaptation strategies under changing climatic and market conditions.

Socio-demographic context

The population of Buloke Shire has been in gradual decline since the 1960s. From 2001 to 2006, the population dropped significantly from 7331 to 7080, with the shire representing one of Victoria's most sparsely populated municipalities. The age structure of the shire has also changed (as seen in Figure 6.5), with significant decreases (increases) in people younger (older) than 64 years. People aged over 64 years represent 23.4 per cent of the population (compared with 15.9 per cent for regional Victoria as a whole) and 3.1 per cent are aged 85 years or older (compared with 1.9 per cent for regional Victoria). All age groups over 50 years have increased between 2001 and 2006, while all age groups under 50 years have experienced varying degrees of decline (BSC *2*008).



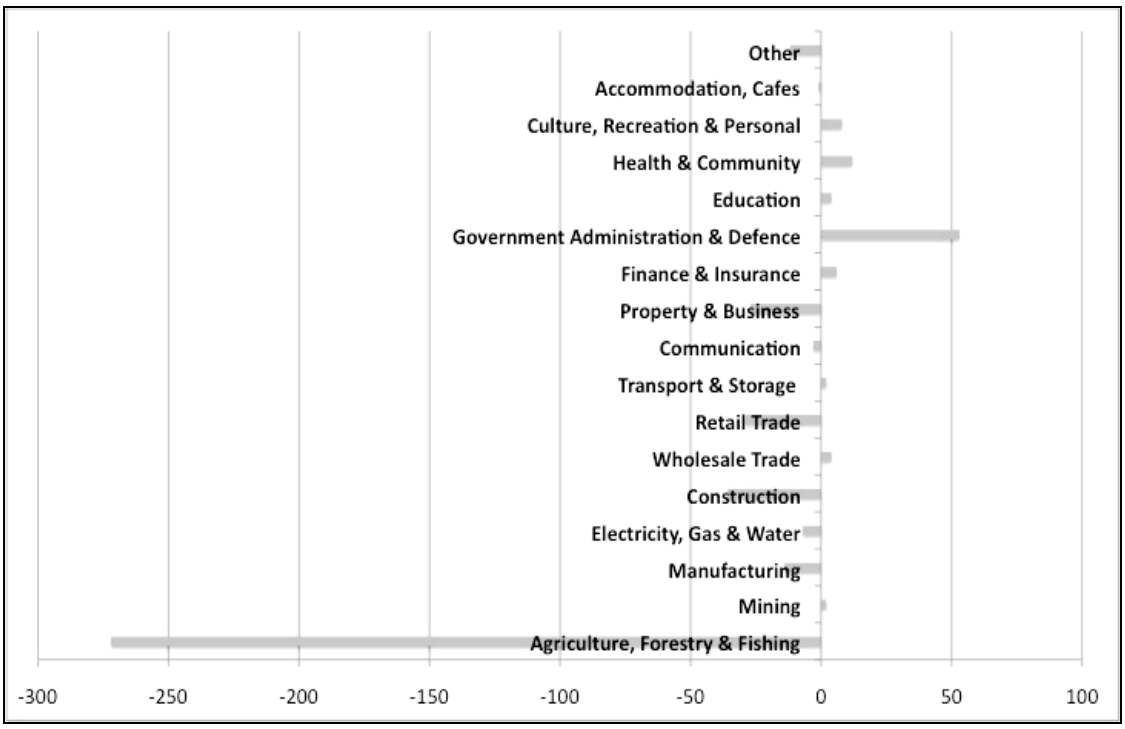
Source: BSC (*2*008).

Figure 6.5 Change in Buloke Shire population numbers by age structure, 2001–06

The shire is characterised by high levels of home ownership (57.4 per cent) compared to regional Victoria (38.8 per cent), with just 15.6 per cent renting (compared with 22.4 per cent for regional Victoria). However, individual income was significantly less than regional averages. In the Buloke Shire, 7.3 per cent of the population earned a high income ($1700 per week or more) and 54 per cent earned a low income (less than $500 per week), compared with 12.8 per cent and 46.0 per cent respectively for regional Victoria (BSC *2*008).

Similarly, the shire traditionally has below-average educational qualifications. Overall*, 2*9 per cent of the population holds educational qualifications, and 59 per cent have no qualifications, compared with 35.5 per cent and 52 per cent respectively for regional Victoria. Only 25 per cent of people had completed Year 12 or equivalent in 2006, compared with the regional average of 32 per cent. As in the case of Mildura, these below-average trends in educational qualifications may present further challenges to the region in terms of people's capacity for future adaptation.

Employment levels in 2006 were high at 97 per cent of the population, compared with 94 per cent for regional Victoria (BSC *2*008). Due to its relative isolation from other centres, over 90 per cent of employment is filled by people who live in the shire. As stated, agriculture accounts for the majority of employment in the area, representing 32.7 per cent of the total, with health care and social assistance (11.2 per cent) and retail trade (8.7 per cent) the next largest employers. The recent weakening of the agriculture industry is reflected in the marked decline (6 per cent decrease) in people employed in agriculture from 2001 to 2006 (see Figure 6.6), with smaller declines in employment across the manufacturing/construction and retail trade sectors. Increases in employment have been observed in government and health/community services.



Source: BSC (*2*008).

Figure 6.6 Change in numbers of people employed by different industries in Buloke Shire, 2001–06

As in the rural areas of Mildura, indicators of social cohesion were high in Buloke Shire. A total of 42 per cent of the population reported performing voluntary work and 13 per cent provided unpaid care, compared with 24 per cent and 11 per cent respectively for regional Victoria. Buloke Shire is evidently a fairly traditional rural community, which follows many of the trends for rural areas already discussed, including a declining and ageing population, lower incomes and educational attainment. The shire is also very homogenous, with over 95 per cent of the population Australian born (compared with 90 per cent for regional Victoria), with 65 per cent declaring Christianity to be their religion. Couple families with children dominate the family structures with just 10 per cent one-parent families (BSC *2*008). It is likely, however, that Buloke Shire will be forced to confront challenges faced by the already stressed agricultural economy, and a declining and ageing population, with rapid changes to the traditional makeup of the community continuing into the future.

There are significant differences between Mildura, which is an irrigation community (albeit with a dryland farming hinterland) that is also a major regional centre, and Buloke, which is a small dryland farming community. While the Buloke Shire has many advantages over the irrigation districts of the Mildura region, due to a lack of reliance on large water allocations for irrigation, the smaller population, decline in amenity associated with recent dry conditions (e.g. loss of lakes and rivers, dry and dusty parks and sports fields) and an increasingly ageing population, may prove dire for the survival of many smaller towns in the region. Retaining the attraction and amenity of small rural towns such as Donald for families and workers will be paramount for the continuing future of regions like the Buloke Shire.

6.2 Drought and rural communities: impacts, attitudes and responses

Interviews with local representatives in Donald and its surrounding area confirmed many of the trends noted in the climatic, socio-demographic and industry makeup of the region (see Section 3). As in the case of Mildura, talking with people in Donald gave life to these trends, and added depth and meaning to the ways in which they are understood, experienced and managed in an everyday context. Although both towns are located in regional Victoria, the experiences of the people in Donald were distinct from those in Mildura. The dryland areas of Donald are not so affected by the 'marketisation and politicisation' of irrigation water, but water is still an emerging commodity and the implications of this are highly uncertain. Across the Donald farming community, it is the recent lack of autumn rainfall (combined with hot weather, extreme crop-damaging rainfall events and diminishing commodity prices) that is decreasing the value of crops in an already stressed global market (see Section 6.1.2).

Rather than the uncertainties of water supply and security seen in Mildura, Donald interviewees spoke more of the uncertainties of a changing rural landscape. Some of these changes were related to an ongoing and relentless drying of the region, but most were much broader demographic, family and farming sector shifts that present critical challenges to the survival of rural communities like Donald. For many Donald farmers, drought and drying were a more manageable challenge than the shifts that are changing the very nature and identity of rural communities and traditional farming families.

In the following discussion, the key themes arising from interviews in Donald are examined in order to give voice to people living at the forefront of a drying climate.[14] The themes from Donald –many of which overlap with those discussed in the Mildura case study – are:

- 'It's just normal': dryland communities and water
- 'It's not just drought': commodity prices, rural demographic shifts and a changing farming industry
- Economic impacts: drought, drying and the family farm
- Social stress: small rural communities, farmers and their families
- 'It's in our blood': farmer sentiment and community strength

[14] See Appendix A for details of interview participants. In most cases, each interviewee represented more than one group. For example, some interviewees worked for a government agency but were also farmers. This feature of the rural setting of Donald elicited layered and multiple perceptions about the community and region. In addition, it is important to note that the term 'farmer' has been used as a generic grouping to cover all farming, growing and irrigating enterprises.

- Government support: supporting farming families and rural communities
- Future scenarios: climate change, adaptation, mitigation and the future of rural communities.

While many of the insights and recommendations below support and enhance experiences of change in Mildura, a range of issues were also revealed that are unique to Donald. This section of the report seeks to both strengthen insights made in the Mildura context, and offer other views that emphasise the particular experiences of people working and living in the small dryland communities of Australia.

6.2.1 'It's just normal': dryland communities and water

Across all the interviews, people explained the unique nature of dryland farming, their communities and the relationship they have with water. Drought, drying and a lack of water are viewed as customary parts of living in dryland regions, and most consider themselves to be adept at managing and living with limited water. However, simultaneously, they also have a deep and abiding respect for water and its place in supporting individual and community well-being. In dryland communities such as Donald, water is vital for life, well-being and the 'sanity' of people living and working there (see Golding & Angwin *2*009), as described by interviewees below:

> Dryland farmers have traditionally dealt with climate and changes in climate for a long time because they rely on rainfall. It's been happening for a longer period, so they have a greater mental capacity to handle that. (Senior Planner 1, DPCD)

> People in the Mallee have always been conscious of the importance of water, so when we hear stories of water usage in a city, we just can't comprehend it. We're just so much more careful … it's second nature. And we use so little for dry land agriculture now … we're using 1 to 2 per cent of the amount we were ten years ago. Even under recent Stage 4 restrictions, there were still ample supplies for the farms. So [water] hasn't been an issue, other than socially … people not able to water gardens was certainly an issue because you have to have your little oasis in the Mallee. If you can't have your green space, it becomes a very sad place. The women are the ones that are most affected by it. If you can understand wives stuck out on farms, if they're not able to have their garden, why would they stay there? (Dryland Farmer, Donald)

> When there's so much dying, you need a bit of green … to focus on something else, get the mind off it. My wife's from Melbourne, she's been up here 21 years, and that's always my biggest fear, can she cope with it all? She looks out and there's dead grass, the dams drying up, no rain. But I've been brought up with this … it's just normal. This is the environment we're in, we're passionate about it, otherwise we wouldn't be here. (Business Owner, Donald)

> In this dryland community, with no water, we've got nothing. We don't want great expanses of lawn. In fact, most people in this community have converted their front yards into drought-tolerant gardens … put in more water tanks, and recycled water systems … just so they can keep a little green patch; because this environment can be harsh. (Dryland Farmer, Donald)

'It's just normal' for most who have grown up in or farmed this region to cope with drying and drought. In fact, the Coordinator of the local Donald Community Centre spoke of the experience of recent storms, where 'there were kids, 4- and 5-year-olds that had never seen a storm. And it frightened the crap out of them!' The experience of these children highlights that

an absence of water is the norm. Yet it is this very characteristic of the dryland areas that also elicits a strong and abiding connection between individual well-being, water and the life that comes with it – a connection born out in the 'bits of green', the home garden, community parks and nature reserves. In other words, the farm and farmer have learnt to adapt to a lack of water, but the farm family's well-being is fundamentally reliant on maintaining this connection with water in what is predominantly a dry landscape (see Figure 6.7).

Source: Louise Askew, March 2010.

Figure 6.7 Typical landscape in the dryland farming region near Donald

In a similar way, water is viewed as fundamental to the social life and vitality of the community. Water is highly valued for facilitating critical social and recreational activities that sustain small dryland communities (i.e. 'recreational water' as opposed to water for consumptive use or for industrial or agricultural use). Indeed, as with Mildura (Section 5), Donald and its surrounding areas experienced extreme losses in amenity, tourism and recreational value once the local lakes began to dry up over a decade ago. Recent attempts are being made to refill these lakes from purchased water, as explained by interviewees here:

> There's nowhere for [farmers] to go and relax. They can't go to the lake, can't go fish in the river. Just some water in the river would boost, not only the farmers, but everybody … the businesses. We just had over two inches [of rain] recently and the place comes to life, people have got smiles on their faces, they're not looking so worried about things. It gives the sense that it can still rain. (Coordinator, Donald Community Centre)

> The pipeline has enabled us to fill lakes … with water bought for 'recreational use'. We did it in Birchip and Sea Lake. As soon as it started to fill, people were going out there and just standing around watching this lake fill up. And since it's been full, Birchip has come alive. The cake shop is going mad with bread and the butcher is going mad with sausages. There are people up there buying fuel for speedboats, they're out there yachting and skiing. People are coming from as far as 100 kilometres away. So [water] has a financial value and it's got a spiritual value … and it's got a social value because they're out there, not sitting at home. (Mayor, Buloke Shire Council)

These views from local residents support the concept that although 'it's just normal' for many to cope with living in the dry climate of the cropping region, water is valued as essential to the social and community well-being of the area. Water gives people 'a feeling of well-being' (Dryland Farmer, Donald), and the opportunity to wind down, relax and just be with others socially. Many expressed frustration that the limited water they use for these purposes was often subject to the harshest restrictions, as a dryland farmer describes: 'I would hope that in the future restrictions would be more targeted at large water users, rather than the ridiculous amount of restrictions they place on town and residential use here, where the savings are absolutely miniscule … use some business decisions and work out where the wastage is and put the restrictions there' (Dryland Farmer, Ouyen). The social and recreational value of water in and around Donald is immense, and is vehemently protected to support the community and economic well-being of dryland towns.

Key Insight 18

In revising understandings of variable water availability, it is important to also acknowledge the vital social benefits gained from the amenity associated with water (e.g. in rivers, lakes, and pools), particularly in dryland regions.

6.2.2 'It's not just drought': commodity prices, rural demographic shifts and a changing farming industry

Drought and the longer-term drying of the cropping region are among many challenges facing local farmers. Indeed, the issues associated with a lack of water, as noted above, are viewed as somewhat manageable and already well-ingrained in the farming practices of the region. As in the case of Mildura, there are a number of other pressing issues currently facing farmers, including commodity prices in a global marketplace, shifts in the farming industry and broader demographic changes to the composition of small rural towns and communities.

First, farmers describe the influence of commodity prices on the current state of the cropping sector that dominates the rural landscapes around Donald. Unlike Mildura, the problems of market pricing are not so much the result of a commodity glut. In the cropping sector, farmers are still adjusting to selling grain without the 'single desk' of the Australian Wheat Board (AWB), which was abolished in July 2008. The single desk represented a central body through which to negotiate grain policy and prices, and to market and sell grain globally (Hopkins *2*006). However, a series of scandals involving the 'single-desk' approach of the AWB led to a number of inquiries, reviews and reforms of the AWB,[15] the most recent of which was the replacement of the single desk with a free market system of marketing and exporting grain. Many Victorian grain farmers felt that this change, combined with generally fluctuating grain prices, increased the pressure they experienced:

> A lot of our problems at the moment are prices … so the dry land farmers had really much better yields this year than in the past, but the prices are so far

[15] The Australian Wheat Board (AWB) started gaining attention in the mid-2000s for monopolising actions on the global marketplace, the most serious of which was a scandal involving AWB kickback payments of US$221.7 million to the deposed Iraqi regime of Saddam Hussein, an action aimed at securing wheat sales under a UN oil-for-food program. The subsequent Cole Inquiry in 2005 led to a number of reforms of the Wheat Board, of which the removal of the single desk was a key component (Brindal 2010).

> down, that that's why they haven't done well. So at the moment, on top of drought, is the market driven stuff. (Rural Services Officer, Centrelink)
>
> I'm very nervous. Last year was a good year yield-wise, but the prices were very poor. So I think some [farmers] are just keeping their head above water. The unfortunate bit is that when we get good yields here, prices drop. And if the prices rise and we get good yields, well our wheat goes to the dairy farmer to feed cattle to get our milk, [which then] goes to the chook to grow the egg. But they can't afford the high prices for their feed, because they can't sell their eggs and milk for a higher price. So we cop it in the neck with our grain. And if it gets too high, they import grain … that's just lunacy! So my thoughts are, put the egg up another dollar a dozen, you'd be prepared to pay. Put the milk up another dollar. It's nothing out of our life, but at least the farmer gets something. (Business Owner, Donald)
>
> The effect on the farm has been astronomical. They are not getting paid. One of the biggest problems they had was losing that single desk. Because now they just won't pay … the supermarkets, Woolworths all of those. The farmers have got to give it to them for next to nothing. That's why a lot of the farmers' markets have flourished. (Coordinator, Donald Community Centre)
>
> Generally farmers in Victoria wanted to keep a single desk. And anyway, I'm sure there was an option where we could have had a mix of both, but the government decided, and they don't have to live with it, they're not in this community. So the prices are just rock bottom. And they're saying the prices aren't going to get any better … and that's despite the fact that we had an alright yield season last year, it's the first alright season we've had in the last ten years. (Dryland Farmer, Donald and also Secretary of Victorian Farmers Federation (VFF), St Arnaud)

Farmers are experiencing the combined pressures of a drop in commodity prices and a decline in industry support provided by the AWB in navigating and managing the global grain market. Moreover, these shifts are adding to the workload of farmers, as they are now responsible for marketing and selling the grain as well. As the Mayor of Buloke Shire explains: 'the farmer now has to market [grain] himself … so he is harvesting, stripping, carting, trying to sell the stuff, and find the right price … it's just so difficult'. This shift, in turn, has obvious flow-on effects to families and communities, where farmers have less time to spend with their families and for participating in community events and social activities (see also later discussion). Some interviewees expressed the opinion that the single desk should have been lobbied for harder by farmers.

In addition to commodity pricing, farmers currently are confronted with a changing farming sector more broadly. Cropping farms are growing bigger to compete in global markets, and are becoming more technologically advanced to gain efficiencies in on-farm practices. The flow-on effects to the composition of farms, farming families and farming communities is immense, as illustrated in these comments:

> Every thirty years in that cropping area the width of the headers doubles, the number of people you need to run the farm halves, and the farms double in size. And because they've got bigger machines and more complex machinery, the skills to keep it going and service it are much different to what they used to be. It used to be, every town had a mechanic. Now they need skilled staff … in GIS, complex hydraulics, sophisticated diesel engines and computerised guidance systems. So essentially, those traditional services withdraw out of towns like Donald. (Senior Social Researcher, DPI)

> In all these areas we're losing population because the farms are getting bigger, and the machinery is getting bigger, and one man can do 5000 acres just like he could do 1000 acres before. (Mayor, BSC)

> We're seeing the consolidation of properties, therefore the role of towns as support centres for agriculture has dropped off. Farmers are operating with much larger … more sophisticated machinery, and the local dealerships and mechanics are just not in a position to deal with that. Also some of the social connection has been lost from farming communities. As the farming profession has become more complex, they are relying not so much on, 'let's have a yarn over the fence', it's more 'what do we need to pay for?', 'how do we get professional advice?' So what was a natural sharing of information and learning, we've lost some of that. So someone made the comment recently, 'the only time that farmers see each other is at clearing sales and funerals'. (Community Development Officer, BSC)

The changing nature of the dryland farm is having significant flow-on effects for farming families and communities. As farms increase in size and sophistication, the ability of farmers to work together and be serviced by local agri-business is diminished, and as a result the natural sharing and learning between farmers is tempered. This is not to say that farmers in Donald and its surrounding regions are losing their professional and social ties to each other and the community, rather that the once customary and effortless opportunities to engage in these activities are declining. Subsequently, council and other service providers are now actively facilitating regular organised social events at which this sharing between farms and farming families can still be supported, even under these changing farming contexts.

The third issue – and perhaps the most threatening for many rural communities in the area – is the pressures presented by broad rural demographic changes: an ageing and declining population base with an influx of retirees and low socio-economic groups. These shifts are introducing potential problems that, even without the added pressures of drought, pricing and industry changes, would threaten the future of the smaller towns in the region. Many of those interviewed identified these issues with a sense of foreboding, as illustrated here:

> The thing that I'm concerned about is losing younger people. One of the things we've found, and it's not to do with drought, when you get educated, you have to go to uni. And once they go to the bigger cities, they tend to stay, they don't come back. And why would you? If we can't farm and make a dollar, they're not going to come back. (Business Owner, Donald)

> Donald, like other cropping towns, has been on the slow decline for generations. A lot of their populations would have peaked after World War II, so the main age group is 40 to 44. You've also had welfare migration and retiree migration. So the town population has been changing in those places, and what the drought's done, it's sped up that change … they call it 'dust change'. And cultural conflicts can come from that, between the long-term residents … and the newcomers who may not be interested in the same institutions … (Senior Social Researcher, DPI)

> We're also going to have significant service delivery challenges in those small towns, as these people that are moving there don't have the assets backing them that the farm community had. They're often socially disadvantaged … and don't understand the costs or strategies of living there. So, for example, they suddenly discover the water's run out, and they have to get water carted, that's a big expense so they have to get support from the Salvos to get water. This should be seen as a failure of policy and planning, and drought just

> exacerbates that. I can't see these pressures changing … it's long-term and much more reliable than drought. (Senior Social Researcher, DPI)

> We're seeing an ageing and shrinking population, each of our towns is shrinking quite rapidly. A lot of our farmers are much older now, they've sent their children away to be educated. A lot of those younger ones have, because they've enjoyed the city life, not come back. A number of them have wanted to come back, and the parents have said, 'Don't do it to yourself'. Once you start losing people and services, there's the impact on schools. And as the smaller communities shrink, they lose the capacity to host their own sporting teams, which is often the glue that holds communities together. So you can really see a difference in communities where they're losing this capacity. (Community Development Officer, BSC)

The intimate and reliant connections between farming, families and the small rural town are ever more apparent under these strained rural contexts. As the leader of a local community group explains:

> There is the farming community and there's the town community, but one can't be without the other. The town community relies on the farming community, for business … and the farmers rely on the community for services and social connectedness. And we really don't want to change the fabric of that.

Many community groups, such as Donald 2000, together with the local council, are actively working to ensure the sustainability of these rural towns through the maintenance of such connections. However, all spoke about the difficulties faced by a declining skills base and pool of expertise in rural communities, tired and 'burnt-out' volunteers, and limited funding and resources to apply for grants and other support schemes. Any support offered to these small communities, in the form of project or community development officers, increasingly is stretched across larger geographic areas with little time and resources to spend on each individual community. The provision of local support workers to help maintain active, yet tiring community leaders and volunteers will be an essential component of rural community support schemes.

The challenges presented by this shifting rural landscape are many, ominous and ongoing, and 'more reliable than drought' (Senior Social Researcher, DPI). In order to maintain the healthy future of these towns and communities, further foresight and planning will be required to anticipate and support the farming industry and demographic changes already underway, particularly as part of a changing and drying climate. Conventional approaches to government drought assistance do not acknowledge the delicate connections between dryland farms and the rural town, and thus cannot adequately support these transitions occurring in dryland farming communities. At present, and as already discussed, rural towns are changing, with little attention given as to how to manage these transitions in a dignified and supported manner. Moreover, those communities that are withstanding such pressures are not being provided with the necessary services and support mechanisms to maintain their sustainability. There appears to be much change confronting dryland rural towns, yet with little coordinated or strategic planning – this will need to be addressed if the potential services and planning 'failures' raised here are to be avoided (refer to Key Insight 1). Drought is just one of many threats to the survival of small rural towns. A 'more-than-drought' service system is needed, one that acknowledges the intimate connections between rural farms and towns – taking a holistic and strategic planning approach encompassing the farm, farming family and community, small rural town and region.

6.2.3 Economic impacts: drought, drying and the family farm

The interconnected nature of the dryland farm and rural town (and wider community) means that economic impacts on the farm quickly resonate in the town – and vice versa. Dryland farmers currently are experiencing a declining cash surplus from the farming enterprise, with many surviving at 'break-even' or with increasing debts. While zero or negative income is common during drought, the persistence of low incomes and current levels of debt are unprecedented. In addition, the compounding and multiple issues currently facing dryland farming mean that, even if it rains immediately, the economic impacts continue to have a resounding influence on farming enterprises. Several interviewees explained these economic trends:

> Even if it rains overnight, the drought doesn't break, all it's done is rain. The rest's still got to happen, they've got to plant, grow, harvest. It costs a farmer a minimum of $85,000 on average, just to spray a crop, to get the weeds out. And the chemicals are getting more expensive all the time. But they've got to do that so they don't get downgraded. There's not enough money in it now without being downgraded. (Coordinator, Donald Community Centre)

> Cash surplus is declining in cropping. So the average for a Central North [Victoria] farm for cash surplus was $10,000 in 2008, and off-farm income was up to $50,000 … a lot of that is really government support. But the impact in the cropping areas has not been to send more people off farms. When drought hits, and commodity prices are low, not many people are interested in buying, so the market stops moving. So the drought has not forced people out of dry land farming, but it's made them live on less, or live on welfare to hang on, so they can sell when times are better. (Senior Social Researcher, DPI)

> Frankly, the farmers haven't got any cash. They're living on borrowed money. And there are people now who have never borrowed money before. So whether they're prepared to continue to pull out $50,000 and pay interest on it a year to look after the family, I think that's what they'll do. In a debt of a million dollars, it's probably not much. And they are now in a position where they hold so much of the bank's money, that the bank's got to lend them again in hope of a better year. Now where the bank's thinking about climate change is at, I have no idea. So that's an issue I reckon that's got to be followed through, is what do the banks think about climate change and why do they keep loaning money to farmers? Because we've got a whole lot of indebted people. (Mayor, BSC)

> Since we've had this run of dry weather, and the prices, people have just got more pressure financially. It's got to the point now where accountants think if you're running 'level to the ear' then there's nothing to worry about. In other words, if you're paying all your interest, all your fuel and chemical costs, and your giving yourself a living, a $30,000 income … even though you're not increasing, not putting anything away for retirement, 'you're doing really well, don't worry about a thing'. That's the attitude of accountants … because they've got so many cases that are just so much worse off than you. (Dryland Farmer, Donald and Secretary, VFF, St Arnaud)

The dryland farmers that dominate the area surrounding Donald are facing unprecedented financial struggles. Unlike in Mildura, welfare assistance is still relatively new to the Donald region, and farmers are holding on to properties rather than exiting – in the hope of better years to either continue farming or sell up. Farmers are viewed as 'doing well' if their farms are running at 'break-even', yet as aptly described in the above comments, this type of situation does not support investment, adaptation or long-term planning for the future. Moreover, increasing farm debts are often silent contributors to the financial strains on farms

and will need to be addressed to ensure that bank lending policies are not at odds with the projected climatic impacts. The feasibility of farm debt mediation was also raised by interviewees (see also Altobelli & Francis *2*009).

Key Insight 19

In dryland communities, welfare dependence is still relatively limited. However, many dryland farmers and other businesses in rural areas are just 'breaking even' and need proactive financial and planning assistance to ensure that they do not become dependent and inactive in their business activities.

Key Insight 20

Addressing problems of farm debt may require attention to bank lending policies, and whether these are in line with projected scenarios of climate change in these regions.

In addition, this declining farm cash surplus has obvious and ongoing impacts on the economic base of the rural towns that support these farming enterprises. Local businesses and employment are suffering as farmers and their families are forced to curb on- and off-farm spending, as explained here:

> Economically the town has backed off, employment's disappeared. Once upon a time you could get a job anywhere in town, but once the drought hit, and no money coming in, they didn't need people working on the farm. And the businesses have really suffered because there was no real relief for them, there was relief for farmers, but not much for business, other than some tax relief. (Coordinator, Donald Community Centre)

> The businesses suffer as the farmers suffer, with little cash flow on the farms, people only spend what they absolutely have to spend. The local Holden dealership, which was 50 years old, closed last year. (Councillor, BSC)

The financial flow-on effects to rural towns are often overlooked in government planning for farmers' assistance and support. Although income assistance to farmers may indirectly benefit rural towns, assistance to local businesses beyond tax relief may be necessary to ensure the survival of rural towns in the region.

The economic case of Donald provides some unique insights into the financial impacts of drought, commodity prices and rural/farming shifts. For this predominately dryland cropping area, farmers are under extreme strain to just 'hold dead level' (Dryland Farmer, Donald; Secretary VFF, St Arnaud). It is evident that farmers are waiting for a better year in which to make back their losses and perhaps make a profit, or to sell their properties at a reasonable price. In the meantime, long-term planning has been largely put on hold for many farmers, as debts are increasing rapidly. Far from the looming 'welfare disaster of Mildura' (Senior Social Researcher, DPI), the cropping regions offer an opportunity to engage in more long-term assistance schemes and holistic planning, prior to creating dependence on short-term income support measures.

6.2.4 Social stress: small rural communities, farmers and their families

Anecdotal and qualitative evidence suggests that, for farmers, their families and the rural communities in which they live and work, the cumulative impacts of a changing farm sector may result in declining mental health and social well-being. Interviewees described the dryland farmers as very stoic and resilient – often to their own detriment. Many avoid seeking government assistance or psychological help, which compounds existing problems. Moreover, in the relatively isolated rural settings of dryland farms, their first point of contact to seek help is often with accountants, the RFCS, financial advisers or local bank managers – an emerging practice that raises questions around the provision of trained mental health professionals in rural areas. Interviewees illustrate some of these mental health issues here:

> It can affect people in different ways and people have different coping skills. I get a lot of people saying, especially when generations have been on the farm, they feel like a failure, because it's happened to them. But it's not anything they've done wrong, that's the way the times are going. (Rural Services Officer, Centrelink)

> We can see it mentally, we've had a few breakdowns and things around here. Australians are resilient, but how much can you get flogged and still take it? This is probably the eleventh year. They're starting to question themselves, you know, 'I've been doing this for 10, 12 years, we're getting further behind, look at the wife and the young family, what am I doing to them?' It's a strain on relationships. (Dryland Farmer, Donald)

> If you talk to the doctors they are very concerned about stress levels in rural areas. The RFCS is the only independent person some people can talk to. We've got some very good ones and they are getting overworked. Because you need people to go out and talk to farmers, they often feel too proud to get help. And even those counsellors, they are free and people still don't feel like they can ask for help. (Dryland Farmer, Donald and Secretary, VFF, St Arnaud)

> We have psychologists come and use [the community centre] to talk to people. That's doubled during the drought. Sometimes I just get people who want to sit here and talk to me, about problems that they've got, if they don't want to go and talk to a psychologist. A lot of them are depressed or their wives are depressed and farmers don't tend to show things like depression. When you find people coming through the door looking for help, then they're really in trouble. (Coordinator, Donald Community Centre)

Although not always directly related to drought, impacts on the mental health of dryland farmers are compounded by the ongoing dry conditions affecting the region, as a Community Development Officer (Buloke Shire Council) explains: 'Their capacity to deal with a whole complex of changes is much less during drought.' Dryland farmers require the necessary professional support to be able to increase their 'capacity' (i.e. their mental and social well-being) to address, plan and adapt their farming practices into the future, under the projected ongoing drying of the region. In addition, the professional support available in rural areas needs critical attention. Accountants and financial advisers are under extreme pressure to provide assistance to distressed farmers, yet the skills required are well outside their professional capacity and networks (see Key Insights 7 and 13 in the Mildura section, which are also relevant to Donald).

The complex changes discussed in this report place unprecedented pressure on the traditional family farm, thus affecting not only farmers but also families and communities

through the intimate and reliant connections innate to small farming towns. Families are under stress, with little time or money to spend on vital social activities, as described in the following comments:

> When we first got married we would work very little on the weekends. On Sunday afternoon you might get the machinery ready to go Monday morning. And you had football on Saturday. That was the done thing, and it was really five days. We were involved in a lot of community things. Now I reckon there'd be very few who wouldn't work seven days. The farms are bigger, there's more pressure, it's more of a tight schedule, you've got to do more marketing. There's just so many more things to think about now, and do with less labour. (Dryland Farmer, Donald and Secretary, VFF, St Arnaud)

> Wives are stressed. They know how much debt they're in and most of them are out working, because they've got to have cash flow from somewhere. We're also starting to find it in the schools now. And they're not always farming families, the family might have moved here because of cheap housing, parents may not be able to find a job, and the family may be in some kind of disarray. Either way kids are coming to school without meals, and can't always afford to go on school trips. I'm hearing from the school teachers that the stress flows down to the kids a bit, whether in farming or not. There is social disruption happening here because people are poorer. (Mayor, BSC)

Furthermore, these pressures on families have obvious flow-on effects for surrounding rural towns, as noted:

> There's a financial impact every time they go out. And we have all these drought initiatives and we're trying to tell people to come out and not be stuck at home. But they've got to drive a car 15 kilometres for a start and they're saying to me 'you're asking us to come out and stop being morose but every time I do, it costs us money'. (Mayor, BSC)

> Some young farmers don't participate [in sport] because they can't afford to be injured, because they're the only person doing the work on the farm. And you've got to be fit to farm. And that's when you realise how skilled farming is. You can't get somebody off the street to come and drive your tractor. They haven't got the skills. (Dryland Farmer, Donald and Secretary, VFF, St Arnaud)

The social impacts arising from the complex of changes confronting dryland farmers require both immediate attention and long-term planning. If the climatic scenario of ongoing drying is to continue, with the added pressures of a fluctuating grain market and farming sector, these mental health and social impacts are likely to worsen. The fact that many of the farmers and farming communities are hard to reach – both geographically and due to their stoic ethos – necessitates strategic and multi-agency responses that can outreach services to remote locations, to ensure that incidences of declining health do not go unnoticed.

Key Insight 21

Social and recreational activities (e.g. sport) are critical to the well-being of rural communities. More holistic service approaches that encompass farms, families, communities and towns will need to include provisions for supporting such recreational activities.

6.2.5 'It's in our blood': farmer sentiment and community strength

The picture of economic and social health within the dryland region surrounding Donald is often distressing and dispirited. People are confronting new and unknown circumstances with which they may be ill-equipped to deal, and which are exacerbated and aggravated by the drought conditions. While interviewees emphasised the severity of impacts on farmers and their families, they were also quick to note the ongoing optimism, strength and community bonds that they viewed as innate to the dryland region. Moreover, those interviewed perceived these attributes of their community as key to their survival, as the very foundations on which to confront and adapt to future change in the region. Interviewees aptly illustrate these concepts of community enthusiasm and strength here:

> I think that there is still enough enthusiasm for farming in Australia. I mean it's all about profitability, but second to that, there is still enough enthusiasm about doing what we do. We try to call it a business, but there's no doubt it's in our blood, otherwise we probably wouldn't do it. (Dryland Farmer, Ouyen)

> I think the fact they're still here, probably says it all. They're going through a grieving process, they're dealing with all the different issues, personal, community and financial. But in the midst of it, they're finding ways to keep connected and be active. (Community Development Officer, BSC)

> It's really amazing what they've been through, and they can still get up every day … obviously some of them are, 'oh it's all doom and gloom'. But a lot of them have still got the opinion, 'well we've got to make the best of what we've got.' So a lot of them are really positive, and as long as there a people like that, they'll be okay. Because they're a lot stronger than we think. They're not all suffering depression. I think we need to give them more credit than that. They are very strong people on the whole. (Rural Services Officer, Centrelink)

> In Donald's case, the attitude is, 'well if it's something good for the community, let's do it'. There's enthusiastic people involved in the likes of Donald 2000. Donald is one that gets behind its community, and does things that need doing. And when somebody new comes to town, the Donald group … grab hold of them and say, 'tell us what you know, come and get involved, work with us'. And Donald as a result of that has fared quite well. (Councillor, BSC)

> The community has to make whatever there is for itself. And there's a comfort to some degree about being here … in a country town, they identify with the people, they identify with the space and the place. They are the reasons they want to stay and make this place the best it can be. Understanding what it takes to stay here, drives the R&D, drives the need for new projects, drives the need to keep the sporting clubs going. Just understanding that that's what's required to survive is in itself its own driver. It's the support that we need to maintain the drive that's questionable. (Chairman, Ouyen Inc.)

There is a sense of community strength and a bond that underlies these descriptions of Donald (see also McClelland 2009 for further examples). The 'can do', positive attitude of the community is respected in light of the immense challenges facing the region, and also highly valued as the foundations on which to guarantee the survival of the town and community. As the Chairman of Ouyen Inc succinctly explains: 'There is a common understanding about living and farming in the harsh dryland climates – what is required to ensure the social and mental well-being of people living there now and into the future – that needs to drive change, research, and adaptation.' With many community leaders ageing, tiring and overworked, the ability to support this understanding and drive is under threat, and communities are calling for

more local support workers, community development, rural services and research officers to aid in their efforts to avoid the decline of their much-valued communities.

Many working in the field of climate change research question whether this type of optimism and community strength is enough to genuinely adapt and mitigate future climatic changes (e.g. Mackinnon *2*007). Moreover, there are others who suggest that this 'resilience' of rural communities may actually be a barrier to adaptation and change (e.g. O'Toole *2*001). As in the case of Mildura, these notions of resilience can indeed be obstacles to facilitating transition and change (see Key Insight 8). In the case of Donald, however, we note that beyond such notions of resilience, there are high amounts of community strength and practical knowledge – a more adaptable, forward-looking and strategic sense of robustness that may offer some opportunities to build-in adaptation and change.

Key Insight 22

Service systems, as well as research and development (R&D) programs addressing climate change, must look to the strength and practical knowledge already existing in these communities as effective foundations for building in adaptation, mitigation and change. Groups like Birchip Cropping Group (BCG) are already strongly active in this area.

6.2.6 Government support: supporting farming families and rural communities

Government support and assistance schemes are relatively new to the dryland cropping regions surrounding Donald. As in the case of Mildura, Donald is under EC declaration, enabling farmers to apply for the Exceptional Circumstances Exit Grant. In addition, dryland farmers have also had increasing access to government support services under EC, such as Centrelink income support, the Rural Financial Counselling Service (RFCS) and Youth Allowance.

Despite this access to government support, the uptake of these services has not reached the extent and scale of that in Mildura. Exits from dryland farms remain minimal in comparison to the extensive exits being experienced in the irrigated areas. As explained previously, many are 'hanging on' to their dryland farms to wait for a better time to farm and pay off their debts, or to sell the farm. Moreover, the uptake of government support programs is still relatively new to the area, with many farmers still maintaining their farm income at a 'liveable' or 'break-even' level (Senior Social Researcher, DPI).

In light of the current reviews of drought policy (see Sections 2.3 and 24), this is an opportune time to investigate the ways in which government support services are enacted 'on the ground' and to look at how this might differ between areas such as Mildura and Donald. This section addresses some of these critical issues of drought policy and the ways in which it is delivered through the stories and experiences of dryland farmers, and government and NGO workers in the area. It describes the current government drought-support context in this region, highlighting the support schemes available and how they are typically engaged by farmers. Further discussion is provided from the perspectives of those working in the sector, the aspects of government support that are successful, the types of practices and programs

that facilitate effective service delivery in the region, and possible service approaches recommended for the future.

For many farmers in the region, government assistance is encountered largely through EC provisions, which allow for certain government support schemes to be accessed if a farmer is assessed as eligible. As in the case of Mildura, most interviewees described EC as an imperfect and inequitable mechanism for supporting farmers, but one that was vital to sustaining some farmers in the context of a dearth of other support services, as described below:

> EC, I guess its got some people through some difficult times, as long as it's used in the right way. And that's the hard thing, who do you give it to and who don't you give it to? You've got some people saying 'I can't afford to do this, I won't survive so I'll use the old machine a bit longer' and other blokes keep buying, buying, and spend all their money and then say 'I'm in trouble, please help me'. But there are people who are desperate, so you need something, but it's difficult. (Dryland Farmer, Donald and Secretary, VFF, St Arnaud)

> Exceptional Circumstances provisions have been critical to the survival of many. However, at the same time a lot of the statutory provisions have meant that farming families who were very prudent managers of their resources, were then cut out and that created some real disappointment. There were real divisions starting to show in the community, where the appearance was that if you were a poor manager, you were being rewarded. And obviously the nature of the problem is not a short-term emergency. It's a much longer-term issue that government is still trying to come to grips with. You know, government's pretty good at the short-term emergency management, this is a different ballgame. (Community Development Officer, BSC)

The nature of short-term, emergency-focused government responses is that strategic planning and investment is not a priority. For many farmers, the short-term focus inherent in the EC scheme is seen to be unsupportive of those farmers who are good managers and who are most likely to be at the forefront of adaptation in the farming sector – an already widely noted criticism of EC (see Drought Policy Review Expert Social Panel *2*008; Botterill *2*009; see also Key Insight 4).

Through EC provisions, farmers in the Donald area increasingly are coming into contact with social and economic government support services. Far from the potential 'welfare disaster' (Senior Social Researcher, DPI) noted in Mildura, for dryland farmers welfare dependence is still relatively limited. The most challenging thing for farmers has been overcoming many of the preconceptions about Centrelink and counselling/psychological support services, with many embarrassed to use such services (see also Section 6.2.5). A gradual shift in people's perceptions of Centrelink was noted by several interviewees; they praised the efforts of Centrelink's Rural Services Officers, who have done much work with farmers and other service providers to build effective support networks that are assisting many hard-to-reach farming families. Several support workers who form this network in the area describe this changing services context below:

> They're a new client group for us. In the past, we haven't needed to have a lot to do with them because they traditionally haven't qualified for anything because of their assets. Whereas under EC, all their farming assets … are exempt. So for them it was difficult to approach us, and for us, it was sort of a whole new way of approaching them. So for [Rural Services Officers], it's about connecting the rural community with the Centrelink services. So we go

> out on farm and help fill out forms, to give them access to Centrelink payments and programs, as well as referring them off to other programs and grants. Basically we look at it in a holistic approach … because it can be very confusing. Confusing for us, and we work here! (Rural Services Officer, Centrelink)
>
> Farming families just hate it, you know, 'Centrelink's for dole bludgers, we don't do that'. And of course, when EC first got out there, the paperwork was horrific, and there was a lot of work involved … so people then just self-assessed as, 'no, we'd never get it'. So what has been really noticeable has been a maturing and growth within Centrelink through that process. Centrelink was approaching it with their normal welfare manner, which is basically assuming that you don't want to cooperate. But then they gave their Rural Services Officers space … to work with the Shire and make themselves available to be out and actively knocking on farm doors. We sit round with a family, often who assume that they're not eligible for anything and are going through some pretty tough stuff, and the Centrelink Rural Officer actually works through that … and just the look of relief on their faces. So we've found that our farming families have starting to recognise that 'these are people we can work with'. So the actual putting of EC on the ground has been done with real effectiveness in this area. (Community Development Officer, BSC)

Despite the criticisms made of EC, those workers engaging with EC 'on the ground' are utilising it in the most effective ways they can, to try to gain some relief for those farmers who are struggling. There are obvious challenges presented by geographic and often social isolation of dryland farmers, the preconceptions of 'welfare', and their grappling with notions of the 'resilient farmer'. Yet, through much hard work by Rural Services Officers in particular, some of the challenges are being met, confronted and defused. Ongoing support for this type of on-farm and personal support service is crucial to engaging dryland farming families, and will remain vital even under new government-funded rural assistance schemes.

Key Insight 23

The service approach undertaken by Centrelink Rural Services Officers has been extremely effective. Even under new government support schemes, such 'joined-up' and community-engaged networks should be built upon and sustained to better service farming communities.

In describing current government service programs and drought-support schemes, workers identified those support and service practices that were effective at engaging farming communities and those that provided the most useful long-term assistance for the region as a whole. The same four suggestions, as noted in Mildura, were put forward as the most effective foundations for future rural support:

- collaboration between service providers and practitioners
- undertaking community-led projects and programs
- supporting proactive, consistent and long-term approaches to service provision, and
- developing practice-oriented research and development schemes to support adaptation and future sustainability of the region.

The consistency of effective practices between regions indicates the primacy of these services approaches, demonstrating a viable foundation for future government and non-government support for farming communities and rural towns.

First, interviewees described the importance of partnership, working between the range of service providers involved in rural areas. Joined-up working appeared to be only a recent practice across agencies in the area, but one facilitated by the close rural settings, as explained here:

> Centrelink do a lot of referrals, to our social worker, the RCS, DPI. And I think vital to that working has been the drought advisory committees in each Shire, where you go to meet all the people working in that area, like Mental Health, the RFCS, the Shire Council people, resources centres, all your stakeholders and service providers. So you get to know those people, and you have a face to the name. (Rural Services Officer, Centrelink)

> In the past, there wasn't a clear picture of where drought services were in the Shire, no one was actually coordinating or doing anything with it … and climate and drought sat behind everything we did. But now we are addressing that and working together. We did have … through Local Government, Drought Service people, and that created some really good networking opportunities … and knowledge about what services were out there, learning who was doing what, and just building a good knowledge base. But as of this year, all of that funding has stopped. And now we've lost that incredible corporate knowledge that built up over that time. So that's a constant issue, where are decisions made, and how much notice is taken of the local knowledge, and recognising that not one size fits all. (Community Development Officer, BSC)

Partnership working is renowned for its difficulties and challenges, and in rural areas new to such government approaches, this is particularly the case. Dedicated, supported and well-resourced staff to coordinate this type of networking are vital to maintaining partnerships, and may be particularly successful in the settings of rural communities (see Key Insight 12).

Second, support workers in the Donald area noted the importance of the way in which services are framed and delivered, particularly when targeting farmers. They noted the effectiveness of community-led projects and programs, and grants and investment initiatives – approaches that were not about 'welfare' but rather about social well-being and the future. Interviewees describe this approach below:

> We've found that the more family and friends they have around them, the better they cope. And that's why we sort of tried with a little bit different approach when we give drought advice … you know, to get them out and to barbecues and to socialise, and try and forget their worries. (Rural Services Officer, Centrelink)

> Personal engagement has been critical to everything we've done, and of course we're in the position to do that, with less than 7000 population all up. Farmers realising there's actually a person, a face and a name to help them, that's such an important part of that process, trying to personalise the whole thing for people. (Community Development officer, BSC)

> The most successful things we've done are the pool parties and party nights in the park. We just did a Men's Night in conjunction with the primary school … that was a great night out. We've also started a drop-in centre where farmers' wives, can drop in and have a chat to people, or sit down and read the paper … stay in touch with the rest of the world, instead of getting locked out in the farms. Once things get tight, all the niceties disappear in the drought, and it's usually the women that cut them out first, because they realise there's a problem. (Coordinator, Donald Community Centre)

> The farmer doesn't want a handout; I don't think that's the way to go. Grants are good … when it's a grant, they'll all apply for it. We actually have a program that's called the professional advice and planning grant, which is a $5500 grant to get a drought management plan put in place. So get a farm consultant in, or an agronomist, and look at what you can do to change your farming practices … that's been great. (Rural Services Officer, Centrelink)

The combination of community-led initiatives and investment-based grants has been identified as the most successful ways to engage and support the farming community in this region. The majority of interviewees noted two particular engagement programs as extremely successful: the farm-gate visitation program and the Fire Shed gatherings. The farm-gate visitation program facilitates Centrelink and council officers to visit all the farms across the Buloke Shire, to reach out to farmers who may not seek help themselves, and offer assistance, information and referrals as needed. The Fire Shed gatherings have also been 'fantastically received', providing a once-a-month event in different locations across the shire, where farming communities 'get together as a community and catch-up with each other' (Rural Services Officer, Centrelink). The event attracts local families to a social gathering and informal meal where local service providers offer 'information if [farmers] want it, but really just go and talk to people' (Rural Services Officer, Centrelink). These approaches that recognise and respect the existing skills and knowledge of the community, and provide opportunities to relax and get together socially, are by far the most effective in providing support and engaging the farming community in this region (see Key Insight 13).

Key Insight 24

Dryland farmers can be hard to reach, geographically and due to their 'stoic' ethos, and are unlikely to go to where the support is. This must be taken into account when planning support and mental health services through the inclusion of farm visitation programs and other community-led social activities.

Finally, the farming community identifies practice-oriented research and development schemes as crucial to supporting the adaptation and future sustainability of the region. Many describe the decline in research services offered by government, and the importance of non-government organisations (e.g. Birchip Cropping Group) in providing effective leadership on a range of issues – from farming systems and technology through to climate research and community development. Interviewees describe the importance of research here:

> R&D is very, very important. We have to have ongoing R&D, as we face the issue of climate change or variability. We have to have R&D keeping us up to speed with, or better, ahead of it. Dryland Farmer, Ouyen)

> Farmers will adapt as quick as blazes, and they love technology. But they need help through taxation and initiatives or grants to buy into technology. So we've got to make research and technology accessible to farmers so they continue to farm sustainably. (Mayor, BSC)

> DPI], their emphasis has changed dramatically. We used to have about 10 or so DPI people ... now we've only got one, and he pushes paper most of the time, you never really see him. But they used to do a lot of work here, and help with the trials. Now Birchip Cropping Group have taken a lot of that over. It seems ridiculous that you can have a private group start up and take over the Department of Agriculture. I mean it's good that they did … but it's at an

> extra cost to the farmers … and they don't have the spread DPI had. (Dryland Farmer, Donald and President, VFF, St Arnaud)
>
> We used to have DPI people walking around helping farmers with their problems. Now there's one DPI person I can think of in this shire. And what do we do here? We feed the cities. 'Primary Industries', that's their name and they're not here … it's disappointing. So DPI seem to have moved away from the farmers, they're just keeping an eye on groups like the Birchip Cropping Group … which is a great asset to the community. (Mayor, BSC)

Research and development in the farming sector, and the ability to deliver this knowledge in amenable ways, are crucial to gaining the experience in new technologies and best-practice farming necessary to adjust to a rapidly changing farming sector and climate. Many dryland farmers are now in the position of having to pay for this support, through agronomists and other industry support groups, as the role of practical and connected assistance from government appears to be diminishing in this region (see Key Insight 14).

Government and NGOs have a critical role to play in supporting rural transitions, adaptation and mitigation measures across these dryland communities. People living and working in these areas are quick to identify those service approaches that work and those that do not. Across all of these stories is the sense that it is not just about drought, and that focusing support services solely on drought limits assistance to short-term crisis-management responses and impedes long-term planning and investment in alternative farming and rural community futures. Government and NGOs need to be listening to those who are working at the forefront of these rural transitions, who can identify that holistic and community-engaged services support farming families and communities through change in the most effective and respectful ways.

6.2.7 Future scenarios: climate change, adaptation and the future of rural communities

In light of the extensive changes being experienced in dryland farming areas such as Donald, what can we expect the farming industry and community to look like in the future, and how might the people living and working in this area respond and adapt? In considering this, as in the case of Mildura, it is essential that respect be accorded to the existing knowledge and adaptive capacity of those living in this region – those at the forefront of a changing and sometimes harsh climate (see also Berkhout et al. *2*006). This requires research to elicit the lived experiences, practical knowledge, and existing mitigation and adaptive practices of farming communities. It also acknowledges that adaptation is 'not just about changing people's minds', but rather working with people to be responsive, adaptive and creative in meeting future climatic changes (Howden *2*008; Stokes & Howden *2*010).

The following discussion examines ways in which the farming community of Donald currently understands and undertakes adaptation in its farming practices, and how the community might imagine this changing into the future. This section specifically addresses the future scenarios interviewees imagine in light of a changing farming, climatic and rural environment. It also highlights key ways in which the farming community and the rural towns intimately connected to this community already are undertaking adaptation practices, the areas in which they are vulnerable to climatic change, and how they could better be supported to strengthen their adaptive capacity for the future.

First, how do people living in and around Donald perceive the climatic future of their region and the ways in which this might affect farming and the wider rural community? Donald is a very conservative area, and concepts of anthropogenic climate change most often elicit scepticism and disbelief – with most advocating notions of a variable climate, made up of cyclical changes: 'we're in a cycle' (Coordinator, Donald Community Centre); 'I confess to being a bit of a climate change sceptic … it just goes up and down' (Councillor, Buloke Shire Council); 'I don't know if I agree with climate change, what I say is, "we're living in a changing climate"' (Rural Services Officer, Centrelink). Coming from key representatives across government and non-government agencies, these views can be a worrying indicator when it comes to a rural community's ability to understand and adapt to future climatic changes in the region.

However, as we noted previously, climate change scepticism does not always limit people's ability to undertake adaptive on-farm practices, or imagine different climatic futures for the region. In addition, there are many who adamantly believe in climate change. Although some may under-estimate the nature of climatic changes with respect to predictions, they are thinking about climate, and about managing and adapting to its changes in everyday ways. Some interviewees provide examples of these attitudes:

> Already, climate change has had a huge impact. Historically, 50 per cent of Victoria's grain has been grown within a hundred kilometres of Birchip. And that's no longer the case. That prime grain growing has now switched down to the Western District, which was historically a wool growing area. It was too wet to grow grain down there, but now with the climate changes, they've got the ideal conditions. (Community Development Officer, BSC)

> I think that in the future this area may become unviable for grain cropping. I mean if you can believe what you read, the rainfall in the long term will reduce here, and it'll become hotter … if that's right, this area may become too climatically different for dryland farming. (Director, SMECC)

> I think it's always in the back of [farmers'] minds, that something's not quite right. So even through the thick of it all, they're convinced that they should be doing something to contribute [to the environment]. You know, farmers cop a bit of a floggin' with people saying, 'You're destroying the planet.' And we're not at all. We're the best conservationists. You're not going to kill the ground that feeds you, but they don't get that. (Dryland Farmer, Donald)

Whether people believe in 'climate change' or a 'changing climate', they still seem to support the view that the region's climate will continue to change and that this will affect farming, albeit to varying degrees. This acknowledgement provides a heartening digression from common presumptions about conservative rural communities' adaptive abilities, providing an amenable and burgeoning foundation for future work on climate change (see Key Insight 9).

Indeed, farmers ardently subscribe to adaptation, research and development, as well as change in their on-farm practices. They describe themselves – as do other people in the community – as responsive, up to date and willing to change, as encapsulated in these comments:

> The drought's been a good thing in one way that people have learnt to get by with a whole lot less water. So they're changing their practices on the farm. They're very good with change you know. People seem to think farmers aren't good with change. But they run a business now, they're not just farmers, so

> you have to be on top of it. I mean some of the things I go 'my god, you'd have to be a scientist to understand this stuff, how do they cope?'. But they do it … they're always looking for change. (Rural Services Officer, Centrelink)

> That's the mental change … they're now thinking about, yes we have climate change, yes it's getting hotter, yes we're getting less rain. Farming techniques, they're changing accordingly. You know, minimum till, so you don't go out and work it every time it rains, you leave the straw there to retain the moisture. We're passionate, and we do think there is change, whether it's going to cycle or not … let's do our bit. And it's all conservation, you know, conserve the moisture that we have, farm for bad years, not good years … and then we'll get it right. So they're switched on, they're changing, they're doing it right, and getting more efficient at it. (Business Owner, Donald)

> Farmers are probably the best adaptors you'll find because they can't keep losing money. Birchip Cropping Group is looking at what other varieties they might grow. They have got into the hay market. We can start an industry up here with chook sheds, a pellet factory, bio-char setup and gasifier machine. There's also options for funding farmers to plant unused land with native vegetation. We're doing a soil trial now, sowing native grasses and talking about more salt bush. In relation to farming, we've got into alley farming, so we've got trees back in the landscapes which not only reduce high speed winds but also attract more rain, biodiversity, beauty. Farmers are also growing crops on 9 inches [of rain] that used to have 16 inches, so growing in half the rain … So we've got an opportunity, we've just got to grasp it. (Mayor, BSC)

> I think adaption has been increased [by the drought]. If you look over the fence at somebody who's adopted the more modern farming methods … and see that they're getting a benefit, then you adapt and change as well. And so the adoption by other people has been very quick, because it's been a case of do it and survive, or have poor yields and go. We've made huge gains in our farming methods over the last fifteen years … for example, how do you explain the Mallee? Hot, dry and dusty. Well we've actually removed one of those words out of the vocabulary: dust. There is no longer any dust in the Mallee because we're retaining straw all the time. There's been an unbelievable change to living in the Mallee, and we're all very proud of what we've done, but we get absolutely no recognition. (Dryland Farmer, Ouyen)

Dryland farmers are experimenting and trying different crops, ways of growing and techniques for managing the Mallee environment. All acknowledge the vital role played by the Birchip Cropping Group, which provides locally based and technologically advanced support for the dryland farming sector. Farmers also note that this type of adaptation is hastened during drought because it is a matter of survival. The dryland areas appear to offer great potential for the experimentation in and uptake of adaptation and mitigation measures, due to the innate innovation in farming activity and also the communication that occurs 'over the fence' between farmers.

The ability of farmers to engage in these types of mitigating and adaptive behaviours is, of course, influenced by the current social and economic pressures on dryland farming communities. Although many still maintain the resources to be able to engage agronomists and up-to-date farming practices, they are tired and uncertain about the future, and with this their mental resources to be able to undertake change are diminished, as described here:

> It's very hard to plan. See every year suits a different crop ... but at this point you cannot tell. You don't know how much rain you're going to get, whether there's going to be a frost ... what enterprise mix you should be doing, and for

> that reason you can't pick just one crop, because you won't know the price, you won't know the yield. You don't know the grade. Even if you wait till harvest, you still don't know. You could choose one thing and make $200 000, or another and lose $200 000. It just breaks you … there's so many variables. (Dryland Farmer, Donald and President, VFF, St Arnaud)

> It all depends on the rain. If we go back to an average year, it won't be too bad. But if we keep getting another 10 years of dry it'll be very interesting. Everybody will be too scared to do anything … everybody is going to be looking at less risk. (Dryland Farmer, Donald and President, VFF, St Arnaud)

> They're changing … and getting more efficient at it. But it comes to a point where you plateau, you can't become any more efficient than you are … we really do need a bit of a break in the weather, and we need good prices. (Business Owner, Donald)

The ongoing drought and drying of the region are chronic. The amplified pressures of drought combined with market fluctuations and rural change is producing extreme uncertainty and is, quite simply, tiring. Many farmers spoke of the need for a break, however small, from the seemingly relentless pressures on their farms and communities. Farmers' ability to envision change, adapt and adopt mitigation measures is most definitely abiding, but is stretched to its limits under the current conditions and needs critical support (see Key Insight 10).

A vital part of supporting adaptation and the fatigue of farmers is through the rural towns that remain – despite many socio-demographic pressures – strongly tied to the farming community. Many of the smaller towns throughout the dryland region are confronting an uncertain future, as people, services, schools and businesses are depleted – a pattern that is likely to be enhanced under a drying climate. The future for the small rural town can look grim, but interviewees offered a view of their future that both noted the immense challenges they face, and also alternative visions for the future and strategic plans for their survival. Interviewees noted the importance of retaining and gaining population, and making the town attractive and liveable, as captured in the following comments:

> One of [Donald's] big concerns is to retain and attract population. We are seeing a change in population in these areas, where a lot of younger families are going to the bigger centres, and then we're seeing older people just retired … come and buy a property up here, at a more reasonable rate. They take a look at the place, love the look, the lifestyle … they're actually quite strong assets for our community. So the future of these towns is very much around the ageing population and ensuring the liveability of the town. And we are actively doing things in that way. Donald's got a real active community, and are always looking at 'where to from here?' (Community Development Officer, BSC)

> If you read the government figures, we're going to have double the population in Victoria in 15 to 20 years. And I think a lot of them are going to come this way, and come from Queensland when it gets too hot. Immigration will be big to these areas. And I think the country community has an opportunity now to use technology to invite people to live here. You know artists, novelists, engineers, you have to grab these people because they have skills. Those sorts of people will come into our towns and change the way things happen. So population needs to be at a sustainable level, to service ourselves, and what is an ageing population. (Mayor, BSC)

In addition, some interviewees also illustrated alternative visions of the town, not just of retaining and attracting population but changing the very foundations of the small rural farming town itself, as indicated below:

> Technology is the answer for a lot of things up here. In 10 years' time the world will be nothing like it is now. We'll have a health system where you communicate via video link; a machine takes a scan of your thumb, gives you your blood pressure, glucose, whatever. Then you talk to the doctor. Same with pharmacies, you talk via video link to a pharmacist kilometres away about what you need and it gets sent to you. That's how rural towns will have to evolve. And I think we're close to that with some things, like video teaching, they're doing that at the school here. (Mayor, BSC)

> If it's going to get hotter, the positive side is … solar power. We've got more sun than anywhere else, we should be capitalising on it. So I'd like to see more government spending here for … solar farms. We've got the space, we've got the gridline, we've got the people. Another thing, we grow excellent canola around here. Canola you crush for the oil, oil makes biodiesel, biodiesel saves the planet … and we can sell it to Germany and France where they haven't got enough land to grow canola. But the government put taxes on biodiesel. Well if they're serious about it, scrap the tax … and don't build another coal burner. (Business Owner, Donald)

Like those in Mildura, the people living and working in the dryland farming region are talking about their future and the changes that are required for survival, and most importantly are active in undertaking any initiatives that will aid in their survival. In addition, farming communities are imagining very different futures, where isolation and service demands are managed through technology, and alternative industries and energies offer a sustainable and economically viable way forward for their towns and wider communities (see Key Insight 15).

Importantly, interviewees noted that there was no one answer or panacea to the challenges confronting the region. They acknowledged that the dryland area needs a 'balance of things' in order to survive, a view perhaps 'borne out of the common farming practice of spreading risk' (Chairman, Ouyen Inc). The dryland farming communities are confident of their survival, even if it is not in dryland farming, as beautifully illustrated by a business owner in Donald:

> I think we'll survive … it's the good leaders, the mix of people. That's what we do, we look after ourselves. And if the weather turns around, it'll be a bonus, and if we get paid for the crops, it'll be a bigger bonus. And if the weather doesn't turn around, we'll do something else, like the canola … the solar power … all we need is a little bit of help … and then it brings new technology, new ideas, fresh people … it's pretty simple really.

There is evidently a strong attachment between the people, the land and their community in this region. Yet this attachment is not fixed and staid, as is commonly assumed. Instead, these types of connections between people and place may in fact provide opportunities on which to build effective adaptation approaches and new futures.

The dryland region encompassing Donald is experiencing unprecedented change to its traditional economic base of dryland farming and its socio-demographic foundations. In many ways, drought has merely accelerated already occurring changes to both the farming industry and demographic makeup of these rural communities. Dryland farming has made extensive technological changes to its practices as the rural community slowly loses its young families, services and local businesses. The economic and social impacts of these shifts are

resounding, and the support services required to deal with these impacts are being stretched to their limits. The resulting problems facing the region will require proactive approaches in envisioning, planning for and enacting different climatic and socio-economic futures. We reiterate that, throughout this process, it is vital to work *with* local people to gauge and utilise the practical knowledge, experiences and insights gained from confronting drought and climate change in very real and locally-specific ways. Moreover, it will be important for people to be well supported through the processes of change, in ways that are respectful and revitalising for those who are fatigued from chronic drying and farming pressures.

Learning about and acceptance of different futures will be key to this type of approach of government policy and programs. Drought need no longer be the centrepiece of government policy in these regions, and in fact it would be detrimental to continue with such a drought-centric approach. The issues facing this region are 'more-than-drought', and only understanding and addressing them in this way will offer an effective means of support through projected increases in the occurrence of drought. There is much evidence, despite the conservative nature of the dryland community featured here, of adaptation and openness to change, which will offer government and research opportunities on which to build and sustain future proactive and practice-oriented support services and programs.

6.3 Workshop: Drought adaptation and the future for Donald

A one-day workshop was held in Donald during June 2010 (see Section 4.4 and Appendix D for further details). The workshop in Donald enabled a more thorough understanding and analysis of future challenges and aims for the region, whilst providing a basis for comparisons to be drawn between the two case study locations. As previously stated (Section 4.4), the identification and prioritisation of elements, in terms of human, natural, social and financial capital, enabled us to examine current and future adaptation options for Donald, which assists in projecting future viability and identifying areas where support is required.

Summarised in Table 6.3 are the key elements and likely conditions and priorities identified by Donald workshop participants for 2015 and 2030. These form part of the preferred climate step-change scenario established in the workshop – 'Plan for the Worst but Hope for the Best'. The workshop intended to explore multiple climate change scenarios associated with continuation of the Big Dry drought and other, less severe climatic conditions. However, it soon became apparent in the discussion that over the timeframe for consideration of the scenarios (to 2015 and to an extent to 2030), the only consequential scenario was continuation of the Big Dry. Incidentally, this scenario is one of the main planning scenarios for the Western Region Sustainable Water Strategy (DSE 2010).

Table 6.3 provides a summary of participants' insights of what the future might be like if the Big Dry continued.

Table 6.3: Potential future impacts of a Big Dry

Climate step-change – 'Plan for the Worst but Hope for the Best'		
Element	**2015**	**2030**
Town	▪ With the Wimmera-Mallee pipeline, town water supplies would be better and more assured than they have been historically. ▪ However, water restrictions unlikely to be better than Level 3 and likely to vary between Level 3 and 4. ▪ The town would (and has) adapted to dry-country gardening and landscaping. ▪ General appearance of town would deteriorate, with loss of older amenity trees due to lack of water.	▪ Donald may face strong competition for water within Wimmera system from other users, particularly mining. Participants concerned that (some) towns may be uncompetitive. ▪ Controls are required to protect water supply for critical human and farm water needs (from water trade). ▪ There may be insufficient water to supply towns if Big Dry continues out to 2030. The Pipeline guarantees water only if water is available in the Grampians. ▪ Priorities for water use needed, e.g. stock versus domestic use
Stock and domestic	▪ Same as town. Wimmera-Mallee pipeline has secured supplies compared with recent past. ▪ Availability of water from pipeline may allow expansion in intensive animal husbandry (chickens) over this period. This might be supported by higher global prices and higher demand for animal protein and decisions by farmers to diversify risk. ▪ Water likely to be increasingly commercialised. ▪ Traditional farming increasingly challenged by water availability.	▪ Enterprise diversification opportunity limited by water availability. ▪ Global economy will be challenging and may make water availability irrelevant. ▪ May require legislation or regulation to uphold value of water for food production. ▪ Costs to set up new industries is huge and may require subsidies. ▪ Opportunity to retain integrity because of 'clean and green' image of Australia compared with other international agricultural producers.

Climate step-change – 'Plan for the Worst but Hope for the Best'		
Element	**2015**	**2030**
Rainfall for farming	▪ Some/many farmers have been adapting to such conditions through changes in cropping practice, use of new technology, use of new machinery, etc. ▪ May lead to marginal land and farmers with low equity becoming unviable. ▪ Viability will reflect commodity and input prices as much as local climatic conditions. ▪ Further shift to corporate style of farming. ▪ Try and hold on sustain current activities until future R&D advances provide a solution.	▪ Assumed that R&D (e.g. through breeding, genetic modification (GM), etc.) will enable better crop production on much less grain. ▪ New crop opportunities arising from R&D. ▪ Carbon economy will drive change in enterprise mix (e.g. opportunities for biodiesel crops, solar energy farms, wind farms, carbon offsets through planting, etc.). ▪ Many farmers will succumb to difficult times and exit farming and the district resulting in a depletion of farming families and population. ▪ More corporate-style farming (even if family businesses). Non-family corporates may invest elsewhere if farming perceived to be too high a risk. ▪ Larger farm size (regardless of corporate or family owned). ▪ Opportunities for biodiesel crops.
River and lakes	▪ Taken for granted that river and lakes will generally remain dry. ▪ Limited tourism revenue as a result of lack of water in lakes (e.g. duck shooting, water skiing etc.). ▪ Loss of recreational and social opportunities associated with lakes. ▪ Maintaining water for swimming pools (seven in Buloke Shire) will assume greater importance. ▪ Need for 'dry' fire fighting will increase requiring money for initiatives and training. Initiating welfare, including support as a method to manage risks associated with loss of brigade members as people	▪ As for 2015. ▪ Water for swimming pools critical to maintaining amenity of towns.

Climate step-change – 'Plan for the Worst but Hope for the Best'		
Element	**2015**	**2030**
	leave the community.	
Land use and management	▪ Farming based on low-risk production systems. ▪ Enterprise mix within current knowledge. ▪ Need to provide increased social or mental health support to farmers. ▪ Few highly profitable farms and increasing rural poverty. ▪ Need welfare support and R&D in place now to get through to 2030 when technology will hopefully assist. ▪ Increased debt burden and lower equity. ▪ Continued assistance required from EC or similar. ▪ Banks will stop lending to increasing numbers of farmers. ▪ May shift towards having very large farms run remotely (on fly in/fly out basis – as in Western Australia). This is not so good for the local community and town.	▪ New crops available as a result of technology. ▪ Diversification into new enterprises – some of which may only have niche markets (e.g. native grasses) so likely to only be enough demand for a small number of farmers. ▪ Food security a growing issue for Australia and world – investments required in transformative R&D for highly water efficient production. ▪ Continued application of technology.
Productivity and profitability	▪ There is the feeling that farmers have done what they can with current knowledge and technology. ▪ Move to lower risk farming systems may help to protect profitability.	▪ Dependent on technology for new crops.
Farm size	▪ Getting bigger, may sustain more than one family	▪ Even larger, shift to corporate rather than family structures.
Employment	▪ Local businesses decline due to reduced population and prosperity. ▪ Reduced on- and off-farm local employment opportunities.	▪ Viable farm and town employment would require support being given to local business and efforts by local government to attract new industries (which would be supported by state governments) to set up.

Climate step-change – 'Plan for the Worst but Hope for the Best'		
Element	**2015**	**2030**
Economy and investment	▪ Businesses for sale, not viable and with no one to buy them. ▪ Can import goods cheaper than they cost to make. ▪ Businesses would need to focus on developing external markets (e.g. use internet for marketing). ▪ Diversification into intensive animal husbandry. ▪ Towns within Buloke Shire would need to collaborate rather than compete.	▪ Dependent on successful R&D outcomes for agriculture. ▪ Greater reliance on non-agricultural industry (e.g. solar power, carbon economy, tourism, manufacture).
Demographics	▪ Specific effort to attract retirees to town, provided hospital and other services can manage. This would exacerbate ageing of population. ▪ Increased rate of loss of young people.	▪ Continuation of trends with much older population and demographic mix
Health	▪ Currently three doctors, only obtained through hard work of community to get them	▪ Population decline would lead to loss of doctors and other health professionals, and decline in services
Services	▪ Loss of population may reduce capacity to operate Country Fire Authority (CFA) brigades. ▪ Continued and strengthened requirement to provide support services to assist social and mental health issues (e.g. the problem of having insufficient health services but an increasing number of ageing and unhealthy people, family breakdown, financial pressures, suicide, etc.). ▪ Declining social amenity (especially for young people). ▪ Increased collaboration between community organisations required (e.g. schools). ▪ Ageing social climate and resulting problems of youth boredom in small towns and lack of communication – need for community projects for youth.	▪ Further increase in emphasis required on building and strengthening community: – Community groups service partnerships – Encouraging in-migration and multiculturalism – Conveying sense of dynamic community, with strong non-agricultural economy – Community funding support services (e.g. church minister).

Climate step-change – 'Plan for the Worst but Hope for the Best'		
Element	**2015**	**2030**
	▪ Strengthen sporting programs to engage youth in community. ▪ There is a role for person/people to coordinate/connect people and create partnerships through innovations that are outside the square.	
Local/state government responses	▪ Complex system of rules. Reduce red tape – need for quick decisions, so as not to miss opportunities. ▪ Demands of schemes in terms of the time required by those receiving the funding is often unrealistic. Makes getting the funding impossible for actual farmers and means those who can afford to make the commitments/requirements are the wrong people. ▪ Councils may need to consider amalgamation of towns/town resources to ensure local government is viable. ▪ Need stronger focus on economic development to offset losses in farming sector. Would require a different mode of operation. ▪ Provide support for housing development to ensure supply available for new residents. ▪ Trust the community enough to let them spend the money – government needs to take more of the risks itself.	▪ As for 2015.
Other	▪ Donald has adapted successfully in face of changes experienced to date: – Strong community connections – Generous community spirit – Strong support networks – Trust among people – Confident in future – Abundant social capital. ▪ Balance between the good	▪ Technology and remote management increasing – social systems will need to adapt. ▪ Arid areas have viable but different agriculture.

Climate step-change – 'Plan for the Worst but Hope for the Best'		
Element	**2015**	**2030**
	things happening and the hardship. ▪ There are locals who will invest money and will then continue to mentor.	

As the workshop proceeded, a more general discussion evolved. The main themes of the discussion were: (1) the risks and opportunities facing Donald in the future; (2) the best ways to manage the risks and make the most of the opportunities; (3) industry-based adaptation options; and (4) the strengths and weaknesses of the Exceptional Circumstances policy.

Workshop participants identified that the main risks facing Donald in the future were the:

- sale/loss of water that would usually be used for human needs
- loss of town amenity
- loss of marginal farming enterprises
- reduced farm and local employment
- reduced investment in farming and local business, and resulting business closures, and
- accelerated ageing of the community (both through out-migration of young people and in-migration of retirees).

The main opportunities identified for Donald in the future were:

- alternative farming systems with lower risk of failure in drought conditions
- the carbon economy (including the potential for carbon sequestration, carbon offsets through on-farm planting, solar and renewable energy generation, biodiesel)
- intensive animal production (while water available)
- non-farming businesses (e.g. tourism, servicing the need for retirement villages, manufacturing, etc.)
- partnerships and communication, and
- a focus on community development.

Workshop participants decided that the risks could be managed and opportunities taken advantage of via the following strategies:

- develop housing (public housing, land for housing, attract retirees and develop service support)
- develop employment and economic opportunities that do not depend on farming or local markets (e.g. non-farming/internet-based, non-local markets)
- develop social and health services and support that are integrated into other industries and linked to larger centres via internet
- develop and promote schools and sport (good-quality, strong community support)
- community (one-on-one effort to attract and retain people, support for each other, for example through generosity, volunteering, positive attitude towards town), and

- bring people together as often as possible (e.g. men's nights, Fire Sheds, Country Women's Association, farm-gate visitation, Country Fire Authority (CFA), etc.). The need to translate the success with these programs and initiatives to more youth-focused events was seen as urgent, but also extremely challenging (and not just an issue for rural communities).

Some aspirational industry-based adaptation options were also discussed, and are summarised below:

- Workshop participants saw the development of energy resources (e.g. especially solar, wind, natural gas) and associated power generation as a future industry in which Donald could play a role. A suggestion was made by one participant for a power-producing plant to be developed for each of the five towns in the shire. This would give local control of the power, security of energy supply, local jobs and associated revenue for local businesses. In the current global focus of alternate non-agricultural industries, it was agreed that this was a good idea to consider.
- Birchip Cropping Group (BCG), a private organisation, leads the way in terms of improvements and advice for many rural industries in the Buloke Shire (especially broadacre farming). Questions were asked about why it was left to private industry to provide this service. The overwhelming view was that government needs to increase its level of support (both financial and personnel) towards climate forecasting, training and retraining of farmers, community groups, and to rural communities and business (especially farming) in general – this support is particularly needed during bad seasons (e.g. caused by drought, poor commodity prices, etc.). Information seminars on emerging industries (e.g. biodiesels, mustard and juncea, wind energy) would be particularly useful.
- There was also discussion about how small inland towns could 'provide the answer to many of the city's problems'. For example, cities are overcrowded but small inland towns have space for things like retirement homes, hospitals, industrial sheds and warehouses.

As discussed in previous sections, one of the most controversial topics associated with drought policy is the Exceptional Circumstances (EC) declaration process, and the associated rules and regulations surrounding who is eligible and how to apply. Donald workshop participants saw the financial support associated with EC as crucial to supporting farming families during drought (particularly those who came back to the farm at 'the wrong time' and now face drought, poor commodity prices and high debt levels). The view was that continued EC support will likely be required by future generations (e.g. issues of succession/timing, next generation being handed the debts) and that EC-type funding needs to be seen as a stimulus and as support for farmers to adapt, rather than as a handout. The EC and other types of support (e.g. food packages, fuel vouchers, gift vouchers to local shops, DGRs [Deductible Gift Recipients], cash) are all crucial for supporting local business (i.e. not just the farmers receiving the EC support but the wider rural community as well). However, it was acknowledged that there are some issues around judgement of people on EC support (i.e. opinions as to who should and should not be getting it), which causes some friction within the community and can also negatively impact the mental health of the people receiving EC support (i.e. some people on EC have the impression that other people in the community think they are a failure or not a good farmer). Another issue identified is the frequency with which Centrelink officers have to reapply for their positions (usually annually), which often

results in lost continuity for the rural community members who are Centrelink clients. Recommendations for improvement to the EC process included:

- Better defined criteria are required for who can apply and who gets granted support.
- Increased equity is needed with regard to who can access EC support – it should not just be farmers (e.g. local business owners are not eligible for assistance if their partner earns a full-time wage when this income is irrelevant in relation to a business owner's ability to run a business and generate the positive repercussion for the town/community as a whole). Anecdotal evidence was provided relating to how non-farming businesses act as banks to people who need items to run their farm or business but can't afford to pay during drought periods – for example, in the past (prior to the Big Dry) this manufacturing business employed more than 20 people but this has now been reduced to eight – the point is that this non-farming business needs as much access to support as farmers in order to provide employment opportunities to locals (especially young apprentices) and supply farmers with the infrastructure they need.
- The barriers that prevent people who require support from seeking support need to be identified and overcome.
- The concept of 'community EC' (i.e. support is given to a local organisation to be distributed across the community) as opposed to 'individual EC' was identified as worth exploring as a way of reducing 'red tape' for individuals and better ensuring the support goes where it is needed. However, it was recognised that the success of a 'community EC' concept is dependent on community structure, size and organisations, and also the flexibility of the EC people on the ground, the capacity of RFCS to act, and the need for respect within the community.
- It was also recommended that the EC process should be more flexible so as to meet the needs and priorities of differing rural communities.

The insights gained from the Donald workshop supported and extended the information gained through the interview process, and as a result have been incorporated into the Key Insights listed in Section 6.2. The following two comments sum up the difficulties facing farmers in and around Donald (and also many other rural areas):

> The system needs a rethink. Farming is the only business where you buy at retail prices, sell at wholesale prices and, on top of that, pay for freight both ways. (Mayor, BSC – adapted from John F. Kennedy's campaign speech (National Plowing Contest, Sioux Falls, South Dakota, 22 September 1960)

> Name me another job where you work very hard for 12 months and then at the end of that 12 months you may or not get paid this is what farmers do. (Executive Officer (Chaplain), Donald Friends and Neighbours Society)

7. Conclusions and recommendations

> [Australia's history is] … sometimes a horrifying concentration of environmental damage and cultural loss; sometimes a heartening parable of hope and learning. (Griffiths 2003: 16)

The regions encompassed in this study present a complex picture of damage and hope in drought-affected rural communities of Australia. The people interviewed have provided their experiences of, and attitudes towards, the rural community and the changes they are now confronting. This extensive knowledge gives depth and meaning to the rural and climatic trends discussed in policy and research circles, and provides a means by which to connect such broad trends with their everyday experience.

The picture that local farmers, government and NGO workers, and community representatives reveal is often mixed (there is real disadvantage and distress that requires immediate attention and support, but there is evidence of resilient and optimistic communities that have strong social capital and a proactive approach to ensuring their viability). There are many apparent criticisms of the current short-term and crisis-management response to drought services, yet it is crucial that such criticisms do not result in an immediate end to social support services to these farmers. We argue instead that what is needed is a transition of government support to drought-affected rural regions – one that encompasses both short-term social support measures and long-term planning and programs that facilitate struggling farmers to move on to more viable, or entirely new, futures in a dignified way. Key to such a holistic approach will be reshaping the language and approach of support services, to broaden from a focus on drought and farmers to notions of ongoing drying and more wide-reaching support for the rural communities and towns so intimately bound up with the farming industry.

It is among existing, though changing, support networks (e.g. families, friends, community groups, sport clubs, rural counselling services) that another picture portrayed by some interviewees can be drawn on and developed – a picture of optimism, community strength and alternative futures. There is much existing strength in these closely bound communities that can be utilised to establish and sustain more effective rural service networks. Moreover, there is considerable adaptive capacity and knowledge available in these regions that can be nurtured, developed and learned from in advancing climate change adaptation. Climate change involves a range of factors and impacts – climatic, economic, social, political, environmental – and it is in these everyday contexts that this conjunction of impacts is already being experienced, offering effective spaces in which to learn about climate change and how best to manage its impacts.

Several key insights have been gained from this project, some of which are applicable to a specific case study, while others are relevant to all areas and people affected by drought. These insights lead to the following broader recommendations:

1. There is great advantage in furthering comparative, case-study based research into climate change impacts and adaptation. The actual experiences of drought and other climatic extremes are vital to advancing our knowledge of how to respond and adapt to such conditions, and how this might vary between different areas – such as the irrigated areas of Mildura and the dryland communities around Donald, or even the

flood-prone communities of Queensland. Such an approach will be vital for addressing the specificities of regional climatic issues, while also bringing together a coordinated foundation for government response to climate change nationally, drawing on those successful programs and practices that are common across different regions. There are a number of specific, critical issues that need further attention in research into drought-affected rural communities. These include: the mental health and well-being issues confronting these regions, including the unique effects of chronic drying and uncertainty; the potential challenges faced by rapidly ageing communities with growing socio-economic disadvantage; and the issues of debt and the declining asset-base of farmers and how this might better be anticipated and supported. Further, we strongly advocate the incorporation of research that examines, identifies and builds on the immense and already existing adaptive capacity and knowledge of these rural communities living at the forefront of often harsh climatic changes. It is particularly important to maintain this focus when it rains and drought is forgotten temporarily.

2. Across any such research projects, further efforts to revise the language and understandings of drought are crucial. These efforts need to address the changing environment and climate by shifting from notions of 'drought-as-crisis' to 'ongoing drying' – acknowledging the variable availability of water and the potential for multi-year periods of significantly reduced water availability to become more frequent. The immense value of water to economic, social and environmental well-being should also be recognised in a more meaningful way. Clarification of the language used in climate change adaptation research and policy is also required to highlight the importance of resilience (as opposed to stoicism) in enhancing adaptive capacity (as per Key Insight 8).

3. Food supply is important to Australia's future, as is global food security – particularly under a changing climate. Yet respect for the people growing food is distant and wanting, as aptly described by a dryland farmer from Donald:

> Farmers are thinking 'what's the point?' City people think 'you can live out in the sticks and work seven days all your life, that's fine', you know 'keep working out there to make food for us, and if it's a big deal we'll just buy it from overseas'. It just breaks people's hearts. Support the local industry at least. People put more emphasis on having a GPS unit, or a new big flat screen TV, than they do their food. It's got right out of kilter and the governments must realise that the emphasis is wrong. (Dryland Farmer, Donald)

The urban population is disconnected from food production and farming. More efforts must be made to rebuild this connection and revalue the farming enterprise. As part of this, we reiterate the need to reframe our language of service provision and support in drought-affected regions. This reframing will require shifting from notions of farmer welfare and dependence towards holistic rural support and investment for a vital food industry – a shift that will be necessary in order to maintain the health and dignity of rural and food-producing communities as they face changing futures.

4. There is an urgent need for more accurate (not to be confused with precise) and reliable seasonal to multi-decadal climate forecasts that are relevant at the farm scale. Research is needed to determine what constitutes a 'good' climate forecast for farmers and rural communities (What variables? What format? What level of accuracy

and/or lead time is useful and what is not? What temporal and/or spatial resolution?). Unfortunately, significant uncertainties currently exist around the climate science and modelling needed to produce the sort of forecasts farmers say they need. It should also be noted that, especially for rainfall forecasts at the farm scale, this uncertainty will remain for the foreseeable future. Therefore, while there is a need to reduce uncertainty around climate forecasting, where possible the more urgent, and more achievable, objective should be to robustly quantify this uncertainty and to build resilience (i.e. the ability to reconfigure without crucial loss), such that rural communities are capable of adapting to the climatic variability that exists in Australia and also the fact that this variability may change. Farmers are adept at dealing with uncertainty, so long as they are aware of what the bounds of that uncertainty are and have ongoing, consistent and proactive (as opposed to short-term, changing and responsive) drought, water and agricultural policy to support them. The message conveyed here relating to uncertainty around climate forecasts is equally applicable to uncertainty around economics, commodity prices, social demographics and water trading policies. It is not the uncertainty itself that is frustrating for farmers; rather, it is that the uncertainties seem to be in a state of flux – and it is all happening at the same time!

5. Future research also requires a coordinated and respectful approach to working with drought-affected communities. People living and working in these regions are becoming tired and sceptical of 'yet another' drought or climate change research project when they have been involved in so many before and seen few positive outcomes. Further efforts are needed to coordinate 'outcome-based' research activities – a practice that not only provides the benefits of interdisciplinary and inter-agency knowledge, but also respects those with whom we are working by not over-burdening them with separate and disconnected research interventions. Research needs to be engaging and worthwhile for those at the forefront of rural climatic change. In addition, while a lot of drought and climate change adaptation research has been, and continues to be, conducted, the well-documented facts, key themes and recommendations continue to emerge with little evidence of effective implementation. Urgent investigation is required into why the already well-documented solutions and priorities have not been implemented, the barriers that are preventing implementation and how these barriers can be overcome.

References

Aarons, H., Glossop, B. & Vinson, T. 2008, *Mildura social indicators report 2008*, Mildura Rural City Council, Mildura.

ABARE [Australian Bureau of Agricultural and Resource Economics] 2002, *'Get big or get out' – Is this mantra still appropriate for the new century?* ABARE, Canberra.

—— 2007, *Australian commodities – September quarter*, ABARE, Canberra.

—— 2008a, *Australian commodity statistics 2008*, ABARE, Canberra.

—— 2008b, *Australian Farm Survey results 2005–2006 to 2007–2008*, ABARE, Canberra, http://www.abareconomics.com/publications.html/economy/economy.08/fsr-08.pdf.

—— 2010, *Australian crop report*, ABARE, Canberra, http://www.abareconomics.com/interactive/10acr_Feb/htm/victoria.htm.

ABC 2010a, 'Water buybacks decision delayed', *ABC Rural News*, 9 April.

—— 2010b, 'Irrigators reassured over new basin plan', ABC News, 11 June, http://www.abc.net.au/news/stories/2010/06/11/2924579.htm.

Adams, PD, Horridge, M, Masden, JR and Wittwer, G 2002, 'Drought, regions and the Australian economy between 2001–02 and 2004–05', *Australian Bulletin of Labour*, vol. 28, no. 4, pp. 233–49.

Adger, WN 1999, 'Social vulnerability to climate change and extremes in coastal Vietnam', *World Development,* vol. 27, no. 2, pp. 249–69.

—— 2006, 'Vulnerability', *Global Environmental Change,* no. 16, pp. 268–81.

Adger, WN, Arnell, NW & Tompkins, EL 2005, 'Adapting to climate change: perspectives across scales', *Global Environmental Change,* no. 15, pp. 75–6.

Aitkin, D 1985, '"Country-mindedness" – the spread of an idea', *Australian Cultural History,* no. 4, pp. 34–41.

Allon, F & Sofoulis, Z 2006, 'Everyday water: cultures in transition', *Australian Geographer,* vol. 37, no. 1, pp. 45–55.

Alston, M. 2006, '"I'd like to just walk out of here": Australian women's experience of drought', *Sociologia Ruralis,* vol. 46, no. 2, pp. 154–70.

Alston, M. & Kent, J. 2008, 'The Big Dry: the link between rural masculinities and poor health outcomes for farming men', *Journal of Sociology,* vol. 44, no. 2, pp. 133–47.

Altobelli, T & Francis, K 2009, *Research into Farm Debt Mediation Act 1994 for the Rural Assistance Authority of NSW*, University of Western Sydney-Macarthur, Sydney.

Alwang, J, Siegel, PB & Jorgensen, SL 2001, *Vulnerability: a view from different disciplines*. Discussion Paper Series No. 0115, Social Protection Unit, World Bank, Washington DC.

Anderson, D 2008, 'Drought, endurance and "the way things were": the lived experience of climate and climate change in the Mallee', *Australian Humanities Review,* no. 45, pp. 67–81.

Arvai, J, Bridge, G, Dolsak, N, Franzese, R, Koontz, T, Luginbuhl, A, Robbins, P, Richards, K, Smith Korfmacher, K, Sohngen, B, Tansey, J & Thompson, A 2006, 'Adaptive management of the global climate problem: bridging the gap between climate research and climate policy', *Climatic Change,* no. 78, pp. 217–25.

Australian Bureau of Statistics (ABS) 2006, *Measures of Australia's progress: family, community and social cohesion*, ABS, Canberra.

—— 2009a, *Australian national accounts: national income, expenditure and product*, ABS, Canberra.

—— 2009b, *Labour force, Australia*, ABS, Canberra.

—— 2009c, *Measures of Australia's progress: summary indicators*, ABS, Canberra.

Australian Taxation Office (ATO) 2008, *Information for primary producers 2008*, ATO, Canberra.

Barnett, J and O'Neill, S. 2010, 'Maladaptation', *Global Environmental Change,* no. 20, pp 211–13.

Barr, N 2005, *Understanding rural Victoria*, Department of Primary Industries, Melbourne.

Berkhout, F, Hertin, J & Gann, DM 2006, 'Learning to adapt: organisational adaptation to climate change impacts', *Climatic Change*, no. 78, pp. 135–56.

Berry, HL 2008, 'Social capital elite, excluded participators, busy working parents and aging, participating less: types of community participators and their mental health', *Social Psychiatry and Psychiatric Epidemiology*, vol. 43, no. 7, pp. 527–37.

—— 2009a, 'Social capital and mental health among Aboriginal Australians, new Australians and other Australians in a coastal region', *Australasian eJournal for the Advancement of Mental Health,* vol. 8, no. 2.

—— 2009b, 'Pearl in the oyster: climate change as a mental health opportunity', *Australasian Psychiatry,* vol. 17, no. 6, pp. 453–56.

Berry, HL, Bowen, K & Kjellstrom, T 2010, 'Climate change and mental health: a causal pathways framework', *International Journal of Public Health,* vol. 52, no. 3, pp. 123–32.

Berry, HL, Butler, JRA, Burgess, CP, King, UG, Tsey, K, Cadet-James, YL, Rigby, CW & Raphael, B 2010, 'Mind, body, spirit: Co-benefits for mental health from climate change adaptation and caring for country in remote Australian Aboriginal communities', *NSW Bulletin of Public Health,* in press.

Berry, HL & Welsh, JA 2010, 'Social capital and health in Australia: An overview from the Household Income and Labour Dynamics in Australia Survey', *Social Science and Medicine,* vol. 70, no. 4, pp. 588–96.

Birchip Cropping Group (BCG) 2008, *Critical breaking point? The effects of drought and other pressures on farming families*. Birchip Cropping Group BCG), http://www.bcg.org.au/cb_pages/SocialResearchProjects.php.

Blake, J 1999, 'Overcoming the "value–action gap" in environmental policy: tensions between national policy and local experience', *Local Environment*, vol. 4, no. 3, pp. 257–78.

Botterill, LC 2000, 'Government responses to farm poverty: the policy development process', *Rural Society*, vol. 10, no. 1, pp. 15–27.

—— 2009, 'The role of agrarian sentiment in Australian rural policy', In F Merlan & D Raftery (eds), *Tracking rural change: community, policy and technology in Australia, New Zealand and Europe*, ANU ePress, Canberra, pp. 59–78.

Botterill, LC & Wilhite, DA (eds) 2005, *From disaster response to risk management: Australia's national drought policy,* Springer, Dordrecht.

Brunckhorst, D. & Reeve, I. 2006, 'A geography of place: principles and application for defining "ecocivic" resource governance regions', *Australian Geographer*, vol. 37, no. 2, pp. 147–66.

Buloke Shire Council (BSC) 2008, *Community profile: Buloke Shire 2001 and 2006 census information*, Buloke Shire Council, Wycheproof, Vic.

Bureau of Rural Sciences (BRS) 2008, *Social atlas of rural and regional Australia: country matters*, BRS, Canberra, http://affashop.gov.au/product.asp?prodid=13896.

Burke, T 2010, ABARE Outlook opening address, ABARE Outlook Conference 2010, Canberra.

Caldwell, K & Boyd, CP 2009, 'Coping and resilience in farming families affected by drought', *Rural and Remote Health,* no. 9, p. 1088.

Castro, PA 2002, *Sustainable livelihoods analysis: from landscapes to genomes in South Asia*, South Asia Consortium, Syracuse and Cornell Universities, Syracuse, NY.

Crosby, E 1998, 'Welfare and support services for farm families, rural businesses and rural communities', in *Proceedings of Changing Families, Challenging Futures: 6th Australian Institute of Family Studies Conference, Melbourne, 25-27 November 1998*.

CSIRO-BoM 2007, *Climate change in Australia: technical report*, CSIRO, Canberra.

Department of Climate Change (DCC) 2009, *Corporate plan 2009–10*, DCC, Canberra.

—— 2010, *Australia's action on climate change: fact sheet*, DCC, Canberra.

Department of the Environment Water Heritage and the Arts (DEWHA) 2009, *Water for the future: fact sheet*, DEWHA, Canberra.

—— 2010a, *Water for the future: policy and programs*, DEWHA, Canberra.

——2010b, *Water Act 2007*, Commonwealth Government, Canberra.

Dow, K, O'Connor, RE, Yarnal, B, Carbone, GJ & Jocoy, CL 2007, 'Why worry? Community water system managers' perceptions of climate vulnerability', *Global Environmental Change*, no. 17, pp. 228–37.

Department of Primary Industries (DPI) 2010, *Food business*, DPI, Melbourne.

Department of Sustainability and Environment (DSE) 2007, *Our water our future: the next stage of the government's water plan*, DSE, Melbourne, http://www.ourwater.vic.gov.au/programs/next-stage.

—— 2008a, *Climate change in the Mallee*, DSE, Melbourne.

—— 2008b, *Climate change in the North Central Region*, DSE, Melbourne.

—— 2010, *Draft Western Region sustainable water strategy for community comment*, DSE, Melbourne, http://www.ourwater.vic.gov.au/programs/sws/western/copy-of-draft-strategy.

Drought Policy Review Expert Social Panel 2008, *It's about people: changing perspectives on dryness*, report to the Minister for Agriculture, Fisheries and Forestry, Canberra.

Duerden, F 2004, 'Translating climate change impacts at the community level', *Arctic,* vol. 57, no. 2, pp. 204–12.

Edwards, B, Gray, M & Hunter, B 2009, 'A sunburnt country: the economic and financial impact of drought on rural and regional families in Australia in an era of climate change', *Australian Journal of Labour Economics*, vol. 12, no. 1, pp. 109–31.

Estlake, S 2006, 'An introduction to the Australian economy', *Encyclopedia Americana*, http://www.anz.com/business/info_centre/economic_commentary/EncycAmericana(2006 update).pdf.

Few, R 2007, 'Health and climatic hazards: framing social research on vulnerability, response and adaptation', *Global Environmental Change*, no. 17, pp. 281–95.

Fletcher, S 2010, 'Campaspe irrigators sell up water rights', *ABC Rural News*, 26 March.

Forth, G 2001, 'Following the yellow brick road and the future of Australia's country towns', *Regional Policy and Practice,* vol. 9, no. 2, pp. 4–10.

Fragar, L, Stain, HJ, Perkins, D, Kelly, B, Fuller, J, Coleman, C et al. 2010, 'Distress among rural residents: does employment and occupation make a difference?' *Australian Journal of Rural Health*, vol. 18, no. 1, pp. 25–31.

Fussel, HM & Klein, RJ 2006, 'Climate change vulnerability assessments: an evolution of conceptual thinking', *Climatic Change*, vol. 75, no. 3, pp. 301–29.

Gibbs, LM 2006, 'Valuing water: variability and the Lake Eyre Basin, Central Australia', *Australian Geographer*, vol. 37, no. 1, pp. 73–85.

Golding, B & Angwin, J 2009, 'Bearing the risk: learning to be drier mid-river', *Australian Journal of Adult Learning*, vol. 49, no. 3, pp. 472–96.

Golding, B & Campbell, C 2009, 'Learning to be drier in the southern Murray-Darling Basin: setting the scene', *Australian Journal of Adult Learning*, vol. 49, no. 3, pp. 423–50.

Gray, I & Lawrence, G 2001, *A future for regional Australia: escaping global misfortune*, Cambridge University Press, Cambridge.

Griffiths, T 2003, 'The humanities and an environmentally sustainable Australia', in *The humanities and Australia's national research priorities*, Australian Academy of the Humanities and Department of Education, Science and Training, Canberra, pp. 13–20.

Hammer, G, Nicholls, N & Mitchell, C (eds) 2000, *Applications of seasonal climate forecasting in agricultural and natural ecosystems—the Australian experience,* Kluwer Academic, Dordrecht.

Hart, C, Berry, HL & Tonna, A 2010, 'Improving the mental health of drought-affected communities in rural New South Wales', *Australian Journal of Rural Health,* under review.

Hayes, P 2008, 'Resilience as emergent behaviour', *Proceedings of Surviving Climate Change: Adaptation and Innovation Panel on 'Building Resiliency', University of California, Hastings College of the Law, San Francisco, 4 April*.

Hennessy, K, Fawcett, R, Kirono, D, Mpelasokaa, F, Jones, D et al. 2008, *An assessment of the impact of climate change on the nature and frequency of exceptional climatic events*. Bureau of Meteorology and CSIRO, Canberra.

Heyhoe, E, Kim, Y, Kokic, P, Levantis, C, Ahammad, H, Schneider, K, Crimp, S, Nelson, R, Flood, N & Carter, J 2007, 'Adapting to climate change: issues and challenges in the agriculture sector', *Australian Commodities*, vol 14, no 1, pp. 167–78.

Hogan, A, Berry, HL, Ng, SP & Bode, A 2010, *Farmers' climate change-related decision-making*, report to the Rural Industries Research and Development Corporation, Australian National University, Canberra.

Hopkins, P 2006, 'The pros and cons of the single desk', *The Age*, 23 February.

Howden, P 2008, *Making sense for a sustainable agricultural future: an overview of the concept of sensemaking*, DPI, Melbourne.

Intergovernmental Panel on Climate Change (IPCC) 2000, *IPCC special report on emission scenarios SRES: summary for policymakers,* Cambridge University Press, Cambridge, http://www.ipcc.ch/pdf/special-reports/spm/sres-en.pdf.

—— 2007, *Climate change 2007: the physical science basis: summary for policymakers*, Cambridge University Press, Cambridge, http://www.ipcc.ch.

James, P 1973, 'Economic policy for drought', in J Lovett (ed.), *The environmental, economic and social significance of drought*, Angus & Robertson, Sydney, pp. 245–62.

Janssen, MA & Ostrom, E 2006, 'Resilience, vulnerability, and adaptation: a crosscutting theme of the international human dimensions programme on global environmental change', *Global Environmental Change*, no. 16, pp. 237–9.

Kiem, AS & Franks, SW 2004, 'Multi-decadal variability of drought risk – Eastern Australia', *Hydrological Processes*, vol. 18, no. 11, pp. 2039–50.

Kiem, AS, Franks, SW & Kuczera, G 2003, 'Multi-decadal variability of flood risk', *Geophysical Research Letters*, vol. 30, no. 2, p. 1035, doi: 10.1029/2002GL015992..

Larsen, SH & Nicholls, N 2009, 'Southern Australian rainfall and the subtropical ridge: variations, interrelationships, and trends', *Geophysical Research Letters,* 36, doi: 10.1029/2009GL037786.

Leahy, JE & Anderson, DH 2008, 'Trust factors in community–water resource management agency relationships', *Landscape and Urban Planning*, no. 87, pp. 100–7.

Lu, L & Hedley, D 2004, *The impact of the 2002–03 drought on the economy and agricultural employment*, Treasury, Canberra.

Mackinnon, A 2007, 'River memory: narratives of generation, hope and amnesia', in E Potter, A Mackinnon, S McKenzie & J McKay (eds), *Fresh water: new perspectives on water in Australia*, Melbourne University Press, Melbourne.

Mallee Catchment Management Authority (MCMA) 2009, *2008–09 drought impact: irrigation status report for the Sunraysia pumped irrigation districts*, MCMA, Mildura.

Marshall, NA 2010, 'Understanding social resilience to climate variability in primary enterprises and industries', *Global Environmental Change,* no. 20, pp. 36–43.

Mauldon, RG & Schapper, HP 1974, *Australian farmers under stress in prosperity and recession,* University of Western Australia Press, Nedlands.

McClelland, A 2009, *My blood's country: the spirit of Birchip,* Birchip Business and Learning Centre, Birchip, Vic.

McMichael, AJ, Friel, S, Nyong, A & Corvalan, C 2008, 'Global environmental change and health: Impacts, inequalities, and the health sector', *British Medical Journal* no. 336, pp 191–4.

Mildura Development Corporation (MDC) 2009, *Mildura region economic profile: an analysis of the people, economy and industries of the Mildura region*, MDC, Mildura.

Meinke, H & Stone, R 2005, 'Seasonal and inter-annual climate forecasting: the new tool for increasing preparedness to climate variability and change in agricultural planning and operations', *Climatic Change*, no. 70, pp. 221–53.

Minichiello, V, Aroni, R, Timewell, E & Alexander, L 1995, *In-depth interviewing: principles, techniques, analysis,* Longman, Melbourne.

National Water Initiative (NWI) 2004*, Intergovernmental Agreement on a National Water Initiative*, Council of Australian Governments (COAG), Canberra.

Nelson, D, Adger, W & Brown, K 2007, Adaptation to environmental change: contributions of a resilience framework, *Annual Review of Environment and Resources*, no. 32, pp. 395–419.

Nelson, R, Kokic, P, Crimp, S, Meinke, H & Howden, SM 2010, 'The vulnerability of Australian rural communities to climate variability and change: part I – conceptualising and measuring vulnerability', *Environmental Science and Policy*, vol. 13, no. 1, pp. 8–17.

O'Toole, K. 2001, 'Competition or collaboration: local economic development, sustainability and small towns', in MF Rogers & YMJ Collins (eds), *Future of Australia's Country Towns*, Centre for Sustainable Regional Communities, La Trobe University, Bendigo, pp. 146–61.

Park, S, Dowd, A, Mendham, E & van Kasteren, Y 2009, *Planning for community sustainability – workshop 1*, CSIRO Sustainable Ecosystems, Canberra.

Power, S, Casey, T, Folland, C, Colman, A & Mehta, V 1999, 'Inter-decadal modulation of the impact of ENSO on Australia', *Climate Dynamics,* vol. 15, no. 5, pp. 319–24.

Productivity Commission 2009, *Government drought support*, inquiry report, Productivity Commission, Canberra.

Proust, K 2008, 'Salinity in colonial irrigation: British India and south-eastern Australia', *Australian Geographer,* vol. 39, no. 2, pp. 131–47.

Putnam, RD 2000, *Bowling Alone: The Collapse and Revival of American Community,* Simon and Schuster, New York.

Quiggin, J 2007, 'Key issues in Australian water policy', *Australian Chief Executive,* February, pp. 38–47.

Risbey, JS, Pook, MJ, McIntosh, PC, Wheeler, MC & Hendon, HH 2009, 'On the remote drivers of rainfall variability in Australia', *Monthly Weather Review,* vol. 137, no. 10, pp. 3233–53.

RM Consulting Group (RMCG) 2007, *Wimmera Southern Mallee drought report*, RM Consulting Group RMCG) and Wimmera Development Association, Melbourne.

—— 2009a, *Northern Loddon Mallee: aspirations and priorities*, RMCG and Regional Development Victoria, Melbourne.

—— 2009b, *Southern Loddon Mallee: aspirations and priorities*, RMCG and Regional Development Victoria, Melbourne.

Roberts, I, Haseltine, C & Maliyasena, A 2009, *Factors affecting Australian agricultural exports*, ABARE, Canberra.

Rolley, F & Humphreys, J 1993, 'Rural welfare: the human face of Australia's countryside', in T Sorensen & R Epps (eds), *Prospects and policies for rural Australia*, Longman Cheshire, Melbourne, pp. 241–57.

Rural Financial Counselling Service (RFCS) 2008, *Public submission to Drought Policy Review, submission No. 30*, RFCS – Sunraysia, Mildura.

Sartore, G-M, Kelly, B, Stain, H, Albrecht, G & Higginbotham, N 2008, 'Control, uncertainty, and expectations for the future: a qualitative study of the impact of drought on a rural Australian community', *Rural and Remote Health*, vol. 8, no. 950, n.p.

Senate Standing Committee on Rural and Regional Affairs and Transport 2008, *Climate change and the Australian agricultural sector: final report*, Department of the Senate, Canberra.

Sinclair Knight Merz (SKM) 2009, *Information and communication on vulnerability of NRM regions to climate change: final report to the Department of Sustainability and Environment*, Sinclair Knight Merz SKM) and the Victorian Department of Sustainability and Environment, Canberra.

Smit, B & Pilifosova, O 2001, 'Adaptation to climate change in the context of sustainable development and equity', in *Climate Change 2001: Impacts, Adaptation, and Vulnerability – Contribution of Working Group II to the Third Assessment Report of the Intergovernmental Panel on Climate Change*, Cambridge University Press, Cambridge, pp. 879–912.

Smith, D 2003, 'Climate extremes in Australia: the role of risk management', *Interaction,* vol. 31, no. 1, pp. 7–13.

Smith, E & Campbell, C 2009, 'Learning to be drier in dryland country', *Australian Journal of Adult Learning,* vol. 49, no. 3, pp. 520–43.

Stehlik, D, Lawrence, G & Gray, I 1999, *Drought in the 1990s: Australian farm families' experiences*, Rural Industries Research and Development Corporation, Canberra.

Stokes, C & Howden, M (eds) 2010, *Adapting agriculture to climate change: preparing Australian agriculture, forestry and fisheries for the future,* CSIRO, Canberra.

SunRISE 2010, *Mallee irrigated horticulture 1997–2009*, prepared for the Mallee Catchment Management Authority, Mildura by SunRISE 21 Incorporated.

Thompson, A, Robbins, P, Sohngen, B, Arvai, J & Koontz, T 2006, 'Economy, politics and institutions: from adaptation to adaptive management in climate change', *Climatic Change,* no. 78, pp. 1–5.

Treeby, J, Henderson, K & Welsh, C 2008, *Resilient agribusiness for the future of Sunraysia: sustainable landscapes Mallee – irrigation,* draft Scenario booklet, Department of Primary Industries, Mildura.

Urwin, K & Jordan, A 2008, 'Does public policy support or undermine climate change adaptation? Exploring policy interplay across different scales of governance', *Global Environmental Change*, no. 18, pp. 180–91.

van Aalst, MK, Cannon, T & Burton, I 2008, 'Community level adaptation to climate change: The potential role of participatory community risk assessment', *Global Environmental Change*, no. 18, pp. 165–79.

Verdon-Kidd, DC & Kiem, AS 2009, 'Nature and causes of protracted droughts in Southeast Australia – comparison between the Federation, WWII and Big Dry droughts', *Geophysical Research Letters,* no. 36, doi:10.1029/2009GL041067.

Whetton, PH, McInnes, KL, Jones, RN, Hennessy, KJ, Suppiah, R, Page, CM, Barthols, J & Durack, PJ 2005, *Australian climate change projections for impact assessment and policy application: a review*, CSIRO, Canberra.

Whittaker, S, Major, A & Geraghty, P 2004, 'Victoria's emerging framework of regional governance for sustainability: the case of catchment management authorities and regional catchment strategies', *Local Environment*, vol. 9, no. 6, pp. 575–93.

Wilhite, DA & Buchanan-Smith, M 2005, 'Drought as hazard: understanding the natural and social context', in DA Wilhite (ed.), *Drought and water crises: science, technology, and management issues*, Taylor and Francis, Boca Raton, FL, pp. 3–29.

Williams, J 2003, 'Can we myth-proof Australia?' *Australasian Science*, vol. 24, no. 1, pp. 40–42.

Winebiz 2010, *Australia's Wine Industry Portal: Worldwide Comparisons*, http://www.winebiz.com.au/statistics/exports.asp.

YACVic 2008, *Talking about the "Big Dry": young people and the impact of drought – Forum Report*, Youth Affairs Council of Victoria, Melbourne.

Yohe, G, Andronova, N & Schlesinger, M 2004, 'To hedge or not against an uncertain climate future?' *Science*, no. 306, pp. 416–17.

Young, J, Hobbs, C, Perlesz, A, Poll, J, Proctor, K et al. 2008, *The Bouverie Centre's Collaborative Action Research, Support and Training Project with Victorian Drought Counsellors Final Report February 2007–September 2008,* The Bouverie Centre, La Trobe University, Bendigo.

Young, KR & Lipton, JK 2006, 'Adaptive governance and climate change in the tropical highlands of western South America', *Climatic Change,* vol. 78, no. 1, pp. 63–102.

Young, M & McColl, J 2008, *A future-proofed Basin: a new water management regime for the Murray-Darling Basin*, University of Adelaide, Adelaide.

Young, OR 2010, 'Institutional dynamics: resilience, vulnerability and adaptation in environmental and resource regimes', *Global Environmental Change*, vol. 20, no. 3, pp. 378–85.

Appendixes

Appendix A: List of project participants

Mildura interviews and providers of other information

Organisation	Position	Involvement in project
Department of Planning and Community Development (DPCD)	Senior Planner 1	Face-to-face interview
Department of Planning and Community Development (DPCD)	Senior Planner 2	Face-to-face interview
Department of Primary Industries (DPI)	Project Officer Farmer	Face-to-face interview DPI Resilient Agribusiness Scenario Planning Workshops CSIRO Planning for Community Sustainability Workshop
Industry and Investment NSW (formerly NSW Department of Primary Industries)	Irrigation Officer	Face-to-face interview CSIRO Planning for Community Sustainability Workshop
Mallee Family Care	Manager	Face-to-face interview
Mallee Family Care	Counsellor	Face-to-face interview CSIRO Planning for Community Sustainability Workshop
Mildura Development Corporation (MDC)	CEO	Face-to-face interview
Mildura Rural City Council (MRCC)	Aged and Disability Services Coordinator	Face-to-face interview
Mildura Rural City Council (MRCC)	Community Liaison Officer	Face-to-face interview
Mildura Rural City Council (MRCC)	Project Officer	Face-to-face interview
Mildura Rural City Council (MRCC)	Corporate Projects Manager	Face-to-face interview
Mildura Rural City Council (MRCC)	Manager, Community Development	Face-to-face interview
Mildura Rural City Council (MRCC)	Manager, Environmental Services	Face-to-face interview
Mildura Rural City Council (MRCC)	Project Manager, Rural Skills Connect	Face-to-face interview
Mildura Rural City Council (MRCC)	Project Officer, Youth Planning	Face-to-face interview

Murray Wetlands Working Group	Chairman/Farmer	Face-to-face interview
Rural Financial Counselling Service Victoria (RFCS)	Coordinator	Face-to-face interview
Sunraysia Institute of TAFE	CEO	Face-to-face interview CSIRO Planning for Community Sustainability Workshop
Sunraysia Mallee Ethnic Communities Council (SMECC)	Director	Face-to-face interview

Donald interviews and workshop

Organisation	**Position**	**Involvement in project**
Birchip Cropping Group (BCG)	CEO	Donald workshop
Birchip P–12 School	Principal	Face-to-face interview
Buloke Shire Council (BSC)	Councillor	Face-to-face interview
Buloke Shire Council (BSC)	Community Development Officer	Face-to-face interview Unable to attend workshop Provided literature
Buloke Shire Council (BSC)	Manager Economic Development	Donald workshop
Buloke Shire Council (BSC)	Mayor	Face-to-face interview Donald workshop
Centrelink	Rural Services Officer	Telephone interview
Country Fire Authority (CFA)	Member	Donald workshop
Country Fire Authority (CFA)	Peer Coordinator	Donald workshop
Donald Community Centre	Coordinator	Face-to-face interview Donald workshop
Donald Friends and Neighbours Society	Executive Officer (Chaplain)	Donald workshop
Donald Steel Supply and Fabrications Pty Ltd	Business Owner	Face-to-face interview Donald workshop
North Central Catchment Management Authority (NCCMA)	Delivery Manager	Face-to-face interview
Ouyen Inc.	Chairman / Dryland Farmer, Ouyen	Face-to-face interview
Victorian Farmers Federation (VFF)	President (St Arnaud) Dryland Farmer, Donald	Face-to-face interview Donald workshop
Victorian Farmers Federation (VFF)	Secretary (St Arnaud) Dryland Farmer, Donald	Face-to-face interview Unable to attend workshop

Inter-regional interviews

Organisation/ Agency	Position	Involvement in project
RM Consulting Group (RMCG)	Consultant	Face-to-face interview
Department of Primary Industries (DPI)	Senior Social Researcher	Face-to-face interview

Appendix B: Interview questions

Key issues

- What do you see as the main economic effects of drought on rural communities (e.g. change in industry focus, debt levels)? What do you see as the main social effects of drought on small rural communities (e.g. sense of community, family bonds, well-being)?
- What are the over-arching water security/supply issues that need to be addressed by government/organisations/policy/community? What are the issues critical to small rural communities?
- What are the organisational problems/barriers commonly confronted in addressing the effects of drought? Are there any problems/barriers presented by policy? Are there any problems/barriers presented by local industry/farming practices?

Mitigation and adaptation strategies

- What adaptation and mitigation strategies are currently used in the area (e.g. use of alternate water supplies, water re-use, water savings projects)? Are these strategies complementary? Do you think they address the full range of issues you see as important to drought mitigation in the area?
- What other adaptation and mitigation strategies have been trialled or might be trialled? Will these offer further opportunities to address the impacts of drought?
- Have there been any significant or dramatic changes in recent approaches to drought mitigation (i.e. in policy and/or practice)?
- What decision-making processes were/are in place to arrive at drought management solutions?
- Are there any historical practices and approaches to drought that have been utilised or reworked as part of current strategies? What are they? How do they work? How are they shared among community members/farmers?
- What strategies are used locally when not in drought (i.e. in preparation)? Are these based on previous strategies/knowledge?
- How do connections between families, farms and communities help in developing and sustaining drought-adaptation strategies?
- What local decision-making processes were/are in place to arrive at drought management solutions?
- What options do rural communities specifically have in terms of drought adaptation?
- Do rural communities have the capacity to implement adaptive strategies to mitigate drought?
- Do you feel that rural communities will remain socially and economically active in light of these changes?

Future scenarios

- How might previous drought-mitigation strategies be used into the future?
- What do you see as likely scenarios for the future in terms of water supply and management in the area?
- What do you see as the way forward to address these likely scenarios?

- Are there practices already in place that you think would assist in the process of addressing future impacts of drought?

Appendix C: Mildura workshops: extra information

In 2007–08, the Victorian DPI, as part of the 'Resilient Agribusiness Project for the Future of Sunraysia' project, facilitated a series of four workshops with stakeholders in the Mildura region. These workshops sought to identify and prioritise information for long-term planning under different water policy, climate change and socio-economic scenarios. The consideration of 'best'- and 'worst'-case outcomes resulted in four suggested future scenarios being formulated for 2018, namely: 'Utopia-Embrace the chameleon' (preferred scenario); 'Making an Effort'; 'Status Quo'; and 'Dystopia: "Modern Mungo"' (Treeby et al. *2*008). These four scenarios are summarised below.

Scenario 1: 2018 – Utopia: Embrace the chameleon (our preferred future)

- Important water policy decisions taken by the Commonwealth government have brought stability and predictability to water management in the Murray-Darling Basin.
- The new Murray-Darling Basin Plan administered by the Murray-Darling Basin Authority means all states share water close to equally, with one rule for nearly everyone.
- Spending of the $10 billion promised in 2007 by the Commonwealth government for water infrastructure upgrades has been brought forward and targeted fully planned and equitable programs, which subsequently have been rolled out.
- Still, there has been some adjustment required of Sunraysia irrigators; along with water management changes, in 2015 Commonwealth and state governments also removed Exceptional Circumstances legislation, meaning that non-viable farm businesses have left the sector.
- In 2015, the Australian model of an Emissions Trading Scheme (ETS) has been accepted across the world and includes harvested (native) timber.
- Research and development opportunities presented by climate change and the ETS have been maximised via increased investment by governments and industry bodies investing their improved R&D levy dividends.
- The potential disasters of citrus canker and greening have not occurred and Sunraysia has maintained its fruit fly-free status.
- Trade overseas has been aided further by a weaker Australian dollar from 2013 to 2018 and a lower trade weighted index compared with rival producer nations.
- Wine grape production continues to expand its share of mainstream markets but the industry also takes advantage of the slightly warmer conditions to diversify into other varieties.
- Through the initiative of Tourism Mildura, cashing in on an award-winning winery scene, the region's fresh food markets and the popularity of the slow food movement, the 'SUNraysia' website is launched in 2012.
- There is a continued increase in population in Sunraysia, especially in young farm managers and other professionals.

- The cost of resources such as oil, electricity, fertilisers and chemicals is not a limiting factor.
- Food security issues facing Australia mean that the horticulture industry becomes more important politically.
- Generation X, Y and Z accept genetically modified food for its efficiencies and potential health benefits, especially after an influential study published in *Nature* links the consumption of horticultural produce to the prevention of bowel cancer and heart attacks.
- Sunraysia's members of parliament hold the balance of power in both state and Commonwealth parliaments, and Sunraysia is perceived as a place that can supply quality produce at competitive prices and still be an environmentally friendly place in which to live.

Scenario 2: 2018 – Making an effort (working title)

- In 2011, the Commonwealth government tries to buy back 15 per cent of all water rights for the environment.
- After a lot of discussion and political changes in state governments, all states start to have one water plan across the basin, with South Australia acquiring space in the storage dams.
- Additionally, the water market is strictly regulated, maturing rapidly with clear and current information and guidelines quickly emerging.
- River health problems such as salinity and acidification have been kept at bay through the states working together and improvements in water use efficiency on and to the farm.
- Increased water use efficiency on farm is becoming an obligation, as consumers demand to be informed about water use per kilogram of produce, a move backed by governments and the retailers as a point of differentiation from international competitors in 2015.
- In 2015, the Australian model of ETS has been accepted by most developed countries, including the United States, but not China.
- Climate change effects have occurred, but temperature has only increased by 0.6ºC and annual rainfall has decreased by 1 per cent.
- Opportunities from climate change through research and development have been exploited through increased investment into R&D by a public–private partnership program rather than industry/government.
- Australian Quarantine and Inspection Service (AQIS) powers and services are increased in order to keep Australia green, clean and pest free, with growers paying levies to display this as a branding option.
- By 2016, the overall number of farm businesses has stabilised at just under 2000, down from 3070 in 2006, mainly due to a shift to large businesses.
- Due to a reduced water allocation, the value of horticultural land declines, and loans start to be harder to obtain.

- Young farm managers start to leave the industry to work in tourism, mining, energy and manufacturing.
- The cost of resources such as oil, electricity, fertilisers and chemicals starts to be a limiting factor, but some cheap imports from overseas and bulk buying by grower cooperatives lessen some of the financial strain.
- Food security and quality issues facing Australia mean that agriculture as a whole becomes politically more important (after mining).
- Generation X, Y and Z can only be reached successfully via the internet.

Scenario 3: 2018 – Status quo (working title)

- By 2018, poor relationships between Commonwealth and state governments mean there has been no change in water policy, and water trade up and down the River Murray is still not possible. There is no consistency of water security levels between irrigation areas. In spite of this, local water markets have matured.
- The water supply problems across the MDB have worsened over the 10-year period to 2018 and there is much inconsistency in allocations between irrigation regions and within districts in different years.
- There have been limited improvements in water delivery across the MDB, with upgrades to Robinvale and parts of Merbein, but few other changes to the region's irrigation supply system since then.
- Between 2009 and 2014 the irrigated horticulture industry in Sunraysia went through a rapid and painful decline, with many smaller growers leaving the industry.
- Reduced production locally has forced greater competition between processors, and those growers with production during the drought years benefited from better prices, particularly for dried fruit and citrus.
- By 2018, overall production of the major horticultural crops has started to increase again, but it is still more than 20 per cent below 2007 levels.
- River salinity has continued to increase and further reduce agricultural production along the Murray, particularly in South Australia.
- The ETS introduced in 2010 has gone some way towards reducing Australia's carbon emissions, although the European Commission has called for greater cuts by Australia.
- China and Russia are the two world forces, and the loss of US dominance coupled with recession has led the Western world into a downturn.
- Horticulture's decline in the region reduces demand for support services, and although TAFE continues to offer some industry training, La Trobe University closes its Mildura campus on 2014.
- Between 2009 and 2015, many people leave Sunraysia to go to the super cities and mines, as few jobs are available locally.

Scenario 4: 2018 – Dystopia: 'Modern Mungo' (working title)

- Water supply problems in the MDB have worsened, with rainfall and inflows highly variable over the 10-year period from 2008 to 2018.
- Water management has not improved, with the state governments still squabbling over water.
- From 2008 to 2011, millions of state and Commonwealth dollars are spent on improving irrigation infrastructure in the region and a bypass around the Barmah choke.
- National and international suppliers, sourcing food from across Australia, have lost confidence in Sunraysia and are seriously reducing their exposure to the area.
- The ETS introduced in 2010 has failed to significantly reduce Australia's carbon emissions and has made many of our products uncompetitive on the international market.
- As water supply becomes more and more unreliable and temperatures and water costs increase, Sunraysia-based production of the major horticultural crops has declined by 40 per cent.
- As the climate changes, increased rainfall in the northern half of the continent feeds rivers in the north of the MDB and there have been increased horticultural plantings in New South Wales and Queensland.
- In 2018, restrictions on genetically modified horticultural production remain in Australia, despite its introduction and success in major competitor countries like China, India, Chile and Turkey.
- Irrigated horticulture in Sunraysia is further hit by a Queensland and Mediterranean fruit fly outbreak in 2010, followed by a citrus canker outbreak in 2012.
- The region's international competitiveness is further reduced in 2013 when the Australian currency hits $1.50 to the US$1.00.
- By 2013, China and India, and to a lesser extent the European Union, dominate the world economy.
- The government's attitude to agriculture and horticulture dramatically changes over the next 10 years for a variety of reasons, including the dominance of mining and the impacts of the ETS.
- Australia signs up to an international free trade agreement in 2012.
- Horticulture's decline in Sunraysia leads to greatly reduced demand for support services such as TAFE, La Trobe University and DPI, all of which shut down local facilities between 2010 and 2018, stating that the internet will provide the services far more effectively and reach a bigger audience.

Appendix D: Donald workshop: extra information

The Donald workshop was facilitated by Craig Clifton (SKM). Other members of the research team present were Anthony Kiem and Emma Austin. Attendees representing the Donald community, and their relevant organisations, are indicated in Appendix A..

Donald workshop agenda

NCCARF Synthesis and Integrative Research Program – Historical Case Studies: Drought and the Future of Small Inland Towns

Scenario Planning Workshop – Donald

Date: Thursday 3 June 2010

Time: 9.30am to 4.00pm

Venue: Community Centre, 31 Woods Street, Donald

Time	**Description**	**Lead**
9.45 am	Arrive and coffee	
10.00	Welcome and introductions	Craig Clifton
10.10	Overview and objectives for day	Craig Clifton
10.15	Project report overview (Executive Summary provided prior to workshop)	Anthony Kiem
11.15	Use and purpose of scenarios Reports from similar workshops in Mildura provided prior to workshop Introduce three broad scenarios, with time for questions and discussion: Mild climate change, pathway to high climate change, climate step change	Craig Clifton
11.35	Development of Scenario #1 for 2015 and 2030, considering how it would express itself in terms of: Water, Agriculture, Ecosystems, Donald community and economy, Planning and policy responses by local, state and Commonwealth governments Identify the top risks and opportunities associated with scenario. Discuss what can be done (in a practical sense) to avoid the risks	Craig Clifton
12.30	Lunch	Provided
1.00	Development of Scenario #2 following same process as for Scenario #1	Craig Clifton
2.00	Development of Scenario #3 following same process as for Scenario #1	Craig Clifton
2.50	Key outcomes from today, reflections on discussions by participants, how will this information be used?, next steps, evaluation	Craig Clifton and Anthony Kiem
3.15	Afternoon tea and conclude	

Information issued to initiate and direct discussion

The key influences (referred to as drivers) in the scenario planning workshop conducted in Mildura, not as part of this project (e.g. Appendix C; 0Treeby et al. *2*008), were categorised using the INSPECT (Imagination–Nature–Society–Politics–Economics–Culture–Technology) process. The information below, based on the INSPECT process, was given to Donald workshop participants to generate discussion.

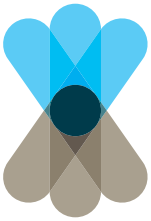
Fire Shed gatherings

While in Donald, for both the interviews and the workshop, we were fortunate that our visits coincided with Fire Shed gatherings (described in Section 6.2.6). The Fire Shed gatherings are held once a month at different locations across the Buloke Shire. Members of the research team attended Fire Shed gatherings on 24 March 2010 in Corack (approximately 25 km from Donald) and on 2 June 2010 in Nandaly (approximately 150 km from Donald). These functions are fully funded by various donations and organised by voluntary organisations, such as the CFA and BSC. They provide an informal opportunity for members of the community to socialise and receive information. At these gatherings, we witnessed at first hand the popularity of these events and their effectiveness in strengthening local networks and facilitating an effective information flow. Such local community-driven initiatives should be explored for the purpose of proposing, developing and implementing tangible drought-adaptation strategies.

Table D.1: Key influences (drivers) categorised using INSPECT process

Nature	• Water security and availability • Climate change • Pest and disease threats (e.g. increases as a direct result of exit grants)
Politics	• Role of government • Political clout of the agricultural sector (e.g. decline in willingness to lobby)
Society	• Power of the media to influence perceptions • Generational change different to expectations • Population/demographics • Urbanisation • Multiple jobs/careers in a lifetime • Concerns about the environment
Economics	• Global food supply • Value of agriculture (i.e. raw product versus value added product that sells in shops) • Cost of resources • Access to credit/capital • Cycles of boom, bust, consolidation (e.g. in bad times having to earn off-farm income) • Diversification of industries • Connections to markets worldwide (e.g. Australian supermarkets not supporting local producers, buying produce from overseas for minimal difference in cost) • General wealth/affluence • Individual marketing • New and existing markets (e.g. removal of the single desk, new niche for brokers) • Supply chain • Economies of scale • Generalist to specialist farming (e.g. speciality and niche crops) • Personal wealth • Oil prices • Adaptability of industries • Globalisation corporatisation of food collective marketing • Branding
Culture	• Leisure/recreation time (e.g. Environmental watering of lakes, farmers working seven-day weeks) • Lifestyle choices • Quality trend • Consumer taste • Family farming (e.g. changes to the family enterprise and succession plans) • Environmental movement • Health concerns
Technology	• Technological change (e.g. GPS is good in many ways; however, it is expensive and is it really necessary? Farmers need proof of success before they will change, support needed for local R&D i.e. closure of CSIRO facilities.) • Mechanisation, automation • Rapid obsolescence • Infrastructure (e.g. for some a double-edged sword, costs to farmers, filling in channels) • Access to information via internet

Source: Treeby et al. (2008).



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