

Adaptation and mitigation in Victorian drylands

CLIMATE CHANGE ADAPTATION THINK TANK

8-9 April 2010

Grains Innovation Park, Horsham, Victoria



ISBN 978 0 7340 4183 8

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Cover photograph: Dr. Patrice Braun

SUMMARY

The Victorian Centre for Climate Change Adaptation Research (VCCCAR) aims to provide new knowledge to support improved decision-making in government, industry and the community for climate change adaptation. A VCCCAR funded think tank, held on 8-9 April, 2010, provided a public forum for presentation and discussion of potential climate change impacts and adaptation options for the Wimmera – Mallee region of north-western Victoria. The think tank brought together regional practitioners and national and international climate change adaptation researchers to identify regional challenges, knowledge needs and adaptation strategies.

Key points:

1. The region is undergoing significant demographic, economic and environmental change. Adaptation to climate change should be integrated into broader regional sustainability strategies and planning frameworks.
2. There is relatively little understanding of climate change in the region. Information about climate change and response strategies is critical in enhancing preparedness and planning for altered conditions, and for future risk management. This information should indicate the complexity of interactions between human-natural systems, focus on solutions, and provide a range of strategies, potential adaptation pathways and tangible actions to manage threats to key assets and vulnerabilities.
3. Infrastructure maintenance and development is necessary for regional economic viability and adaptive capacity, whether in relation to existing socio-cultural needs or future economic viability in a changing climate.
4. Successful adaptation will require broader regional engagement, strategic vision, action plans and demonstration of successful adaptation strategies. Capacity building, information delivery and skill development is essential for effective adaptation. Wider community engagement is needed to improve community understanding, learning and skill development opportunities. Younger people need to be included in planning and decision-making and given opportunities for intergenerational engagement and learning.
5. Existing strong regional networks and collaboration can be built upon to create new information and knowledge pathways, to build local and regional leadership, and to support economic, social and environmental behavioural change.

Knowledge needs

1. Improved awareness and understanding of climate change impacts and predicted changes including information that substantiates the causes and effects of climate change

2. Improved knowledge of reliable sources of information on climate change, adaptation resources and how to access them within the community
3. Regionally specific information on climate change drivers and implications, especially in terms of local impacts and variability
4. Substantiation and explanation of the implications of individual and societal contributions to climate change through personal and industrial emission production
5. Adaptation pathways and strategies suitable for individual, organisational and regional change, improved efficiency and enhanced sustainability
6. Information on more efficient water management and biodiversity benefits to enterprise and regional sustainability
7. New technologies and elements of precision farming and water management to improve productivity and efficiency
8. More efficient transport mechanisms and vehicle upgrading opportunities
9. Development of mechanisms to turn carbon emission reduction requirements from a burden to a positive.

Report on Climate Change Think Tank, Horsham, 8-9 April 2010

A.J.J. Lynch and P.A. Gell

Introduction

The Victorian Centre for Climate Change Adaptation Research was established in July 2009 as a partnership between Victorian universities and funded by the State Government. The aim is to generate new knowledge to improve decision-making and adaptation capacity to climate change in government, industry and the community. One of the means of achieving this is through think tanks that present relevant research, enhance understanding of potential climate change impacts, and facilitate the development of adaptation and resilience in particular regions. The think tanks aim to provide a forum for discussion of climate change adaptation issues and strategies with local decision-makers and to share learning across sectors and communities.

A public think tank was held 8-9 April, 2010, bringing together climate experts, community and government members to focus discussion on the potential climate change impacts and adaptation options for the Wimmera – Mallee region of north-western Victoria. The think tank was a collaborative effort between the Victorian Centre for Climate Change Adaptation Research, the University of Ballarat and WIDCORP (Water in Drylands Collaborative Research Program).

The think tank– **Adaptation and mitigation actions to drive positive change in natural resource management (NRM) in Victorian drylands**– brought together regional, national and international climate change adaptation research as it relates to NRM and land use change in the region.

The specific aims of the think tank were to:

- improve the understanding of people in the Wimmera – Mallee region of climate change impacts
- inform VCCCAR and DSE on relevant research priorities and projects specific to the region.

In order to engage with a broad cross-section of the community, the think tank was advertised through three regional radio interviews by three of the think tank speakers (Professor Rob Wilby, Professor Peter Gell, Professor Roger Jones) and two regional newspaper articles (Appendix 1).

Participation

The think tank was attended by a total of 39 people over the two days, with 34 people attending on Thursday, 8 April 2010, and 33 people attending on Friday, 9 April 2010. Based on the affiliations of the participants (Table 1), a broad cross-section of the community was achieved.

Table 1. Affiliations of participants in the think tank

Affiliation	No. of people	Proportion of all participants
State Government	9	23%
Local Government	4	10%
University	12	31%
Community	8	21%
Catchment Management Authority	2	5%
Industry	2	5%
Other	2	5%
Total	39	

Presentations

Over the two days of the think tank, there were presentations by ten people on a range of topics relating to climate change at regional, national and international scales; its representation in public policy and communication media; adaptation attitudes and strategies of regional communities, farmers and several corporations focused on the water and carbon markets; and existing cooperation and networks within the Wimmera - Mallee region (Table 2).

Table 2. Presenters and their topics

Presenter	Topic
Professor Rod Keenan, VCCCAR	Overview of VCCCAR and think tank objectives
Professor Peter Gell, University of Ballarat	Palaeo-perspectives on climate change
Professor Rob Wilby, University of Loughborough, UK	International perspective on climate change adaptation
Professor Roger Jones, Victoria University	Climate risk assessment
Dr Ailie Gallant, University of Melbourne	Climate processes
Mr Rob Gell, TV Geomorphologist	Climate change communication and media representation
Mr Dave Watson, Dept. of Sustainability and Environment	Regional planning for sustainability
Dr Graeme Anderson, Dept. of Primary Industries	Farming adaptation planning
Dr Sophie Bickford, Carbon Planet	Carbon market opportunities
Mrs La Vergne Lehmann, WIDCORP	Farmer attitudes to climate change and adaptation
Mr John Martin, GWM Water	Water industry adaptations
Ms Jo Bourke, Wimmera Development Association	Regional cooperation and networks

Workshop

A 2 hour workshop was held as part of the think tank on 8 April 2010 to facilitate discussion and input of participants, particularly by those who were not presenters. The workshop proceeded with participants in six groups, with each group including at least one person who identified as a 'local' of the region. Each group discussed their perspective on regional climate change adaptation issues in relation to a particular theme: primary industry, natural environment, recreation and industry/business, urban development, transport, and community health and well-being. Each group was asked to discuss and provide feedback to the entire group on their theme in relation to the following questions:

- What are the most important assets (natural, cultural, social, economic) in the region?
- What are the key vulnerabilities/issues for the region?

- What are the key challenges to address?
- Where are the knowledge gaps?

Although some participants observed during the feedback to the entire group that there was some repetition in the issues identified, this indicates that there was some consistency across participants in their perspectives.

Field trips

A field trip to two local sites was held as part of the think tank on the afternoon of 8 April 2010. Approximately 20 people attended the field trip. The field trip was intended as, and provided, an opportunity for participants to mingle and discuss issues informally.

The first site consisted of the Department of Primary Industries (DPI) FACE (free-air carbon dioxide enrichment) experimental station, several kilometres west of Horsham. A presentation was given on site by Dr Glenn Fitzgerald, the FACE Program Coordinator with the DPI, explaining the experiment and some of the local and international findings of FACE experiments.

The second field trip site comprised the GWMWater pumping station at Taylors Lake, about 20 km south-east of Horsham. Taylors Lake ‘has been identified as a future major recreational facility for the region given its high security status as a major water supply source for the Wimmera - Mallee Pipeline’ (GWMWater 2009, p. 3). The impending completion of the pipeline and its importance to water availability and water conservation in the region was discussed by Mr John Harding of GWMWater.

Other opportunities

During the introduction to the think tank, participants were requested to identify any ‘burning questions’ that they had on any aspect of climate change and adaptation in the region. Through the morning, a list of 15 relevant questions was compiled (Table 3). Most of these questions were addressed specifically by presenters during or in the question time after their talks, except for question 8 (bolded in Table 3).

Mitigation planning and actions were not discussed specifically during the think tank, possibly because it is seen as too big or ‘wicked’ a problem for individual effort to have significant effect. In his introduction to the VCCCAR and the purpose of the think tank, Professor Keenan suggested that the early focus in climate change debate had been on mitigation, with adaptation seen as only a soft option, but that the policy focus appeared to have swung back to adaptation, particularly since the Copenhagen climate change summit in late 2009.

Table 3. ‘Burning questions’ raised by participants at the think tank

1	How do we increase the rate of response?
2	What is the most valuable asset in the Wimmera at risk?
3	What are the land use options in regions where irrigation ceases?
4	Priority? Natural ecosystems or ecosystem services?
5	How can we assure community engagement in adaptation research?
6	How can we ‘better’ balance our adaptation response to build resilient communities?
7	What scenario do we plan for? All drought or some drought?
8	Why is the emphasis on adaptation not mitigation?
9	How do we give government/s (particularly small councils) the confidence to take the lead?
10	How can we link relevant research to regional action to increase the effectiveness of our response?
11	How do we increase the capacity of local government (particularly small councils) in mitigation or adaptation?
12	How do we ‘connect’ people to the natural environment so that ‘connection’ and ‘true’ adaptation can occur?
13	Define the barriers to change.
14	Are we already having difficulty adapting to a 0.8-1.0°C temperature increase?
15	Is population growth the real main issue?

Think tank evaluation

The think tank participants were invited to provide feedback using an online Zoomerang Survey form. Of the 39 think tank participants, 28 provided survey responses (Appendix 6). The results supported that a cross-section of the community attended the think tank, and 67% of the respondents agreed that the number and mix of participants was appropriate. Nevertheless, several respondents suggested that a wider representation of the community would have been beneficial, particularly of younger people, regional NRM and CMA staff and researchers, Parks Victoria and business representatives (e.g. Birchip Cropping Group and Southern Farming Systems). Invitations had been sent to these farming groups and many others but the short timeframe for arrangement of the think tank affected the availability of many people. More notice for the event was raised as a suggested improvement for future events, along with ‘broader and earlier engagement with stakeholders and potential participants to build the agenda and attract more participants’. In addition, several survey respondents felt that a discussion paper would have assisted in stimulating early discussion and engagement, and for indicating the objectives and value of attending the proceedings.

Almost two-thirds (64%) of respondents agreed that the think tank improved their understanding of climate change on farming systems and NRM in the region. Furthermore, 79% of respondents thought that the scope and relevance of issues discussed at the think tank was good. Information on past and future regional impacts of climate change and on regional climate drivers was identified specifically as useful, along with the international perspective and water management changes. It was noted that the influence of climate change on community resilience, environmental impacts, ecosystem resilience, rivers, wetlands and biodiversity could have been given more attention during the think tank, as well as more information on the severity of

future climate change impacts. The coverage of present and future impacts facilitated consideration of both short and long-term issues.

The think tank was also useful to most (86%) respondents for networking, getting ‘more people in the room’, and finding out about organisations, projects and websites that may assist them with climate change responses. Two respondents suggested that the think tank scope could have extended to the development and scoping of strategies, actions, projects or adaptation approaches, particularly given the presence of ‘so many knowledgeable people [who could provide] input into new initiatives...’. The inclusive, cross-cutting discussions were noted by participants. Overall, 62% of respondents assessed the think tank as fair, good or excellent as a forum for discussing regional climate change adaptation issues and solutions.

Important findings

Presentations overview

Formal presentations focused on past and present climatic processes, the implications of climate change for future resource availability, and adaptation strategies that are being adopted already in various sectors, regions and nations.

Evidence of climate change (Professors Peter Gell and Roger Jones)

Evidence of past climates, climatic variability, and trajectories of change can be gained from wetland sediments and the biota preserved within them. Professor Peter Gell’s work on the lake diatoms (a type of single-celled aquatic algae) of south-eastern Australia indicate that, while there have been considerable climate oscillations over the past few thousand years, there has been a recent, statistically significant step change across the region toward drier conditions. This change has occurred at a time when the environment is severely stressed by anthropogenic activities—especially agriculture, land clearing and water regulation—that have resulted in extensive catchment and hydrological changes. Indeed, the diatom data indicate that the natural system is now outside its natural range of variability. This recent switch to a dry state, acting in concert with additional desiccation from anthropogenic climate change, has considerable implications for ongoing water availability in the region.

An abrupt shift in the regional climate of south-eastern Australia since 1997 to drier, hotter conditions is also evident from meteorological data according to Professor Roger Jones. Most importantly, the various changes are already equal to or greater than the worst-case projections for temperature, rainfall and stream-flow by the Bureau of Meteorology for 2030–2050. Compared to long-term averages, the Wimmera region has experienced, since 1997, a rise in the mean annual maximum temperature of about 0.8°C; a decline in mean annual stream flow in many western Victorian rivers by 55-79%; a 15% decline in mean annual rainfall, with declines particularly during the March to October months; and a 40% decline in inflows to the Melbourne water storage system. These climatic changes have increased the level of fire danger by lengthening the fire

season conditions and increasing the number of 'extreme' fire weather days; notably, again, faster than had been predicted using simulations (Lucas 2009).

There are implications in these changes also for agricultural industries. There is evidence that within Victoria some crop maturation dates have moved forward: two wine grape varieties on the Mornington Peninsula mature 24-28 days earlier than before 1998. The maturation date shift affects producer logistics by altering harvest dates; higher ambient temperature may affect the regional suitability of particular varieties; and winegrape quality and alcohol content have been affected by earlier and more rapid phenological stage progression (R. Jones & L.W. Webb, pers. comm.). Some changes create opportunities; parts of Victoria with improved water availability will be able to switch from grazing to cropping; and in the UK, there is evidence that livestock can be left out longer due to milder winter conditions.

Along with a global increase in mean annual temperature, Professor Jones reported that there has been a correlated intensification of the sub-tropical high pressure ridge over southern Australia. Climate change therefore may have influenced the altered sub-tropical ridge behaviour and may also have affected other climatic processes such as the Southern Annular Mode and Indian Ocean Dipole. However, natural climate variability may be important also in interpreting these changes.

Climate complexity (Dr Ailie Gallant)

The regional climate system is very complex and there is still a lot to be learned of the drivers of climate processes, the causes of apparently random and chaotic fluctuations, and the effects of interactions between processes. Dr Ailie Gallant described the six major known factors influencing annual, seasonal and decadal rainfall variability: the El Niño Southern Oscillation (ENSO); the Indian Ocean dipole (IOD) and eastern Indian Ocean sea surface temperatures; the Southern Annular Mode; the subtropical ridge; other atmospheric blocking; and inter-decadal Pacific Oscillation (Risbey et al. 2009; Ummenhofer et al. 2009). While we have some knowledge of how various processes influence rainfall, we do not yet understand what influences the processes; thus, attributing specific effects to climate change is difficult. Distinguishing the influence of particular processes is further complicated by interactions between different processes (e.g. ENSO and IOD) and because the relationships between Australian rainfall and climate processes are not constant but vary in spatial extent and in strength.

Adopting an adaptation rather than scenario focus (Professor Rob Wilby)

Because of this uncertainty, adoption of an adaptation-centred paradigm rather than focusing on particular climate regime scenarios may be advantageous. Professor Rob Wilby spoke about his international experience in developing water-related adaptation strategies for southwest England, the Thames River estuary, and Yemen. Drought and declining water availability are already recognised in many regions as critical issues that require adaptive approaches, particularly as climate change may be a multiplier of existing non-climatic pressures on environmental and socio-economic systems.

Focusing on scenario prediction and response may have counterproductive effects in diverting attention to the precision and uncertainty of particular scenarios. Furthermore, there are very few examples of scenario-led adaptations worldwide for guidance. Instead, Professor Wilby suggested having a range of risk assessment and evaluation tools in an adaptation toolkit to suit the different knowledge levels, management options and implementation capacity of particular regions. He recommended that measures should be low regret, involve adaptive management, and be closely monitored.

Prioritisation of different adaptation strategies can be based on their efficacy under various future climate change scenarios. For example, the capacity of a water resource system to meet demand can be evaluated based on the number of times the system would fail in a year under scenarios of 'business as usual', after implementing measures that 'reduce demand', or after implementing measures that increase system capacity and thereby 'increase supply'. An adaptation pathways map, such as that developed for the Thames estuary (Appendix 3), can graphically display the range of scenarios over which particular adaptation response strategies may be effective, complementary groups of strategies, and critical points at which major transitions in response approach would be required. Planning mechanisms need to incorporate transformative as well as incremental strategies since some coping thresholds may be breached even over the near term (2020s).

Attitudes and leadership (Mr Rob Gell)

In facilitating planning and adaptive change, national government leadership and media representation of climate change have been brakes on, rather than drivers of, change. Mr Rob Gell described how recent national policy has been more conservative than some past policies. The Liberal Party under Andrew Peacock and John Hewson in 1990-1993 had a policy to reduce Australia's greenhouse gas emissions by at least 20% before 2000; yet in 2010, national policy settings and approaches to climate change mitigation and adaptation are highly uncertain.

Environmental sustainability (including effective climate change responses) is a key part of global human sustainability along with population stabilization, poverty reduction, and global cooperation to solve common problems (see the book 'Common Wealth' by Jeffrey Sachs). The need to act internationally is also the view of Lord Martin Rees, President of the Royal Society of Britain, who thinks that the very long-term nature of climate change risks may be preventing political action at a time when cost benefit analysis suggests that planning should be based on the worst case scenario.

The climate debate needs to be elevated into discussions about population control and economics, and that the media needs to move beyond juxtaposing climate scientists with sceptics and begin to enhance community understanding, discussion and engagement of issues.

Regional adaptation strategies and programmes (Mr David Watson and Mr Graeme Anderson)

Regional constituents of the Wimmera – Mallee region are not only adapting already but are providing local leadership. Some are accepting the scientific evidence and adapting to climate change, for example, through regional sustainability groups. In contrast, some others (an estimated 70% of farmers) do not accept human-induced global warming but are nevertheless adapting to changing weather and seasonality, and the drought conditions of the last decade.

Within the Wimmera – Mallee region, and farther east in the Ballarat region, there are cross-sectoral sustainability alliance groups that are building community engagement and capacity in their regions and developing Regional Sustainability Frameworks. The frameworks are being developed in accordance with Victorian Government policies outlined in Victoria's Environmental Sustainability Framework (2005) and the Our Environment, Our Future- Sustainability Action Statement (2006). The regional frameworks aim to understand, measure and respond to climate change and sustainability challenges and opportunities.

The Department of Primary Industries also is active in climate change across its policy, research and practice change arena. A significant effort is being focused on seeking solutions to the climate change and emissions reduction challenges that lie ahead. The Victorian Government's Future Farming Strategy includes a 'Planning for Climate Change' action which is now communicating climate and emissions information to farmers and industries across the state. Mr Graeme Anderson, as a climate extension specialist with DPI, described how 300 information sessions have been delivered by the program in the past 18 months to 8000 people on climate change, seasonal variability, carbon and emissions in agriculture. While climate change and emissions issues have been deeply discussed in scientific and policy arenas, there has not been the same effort applied to extension and engagement on such issues with rural stakeholders. A survey of 1503 Victorian farmers identified significant information failures for key climate change issues, indicating the need for more effective delivery of climate and carbon information to rural communities.

A consequence of this has been the confusion of many farmers between the effects of natural climatic variability versus climate change. Many Victorian farmers accept that their weather and seasons are changing, but the majority view the present dry period as part of a natural cycle and are hopeful of a return to 'normal' conditions. Less than one-third (31%) accept that anthropogenic greenhouse gases are causing global warming, while even more (37%) disagree.

Nevertheless, many people are making large changes in their farm businesses to deal with drier conditions. Adaptation pathways are evolving that range from small-scale, incremental changes through to larger-scale, transformative changes. Many farmers have already undertaken initial changes around sowing times, rotations, crop or pasture selections, and water efficiency measures. Some have made more concerted decisions involving farm expansion or changes in business structure; through to the more difficult decisions involving expansion of businesses into a new climate regions, changing their enterprise, or initiation of new

enterprises right through to looking at options to lease or exit farming. Climate change is now another driver of change, along with markets, labour, costs, productivity etc that modern farming businesses have to plan and manage for to be successful over the longer term.

Farming community attitudes to climate change (Mrs La Vergne Lehmann, Mr John Martin and Dr Sophie Bickford)

The survey of 1503 farmers, conducted by the Water in Drylands Collaborative Research Programme (WIDCORP), included farmers from the grains, dairy, horticulture, livestock, mixed farming, farm forestry and peri-urban sectors. Mrs La Vergne Lehmann detailed the survey results, which demonstrated that while few farmers (5%) think climate change is a serious problem, nearly half think it is affecting their area and many (59%) think a temperature increase is of concern. Acceptance of climate change and its seriousness was found to be more prevalent amongst well educated, peri-urban farmers on small acreage but these people are unlikely to invest in adaptation strategies that require significant financial investment.

Despite the widespread perception that conditions are a natural fluctuation, many farmers intend over the next four years to adopt new technologies that improve business viability and most (76%) will improve water efficiency. More difficult decisions requiring greater investment, such as enterprise changes, are being considered by most farmers (61%) and 14% are considering an exit from farming. Short-term climatic conditions and business viability appear to be driving agricultural decision-making, rather than the causes or long-term seriousness of the changes. However, new approaches need to meet a farmer's goals in order to be adopted.

Adaptation is occurring also in resource industries. Major investments have led to the replacement of the extensive open water channel network across the region by enclosed, below-ground piping that can transfer water between reservoirs, townships and farms. This infrastructure will prevent the loss of an estimated 86% of the supply formerly lost as seepage, and will improve water quality. However, additional measures are required as a continuation or repeat of drought conditions and declining catchment supply will impact significantly on the reliability of supply for consumptive use and environmental flows.

Demonstrating a proactive, leadership role, some environmental service businesses have evolved to advise and co-develop business plans for clients to benefit from fledgling environmental markets. Carbon sequestration, carbon trading, biodiversity conservation banking, and wetland banking schemes are examples of such voluntary opportunities described by Dr Sophie Bickford of the company Carbon Planet. These market opportunities are evolving independently of government regulation, in response to corporate attitudes of social responsibility. Nevertheless, these schemes are constrained at present by uncertain legislative environments, legal issues that deter private sector investment, a lack of regional or activity level scoping studies, and an absence of appropriate accounting methodologies.

A regional vision of opportunities (Ms Jo Bourke)

A regional vision of opportunities from climate change is developing, enhanced by the strong history of collaboration, cooperation and networking necessitated by the small, dispersed rural population. The Executive Director of the Wimmera Development Association, Ms Jo Bourke, detailed as an example the complexity of interactions between WIDCORP and other regional organisations (Appendix 4). Such pre-emptive vision is indicative of the strong ‘get on with it’ attitude in regional Victoria. She explained that crises often drive changes in action, but that regional people are starting to see the evolving opportunities. The objective of managing the problem of climatic change is a shared one, which requires appropriate resourcing, strong leadership, cooperative engagement across stakeholders, and increased confidence in available information.

Leadership and information are key themes important to regional sustainability under climate change. It is important to have the right people who can ensure engagement in accordance with differing levels of understanding and goals of people. A key leadership group is active already but additional tools are needed. Engagement with younger people in particular needs enhancement given the importance of present decision-making to future regional sustainability. All councils have documented their environment or sustainability strategies and will develop action statements and opportunities for community involvement. Monitoring and evaluation of progress toward goals will also be crucial to the successful implementation of these strategies.

Information needs to be provided in non-scientific, low jargon language to enhance understanding of climate change, and to detail alternative strategies that enhance socio-economic viability, facilitate environmental sustainability and resilience, and outline available adaptation options and further information sources. Showcasing existing adaptation approaches and innovations can assist discussions and the re-imagining of a future, sustainable landscape. By focusing on innovation and success, leaders at all levels of the community can build regional investment (economic, social and environmental) in adaptive capacity and actions.

Key messages from presentations

- Regional communities are adapting. However some are adapting to climate change (e.g. regional sustainability groups) whereas others (70% of farmers) do not accept human-induced global warming but are nevertheless adapting to changing weather and seasonality and the drought conditions of the last decade.
- Shifting climate is an additional driver of change on top of those already affecting environments.
- There are major uncertainties in understanding of the climate system. This is a critical issue as changes are already equal to, or greater than, the worst case projections for 2030-2050.
- There is no single approach to adaptation so a toolkit of methods is needed in accordance with the amount of available data, climate scenarios, model reliability, level of governance,

resources, risk, adaptive capacity.

- There are an extensive number of vulnerabilities, challenges and knowledge gaps in the region across the sectors of government/planning, business/industry, environment, community, education/information delivery, infrastructure/transport and climate/weather.
- Water availability appears to be the critical factor raised in relation to environmental issues in the region. No knowledge gaps on the environmental side (apart from climate/weather) were raised by workshop participants
- There is preparedness to value ecosystem services and carbon markets but uncertainty in legislative and methodological underpinnings is an impediment.
- Although the Wimmera region has a very good history of regional collaboration and cooperation, there are significant issues of rural decline, an ageing population, skills loss, lack of youth retention and low community resilience after ten years of drought.
- Education and information delivery are critical factors regionally to adaptation, not only in relation to lack of perception of climate change but also in lack of understanding of sustainability, who and what to believe, and how to network and tap into information.
- Climate change issues are often presented in academic rather than practical terms. People want to know what they can do easily and the information needs to be in everyday language that is easy to understand.
- Local leadership by example is evident but broader regional engagement, strategic vision, action plans and demonstration sites are required.

Working group discussions

The six working groups addressed the four questions on regional assets, vulnerabilities, challenges and knowledge gaps by focusing on one of six themes: primary industry, natural environment, recreation and industry/business, urban development, transport, and community health and well-being. However, several other themes also were evident in the discussions as important: government/planning, infrastructure, education/information delivery, climate/weather and the water resource (the working groups' notes are provided in Appendix 5).

What are the most important assets (natural, cultural, social, economic) in the region?

The key assets in the region were identified as the community, landscape and climate, agriculture and other industries, and the affordability, standard of living and opportunities provided by these features and the regional infrastructure. There are strong social networks in the community resulting in high connectivity between people. The towns of Horsham, Dimboola and Stawell in particular were mentioned as important

centres for provision of cultural (e.g. museums, Natimuk art community), education, health and recreation facilities and economic opportunities.

The towns function as the economic centres and as a freight interchange hub, a valuable asset for the region's varied agricultural service providers and grain science and production services. Local producers are noted for farming innovation, particularly their skills in dryland agriculture and managing climatic variability. The region is both cause and consequence of this skill and need for innovation – with productive soil but finite water availability; yet the Wimmera – Mallee pipeline is a major, recent asset that will enhance water supply security. High solar radiation and wind also makes the region suitable for renewable energy investment.

Landscape is an important intrinsic asset to the region due to the number of national parks, montane environments, biodiversity and wetlands, as well as the more esoteric benefits provided by wide open spaces, a 'big sky', fresh air and lack of pollution. Such features benefit both locals and visitors to the region, most notably through general or specialised (e.g. birdwatchers, artists) tourism to the national parks. Good transport infrastructure facilitates regional economic viability, whether as road, rail and seaport networks that are necessary for local producers or the local roads and bike paths that enable tourist and community recreational opportunities. In addition, the moderately sized towns but good services and facilities promote relatively high housing affordability and standard of living.

What are the key vulnerabilities/issues for the region?

Nevertheless, the region's distance from Melbourne and dispersed population result in significant transport-related issues. The rail (including freight) and roads systems are inadequate for the region's dependence on agriculture and tourism, as is the inadequacy of parking near town central business districts. Furthermore, there is a paucity of alternatives to private transport; this is a particular concern for young people and senior citizens who may be dependent on public transport services. This concern is increasingly extended across the community as fuel becomes scarcer and high prices limit travel affordability.

Regional economic viability is a critical issue for the region. Given its agricultural dependence, global markets and export prices are strong influences on regional economic viability. The Global Financial Crisis also impacted locally by reducing credit availability, resulting in a need for investment from venture capitalists. Decentralisation of services such as energy supply and infrastructure would counter to some extent the regional vulnerability to external pressures by supporting local development and employment opportunities. On the other hand, increased communication networks (e.g. increased internet availability) would enable access to broader or alternative perspectives, and increase community literacy and engagement on issues such as climate change and regional sustainability.

Regional invigoration is required, whether this occurs through sustainable planning, enhanced communication or investment in training and employment opportunities. As a rural, agricultural environment, the region is politically stable with a strong National Party orientation. However, the cultural

base is relatively narrow and community resilience has suffered from over ten years of drought conditions. In addition, some degree of 'rural population decline' is evident given that the population is ageing and retiring from paid work, many young people leave the area for education and employment, people are migrating from small to larger towns, and it has been difficult to retain and attract people to the area, particularly skilled labour. As a consequence, 'rural stress' is evident as social and mental health issues become more prevalent.

Underlying these issues is environmental sustainability and reliability. Over-exploitation of soils, water and biodiversity is evident, with much of the natural landscape degraded or fragmented into habitat islands. Water is a critical issue as it is essential for environmental sustainability and for human purposes of consumption, industry and recreation activities. Compounding these factors is the incidence of extreme events; fire, high temperatures, drought and storms may impact significantly at the local and regional levels.

What are the key challenges to address?

Measures that improve regional sustainability are necessary. Firstly, the lack of a broader business model that can adapt to the predicted climatic zone changes as well as the vagaries of global markets and export price variability is a major consideration. Business may need to become more efficient to adapt to the declining human resource base; an increasingly unpredictable, higher stress but lower productivity climatic regime; and reduced resources such as water. Part of improved efficiency will be reassessments of input costs, enterprise and industry scale, expansion potential, labour to income returns ratios, and upgrading of essential infrastructure including rail and road networks.

The second component required for improved regional sustainability is improved community services and capacity building. Workshop participants reported indications amongst the community of apathy, complacency, fear of change, and poor capacity to adapt. These, and the apparent social and mental health issues, are indicative of increased social disparity, social isolation, perceived lack of opportunities, and cultural and educational immobility. Addressing these will require investment in facilities and programmes that enable and encourage interaction, learning, skill development, recreation, engagement and collaboration across the community. It will also require the services of people skilful in communication, motivation, education and the use of internet search engines to facilitate such capacity building and learning. Education of the community and specifically of farmers in adaptation strategies and mechanisms for improved efficiency and sustainability will be a key component. Identification of reliable sources of information on issues including climate change, water management and the benefits of biodiversity are additional knowledge needs.

Community and regional sustainability will need to be underlain by improved infrastructure and transport mechanisms that are appropriate under climate change scenarios of higher temperatures, are more fuel efficient, and produce lower amounts of greenhouse gas emissions. Improved public transport will need to be provided as an essential service and to counter high commuting distances. Service delivery will require

maintenance and improvement, including provision of emergency services, recreation facilities, and enhanced employment and training opportunities. The latter is critical to address the rural drift and retirement evident in the region and the associated loss of skills, cultural knowledge and experience, recreational opportunities, and the capacity for intergenerational engagement, understanding and learning.

Where are the knowledge gaps?

At present, **knowledge across the community of climate change impacts and predicted changes is poor.** A failure of climate change information delivery mechanisms to farmers has been identified, while knowledge of reliable information resources and how to access them in the community is limited. Furthermore, the contribution of individuals and society to climate change through personal and industrial emission production needs substantiating and the implications detailed. There is an urgent need to address these information gaps.

A variety of approaches will be needed to address the challenges and vulnerabilities identified for the region. The socio-cultural, material and environmental issues limiting regional sustainability can be addressed only through enhanced information availability, improved information delivery and discussion, and provision of facilities, resources and mechanisms to effect change. The first step, nevertheless, is **identifying adaptation pathways suitable for individual, organisational and regional change.** The second step is to facilitate access to information, increase understanding, and create personal connections between the effects of action on broader change. **Many individuals are pursuing adaptation strategies or requesting information on them; it is critical that these individuals are supported, encouraged, enabled and connected with the broader community to communicate and demonstrate appropriate, successful adaptive strategies and efficiency improvements.**

In particular, **information is required on new technologies and elements of precision farming and water management to improve productivity and efficiency.** Information is required on utilising the internet and broadband to access information resources. **Alternatives to private transport and more efficient transport mechanisms** and upgrading opportunities need to be developed and communicated to the community. The **inter-linkages between different socio-economic elements and climate change** (e.g. the impact of environmental degradation on agricultural productivity; the effect of high transport costs on imported foods, goods and services; the impact of high food miles on emissions and domestic economies) need to be included in information delivery; only by understanding the complexity and variety of the issues can effective change be achieved. Where possible, carbon needs to be turned from a burden to a positive; for example, there are opportunities for carbon sequestration or trading but these need appropriate legislative and regulatory frameworks. Information on other contributions and mechanisms will assist with **re-envisioning the carbon problem, such as recommendations and information on availability of renewable, sustainable products,** particularly where supported by present or future government investment strategies.

Lastly, research needs to continue into the **mechanisms and implications of climate change**. Regional communities are particularly interested in the local ramifications, including the temporal and spatial variability in controls and effects. This information needs to be provided and **delivered in flexible forms suitable for differing levels of understanding, awareness, education and interest**.

Future collaboration

Regional capacity building and collaboration will be an essential component of mechanisms to improve sustainability. Collaboration and communication opportunities can provide forums for testing assumptions about the local influences on, and impacts of, climate change. They can enable new and unprecedented narrative development and conversations, particularly around best practice and efficiency enhancement approaches. By stimulating discussion, they also create new information and knowledge flows that may encompass local scale, applied implementation or impact issues up to broader scale policy and legislative mechanisms and their implications. Such discussions enable exchange of stories and experiences. Thus, they fuel collaborative and continuous learning, and can provide support for change in economic, social and environmental behaviour.

Conclusions

Five key points are evident from the think tank and workshop discussions in relation to regional sustainability under climate change.

1. The region is heavily dependent on agriculture, particularly the grain industry, and is undergoing significant demographic, economic and environmental change. Adaptation to future climate change will require a broader regional business and planning framework that integrates climate change issues within a broader set of challenges.
2. Information about climate change and response strategies is critical in enhancing preparedness and planning for altered conditions, and for risk management of future changes and extreme conditions. This requires a solutions focus with a range of strategies and potential adaptation pathways.
3. Infrastructure maintenance and development is necessary for regional economic viability, whether in relation to existing socio-cultural needs or future economic viability.
4. Capacity building and skill development is essential in the region to enable effective adaptation.
5. Wider community engagement is needed to improve community understanding, learning and skill development opportunities; to enhance local support and recreational services; improve local health and well-being; and facilitate the capacity to adapt to further change.

The think tank generated the following recommendations related to regional leadership and engagement, information provision and delivery, adaptation strategies and regional adaptation needs.

Regional leadership and engagement

- Strong regional networks and collaboration exist, but they need to be built upon.
- More leadership needs to come from the local and regional levels.
- A network map of local groups, actions and influence is needed to link efforts effectively.
- Collaboration is needed to create new information and knowledge flows and to support change in economic, social and environmental behaviour.
- Younger people need to be included in planning and decision-making and given opportunities for intergenerational engagement and learning.

Information provision and delivery

- Regional planners and extension officers need to be flexible and strategic in engagement with different groups.
- The community needs to be able to identify and trust sources for information delivery.
- Celebrate achievement – use working examples of successful adaptation to communicate solutions.

Adaptation strategies and planning

- Climate change adaptation needs to focus on what can be done now and on tangible actions.
- Some factors come up as assets and vulnerabilities at the same time, indicating the complexity of human – natural systems.
- Planning needs to be ‘live’; i.e. continually updated.
- Information provision and appropriate delivery mechanisms are essential for adaptation.
- Develop adaptation pathways that identify strategies appropriate under different scenarios.

Regional adaptation needs

Knowledge needs

- Improved awareness and understanding of climate change impacts and predicted changes including information that substantiates the causes and effects of climate change
- Improved knowledge of reliable sources of information on climate change and adaptation strategy resources (including available facilities and mechanisms to effect change) and how to access them within the community
- Regionally specific information on climate change mechanisms and implications, especially in terms of local ramifications and spatio-temporal variability in controls and effects
- Substantiation and explanation of the implications of individuals and societal contributions to climate change through personal and industrial emission production

- Adaptation pathways and strategies suitable for individual, organisational and regional change, improved efficiency and enhanced sustainability
- Information on more efficient water management and biodiversity benefits to enterprise and regional sustainability
- New technologies and elements of precision farming and water management to improve productivity and efficiency
- More efficient transport mechanisms and vehicle upgrading opportunities
- Mechanisms by which carbon can be turned from a burden to a positive, e.g. carbon sequestration or trading; renewable, sustainable products

Training needs and opportunities

- Improved climate change information delivery mechanisms
- Opportunities to support, encourage and enable individuals who are actively pursuing adaptation strategies or requesting information and connect them with the broader community to communicate successful adaptive strategies and efficiency improvements
- Training of people skilful in communication, motivation, education and the use of internet search engines to facilitate community and enterprise-specific capacity building and learning
- Use of the internet and broadband to access information resources.

Acknowledgments

The 39 participants in the think tank contributed their knowledge and insights into climate change issues and environmental and resource management in the Wimmera – Mallee region, and more broadly. Mrs La Vergne Lehmann provided logistic support and detailed notes during the think tank, and speakers made available their powerpoint presentations. The think tank was funded by the Victorian Centre for Climate Change Adaptation Research. Comments on the report were provided by Professor Rod Keenan.

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Appendix 1. Newspaper articles relating to the think tank



Wimmera Mail Times
Monday 5/04/2010

Page: 7
Section: General News
Region: Horsham VIC, AU
Circulation: 9038
Type: Regional
Size: 223.14 sq.cms.



press clip

City forum to focus on climate change

By AMELIA ELLISTON

CLIMATE change experts will gather in Horsham this week for a free business community workshop on the environment, climate

Change. Seven speakers in an all-climate change advisory Rob Giel will be a top as participants. The workshop will be held from 9am on Thursday and Friday.

The event is aimed at business leaders and the community.

Mr Giel said the workshop was a chance for the community to understand the effects of climate change. The speakers have a lot of practical climate change advice that will be done to help the environment.

"In the last 12 months we have gone through a period where climate change has been questioned again and the scepticism has moved away from being on the right to a very well funded and organised group of sceptics," Mr Giel said.

"The workshop is an attempt by the people such as those at the University of Ballarat to say that

we're raising you from some things you need to really understand. This is not a matter of conjecture, this is happening now."

"It's really about getting people to refocus (despite debates in government level)

"There are some things they need to understand."

Mr Giel said although climate change was a global issue, the workshop would have a Wimmera focus.

"This is an update and it comes back to the dryland issue. There is a mandatory context, national context and a western Victorian context," he said.

"This workshop is for everybody and I would implore anybody who has the time to come along because it is a matter the community needs to get involved in and understand the science as best they can."

"The speakers are world leaders and people should take advantage of it because we need

we understand individuals in the community to prepare for the changes which will take place in this region and the world."

The workshop is a joint venture between the Geelong, Launceston, Park, Victorian Centre for Climate Change, Asaph, Hon. Research University of Ballarat and Water and Dryland's Collaborative Research Program.

Speakers include hydro-ecological model expert Professor Rob Wilby and Victorian Centre for Climate Change Asaph Hon. Research director Professor Roy Keen.

National and regional experts in residential and commercial buildings, change and Department of Primary Industries, Department of Sustainability and Environment, University of Melbourne and Victoria's Australia's environmental news will also attend.

Mr Giel said people could call Dr Louise Lyden at the University of Ballarat on 8327 9519 for more information.



SPEAKER: Rob Giel



Wimmera Mail Times
Wednesday 14/04/2010
 Page: 10
 Section: General News
 Region: Horsham VIC, AU
 Circulation: 9038
 Type: Regional
 Size: 163.86 sq.cms.



press clip

'Rethink farming' to survive

By AMELIA ELLUSTON

THE Wimmera must diversify away from grain monoculture to survive in a climate of change, a future as farm

University of Melbourne Professor of Environment and Society Peter Gell was one of the main speakers at the climate change conference at the Wimmera Innovation Park last week.

Prof Gell said the future entailed exchanging knowledge and ideas between fields with a knowledge of the Wimmera and agriculture with a knowledge of climate change politics.

"We need to change to suit the conditions. Higher temperatures and less water. We need to bring in the communities of the region as well," Prof Gell said.

"Adapting to the climate change is one of the issues but solutions are more rural in nature. For us rural and urban have an inbuilt diversity, we are an island resilience in the region so it was respect local things, markets as well as climate."

"You build resilience by increasing diversity of the economic portfolio and skills of the region. If you have the green, when there is more than one white rooster is under the hat."

"If you have a broader range of enterprises another way of looking

at it is struggling so the whole region doesn't end with punches of climate."

Prof Gell also suggested areas the region could diversify into were training, engineering, education, tourism opportunities, diversifying crops and the many opportunities which could arise from the pipeline.

Prof Gell said while not all farmers believed climate change was caused by humans, they did acknowledge it was in the climate.

"Farmers are good climatologists because they look out the window every day and they are well taken to the fact that something is happening. They might not be convinced as to what is causing it but they can't really ignore it, they will see the need to adapt," he said.

"In the end we had a really interesting mix of people at the forum, farmers and international resource scientists together and they were on the same page, there to look for solutions."

"There were a lot of questions about how we enable community and government to make the right decisions. People remember, but many political leaders understand the issues but you need a critical mass of the electorate to understand as well to enable them to make the decisions."

Appendix 2. Photographs of participants at the think tank



Figure 1. Panel of speakers addressing some ‘burning questions’: Rob Gell, Rod Keenan, Peter Gell, Ailie Gallant, Rob Wilby, Roger Jones (left to right)



Figure 2. Think tank participants during a presentation



Figure 3: Rob Wilby speaking on international adaptation approaches



Figure 4: Think tank participants during the workshop session



Figure 5: Think tank participants being addressed by John Harding of GWMWater at Taylors Lake pumping station

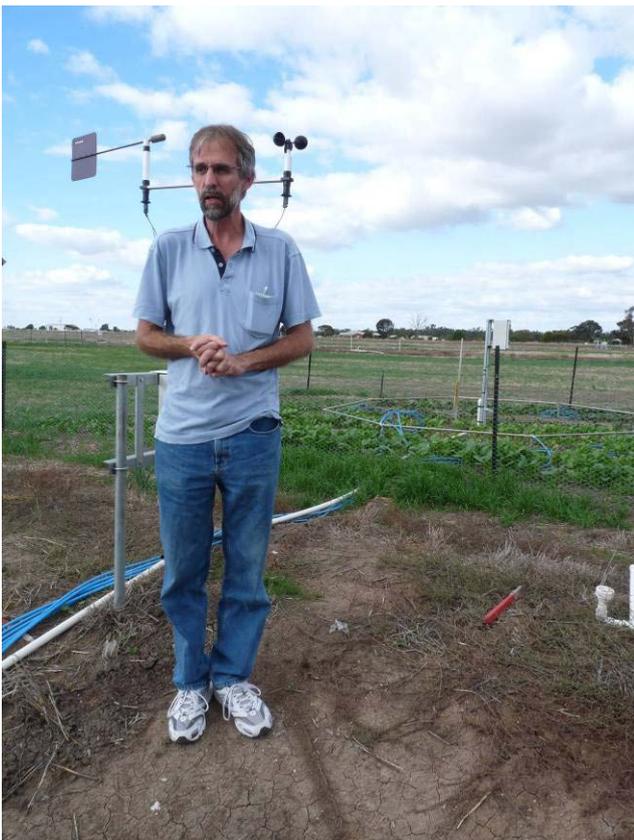
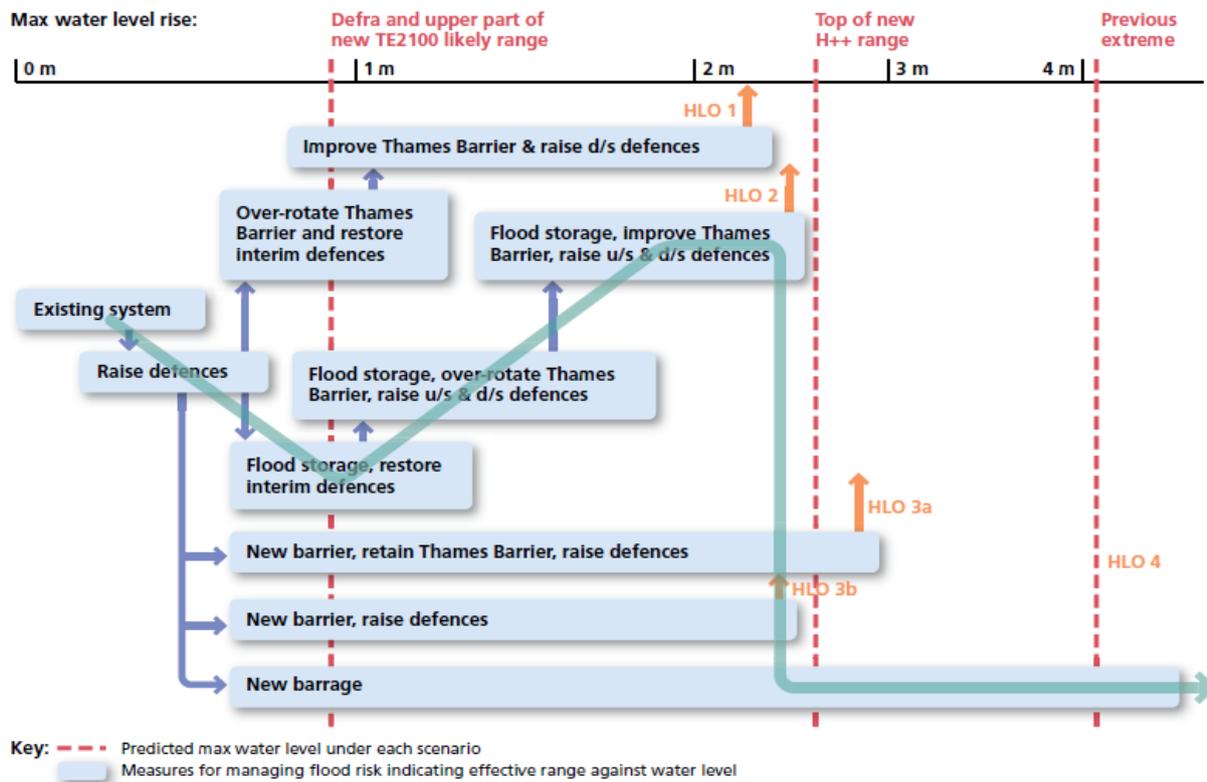


Figure 6: Glenn Fitzgerald, DPI, explaining the FACE experiment, Horsham

Appendix 3. An adaptation pathway map developed by the UK Environment Agency for Thames estuary climate change adaptation strategies (from Lowe et al. 2009)

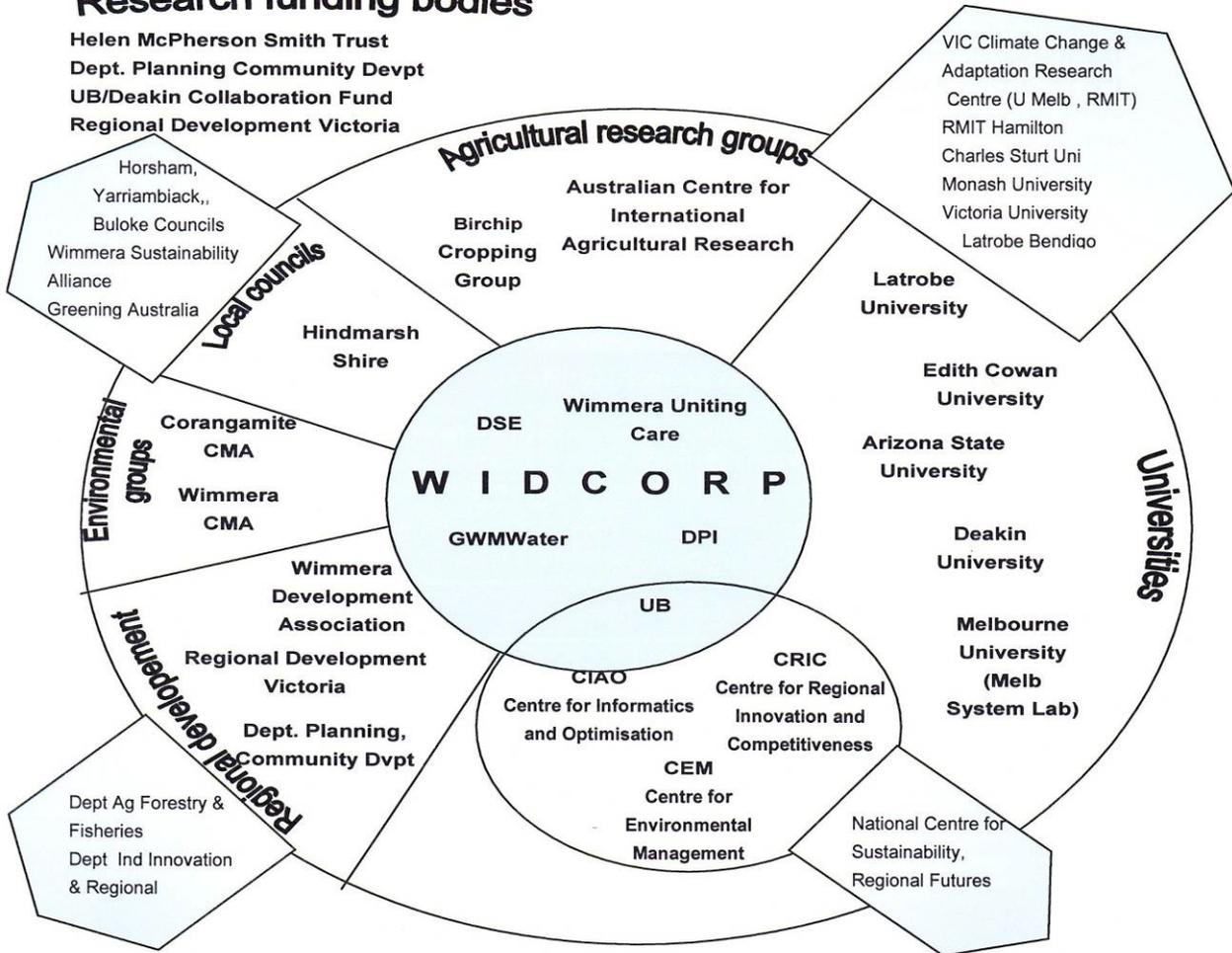


Appendix 4. Research interactions between WIDCORP and organisations active in the Wimmera - Mallee region

WIDCORP Research Collaborations

Research funding bodies

Helen McPherson Smith Trust
 Dept. Planning Community Devpt
 UB/Deakin Collaboration Fund
 Regional Development Victoria



Appendix 5. Workshop findings

1) Most important assets (natural, cultural, social, economic) in the region?

- **Primary industry**
 - People, agricultural service providers
 - People, agricultural service providers, grain services & infrastructure,
 - Land soil assets, skills in dryland agriculture, managing variability
 - Grains Innovation & science
 - Government investment (health, ag, pipelines etc)
 - affordability
- **Natural environment**
 - Productive soil
 - Water – rainfall & ground water
 - Native vegetation, biodiversity & wetlands
 - People (who appreciate the landscape).
- **Recreation & industry/business**
 - Water – natural, recreation & business
 - Landscapes – national parks, cultural, mountains, climate
 - Cultural – agricultural reliant region, innovative(e.g. in farming)
 - Social – key liveability assets, sport
 - Economic – organised sport, space & infrastructure available, climate (renewables)
- **Urban development**
 - Horsham, Dimboola, Stawell etc
 - Horsham a sponge city – issues with retaining and attracting people
 - People most important asset (social networks)
 - Culture, education, health, industry (jobs), recreation, housing affordability
 - Services okay in Horsham
 - Research facilities
 - Transportation
 - Water – pipeline – secure water supply (for now!)
- **Transport**
 - Roads – main roads & local
 - Rail
 - Airlinks & helicopter links
 - Seaports – important to Wimmera
 - Bike pathways
 - Visitors
 - Connectivity between communities
 - Grampians tourist roads
 - Hubs for freight interchange
 - Ag production, land, space, sun
- **Community health and well being**
 - National Parks – Grampians, Hattah Kulkyne, Little Desert, Big Desert, Arapiles – tourism & recreation, bird watching
 - Museums
 - Lakes & wetlands
 - Wide open spaces
 - Big sky
 - Lack of pollution

- Fresh air
- Vibrant art community (Natimuk)
- Grain production
- Silo making factories
- Luvaduck
- Lesser skilled migrants still welcome
- Value adding products

2) Key vulnerabilities/issues for the region?

- Government/Planning
 - Sustainable planning
 - Centralised energy production – need to promote decentralised energy options
 - Stable political views as region is a National Party bastion
 - Employment
- Business/industry
 - Dependency on agriculture (grain industry centric) and tourism
 - Export prices are an important factor in regional viability
 - The Global Financial Crisis has resulted in low credit availability
 - Venture capitalists may be required for further investment in the region
- Environment
 - Rainfall & water – implications for environment, human consumption, industry & recreation
 - Over-exploitation soils, water, biodiversity
 - Landscape fragmentation (islands)
- Community
 - Social and mental health, rural stress
 - Population decline and demographic change, redistribution from small towns to larger towns with associated loss of skilled labour
 - Aging population, lack of youth retention
 - Narrow cultural group
 - Community resilience tapped out after 10+ years of drought
 - Stakeholder literacy & not engaging with issues
- Education/Information delivery
 - Lack of understanding of sustainability
 - Community naivete
 - Climate change –not perceived
 - Information dissemination
- Infrastructure/transport
 - Infrastructure – communications (internet), transport, electricity, fuel costs
 - Paucity of alternatives to private transport
 - Lack of public transport – fuel dependence
 - Ageing population demand for public transport
 - Lack of CBD parking
 - Distance from Melbourne
 - Roads incapable of supporting changed freight patterns
 - Capacity of young people to move without transport
 - Scarce fuel and high prices limits travel
 - Communication limited - dropouts
 - Rail freight system inadequate
- Climate/weather
 - Extreme events – fire, heat, storm

3) Key challenges to address?

- Government/Planning
 - Ability to adapt
 - Service delivery – maintain & improve
 - Sport – water availability, population decline, travel cost
 - Employment opportunities
- Business/industry
 - Scale and depopulation
 - Grain terms of trade continuum (input costs, scale, labour costs vs income)
 - Broader business models
- Environment
 - Water – management, availability, governance
 - Biodiversity is an inhibitor
- Community
 - Social equity issues
 - Social distance
 - Lack of global view & alternative perspectives
 - Keeping young people – loss of cultural attributes, reduced recreational capacity
 - Rural drift
 - Retirement – loss of skilled & knowledgeable people
- Infrastructure/transport
 - Lack of infrastructure
 - Existing infrastructure may not be suitable for temperature increases
 - Cost of upgrading rail
 - High commuting
 - Poor public transport
 - Cost of alternative fuel – biodiesel/electric
 - Access to roads for expanded grain production
 - Providing emergency services to remote communities
 - Car pooling – freeing up car parks in Horsham
 - Emission reductions on private vehicles
- Education/Information delivery
 - Increasing educated & skilled farmers
 - Enlightenment – marketing and understanding of climate change
 - Apathy, complacency, happy with status quo
 - Fear of change
- Climate/weather
 - Climatic zone change

4) Where are the knowledge gaps?

- Government/Planning
 - Future government investment, renewables
 - Need for a variety of approaches for managing climate
 - Turning carbon from a burden to positive
 - Addressing the challenges
 - Capacity of people to adapt
 - Employment opportunities
- Business/Industry
 - New technologies & elements of precision farming
- Community

- Social equity issues
- Social distance
- Lack of global view & alternative perspectives
- Rural drift
- Retirement – loss of skilled & knowledgeable people
- Keeping young people – loss of cultural attributes, reduced recreational capacity
- Education/Information delivery
 - How to network and tap into info
 - Climate change literacy - who do you believe?
 - Something has changed but what?
 - How to get information to farming enterprises
 - Access to Internet
 - Climate change adaptation and pathways for individuals
 - Personal connection between action and broader change
- Infrastructure/transport
 - Lack of infrastructure
 - Impact of high transport costs on food and imported products
 - High commuting
 - Poor public transport
 - Cost and reliability of NBN (avoid transport)
 - Community understanding of climate change & impact of private transport
 - Impact of freight systems emissions on climate change
 - Impact of high transport cost on imported food/goods/ services
- Water
- Climate/weather
 - Modelling – increased natural events like fire, heat
 - Effect of increasing CO₂ & climate change implications
 - Climatic zone change
- **Suggestions for additional themes**
 - Should there be a theme about taking action
 - Engaging in a solutions focus
 - Some degree of integration - combine climate change issues with other broader change issues

5) **Future collaboration**

- Tests assumptions about the way climate change works on the ground
- New and unprecedented narrative, conversation, best practice
- Creates new information and knowledge flows, policy implications
- Supports change in economic, social and environmental behaviour
- Fuels collaborative & continuous learning
- Helps tell and share local stories/experiences
- Could also add integration to this list as well

Appendix 6. Think tank evaluation survey results

Zoomerang Survey Results

VCCCAR Drylands Think Tank, Horsham, 8-9 April 2010

Response Status: Completes

Filter: No filter applied

May 20, 2010 8:20 PM PST

VICTORIAN CENTRE FOR CLIMATE CHANGE ADAPTATION RESEARCH 'Climate change adaptation and mitigation in Victorian dry-lands' think tank, Horsham, April 8-9 2010 Evaluation questionnaire
Thank you for agreeing to participate in a short evaluation of the Drylands Think Tank. This survey should take 5 to 10 minutes to complete.

1. Which of the following best describes your affiliation?		
Government (federal)	0	0%
Government (state)	10	36%
Government (local)	4	14%
Industry	2	7%
University/other higher education	8	29%
Other, please specify	6	21%

2. Why did you attend the think tank?		
To present	4	14%
To network	8	29%
To represent a workplace	12	43%
For personal interest	8	29%
Other, please specify	8	29%

3. Which sessions did you attend?		
Thursday 8 April AM session	22	79%
Thursday 8 April PM session	20	71%
Friday 9 April AM session	24	86%
Friday 9 April PM session	20	71%

4. Please answer the following question if you only attended part of the programme		
Only interested in some sessions	0	0%
Location of event	0	0%
Timing of event	8	57%
Other (a short explanation would be appreciated)	3	43%

Not interested in field trip. Comments heard from those on the field trip did not find it particularly valuable. I couldn't see where the experience of the FT had much impact on the following discussions on Friday.

previous commitment on Day 1

Had to be in Warrnambool later in day

5. Did the think tank improve your understanding on the impacts of climate change on farming systems and NRM in the region?		
Strongly disagree	2	7%
Disagree	2	7%
Neither agree or disagree	4	14%
Agree	18	64%
Strongly agree	2	7%
Total	28	100%

6. Were there any climate change impacts or issues for your region that you felt should have been included / given more attention by the think tank?		
Yes	12	50%
No	12	50%
Total	24	100%

I was a visitor from outside the region.

Getting decision makers in the room.

Environmental impacts, rivers, wetlands and biodiversity didn't get as much attention as water for agriculture

Impacts on river and wetland health

Impacts on biodiversity and resilience of the ecosystem and community

From outside the region - thought the program comprehensive

I think that the severity of the changes were underestimated. It was only Rob Jells who touched on the impacts of the changes that we may expect.

Interested in what we can do and what research needed for immediate action and efficiency and effectiveness.

How we translate planning and research into action for climate change

7. Were you introduced to any people, organisations or projects at the think tank that may assist you to improve your / your organisation's response to climate change?		
Yes	24	86%
No	4	14%
Total	28	100%

Basically the general scope of organisations which I now know have a significant interest

Need help to get Climate Change on the agenda with the community.

Able to make some links between Habitat 141 projects and regional development interest

possible collaborations for research

Caught up with work going on around the place

Some interest web addresses were made available

Slightly. Already involved, but helped focus.

Met various people from Government organisations and universities who will help me to understand climate change and social/economic response more than I did prior to this workshop

talked over 2 days with participants and presenters to get some interesting perspectives

8. How would you rate the scope and relevance of the issues discussed at the think tank?		
Very poor	0	0%
Poor	4	14%
Neither good or poor	2	7%
Good	22	79%
Excellent	0	0%
Total	28	100%

9. Which aspects of the think tank did you find most useful?

12 Responses
 More or less every session after the preliminary session. This session was too long and short on real content.

Regional level impacts of climate change to provide a better understanding of the future for the area. The study of the wetlands as a historical base to climate impacts was also fascinating in terms of the change in salinity and the impact on the plant diversity and distribution. Discussions on the future impacts under climate change also got participants to focus in the longer term in terms of the impacts on number of key concerns.

Greater understanding of regional climate drivers.

networking

Networking with others

DPI info

Learning more about exactly how the climate works and what influences it. Networking opportunities

cross-cutting discussions, new work

i found Peter Gell's historical piece excellent and John martin's GWMWater presentation most interesting

Steering the discussion toward response and action, and research for best results.

The networking and making people work in well-mixed breakout groups so that scientific, government and community representatives worked together

international perspective with national speakers and local expamples. Nicely packaged.

10. Which aspects of the think tank did you find least useful?

12 Responses
 Naturally because of my comments in (10) the first session was the least useful and rather redundant given that it was a think tank of groups or individuals who had reasons to be present.

High level climatology and science from one presentor, and the 'death by powerpoint' from Rob Gell were not all that helpful.

The follow up survey (just kidding), I dont think I could say if there was any least useful.

More could have been made of the Regional Development Aspects

Carbon trading and water management

None

Not sure where it will go

The sceptics!

For both 9 and 10 I think the main fault is mine as I consider amelioration is far more important than adaptation - I now appreciate that this forum was trying to get us to see if we could adapt to climate change. I don't think that the think tank looked too closely at dryland agriculture/NRM It touched more closely on community issues

Didn't end with an agreed set of actions or tasks to complete by a certain time by particular group/s. Research for adaptive management. Repeated areas of discussion recently completed by other community groups, with less involvement and weaker results.

Not least useful, but I think the presenting of the work from the various breakout groups was a little long-winded for late afternoon, could have done with being much shorter

It would have been a good opportunity to be more interactive on developing/scoping strategies, projects or approaches. Great opportunity with so many knowledgeable people to get input into new initiatives to address identified issues.

11. How would you rate the level of discussion and input from participants of the think tank		
Poor	4	15%
Undecided	0	0%
Fair	6	23%
Good	14	54%
Excellent	2	8%
Total	26	100%

12. How would you rate the level of opportunity that you had to contribute to the forum		
Poor	2	8%
Undecided	0	0%
Fair	6	23%
Good	16	62%
Excellent	2	8%
Total	26	100%

13. If you attended the field trip, how would you describe the value of the field trip?		
Poor	3	38%
Undecided	0	0%
Fair	1	12%
Good	4	50%
Excellent	0	0%
Total	8	100%

14. Did you think the number and mix of participants and presenters was appropriate?		
Yes	16	67%
No	8	33%
Total	24	100%

I thought some of the sessions were very animated and demonstrated the depth of understanding and feeling around the topic. It was good that it was inclusive discussion rather than combative. A real danger where water is concerned

Yes, but OK when viewed overall. In the end the workshop was 'preaching to the converted' so too much time was taken up with the high level science.

Good presenters, did we need wider representation from the community?

Would have liked to see Birchip Cropping Gp and Southern Farming Systems attend.

Lacked regional NRM perspective - where are the CMAs/Parks Vic relevant to the region?

There were too few community members
Maybe for Uni purposes but not so much for community responses.

though more community and business representatives would have been nice. Representatives from the younger generation would have provided a totally different insight too and it is a shame the average age of participants was probably in the early 40s!

It was a great opportunity to get more people in the room.

15. How could the think tank, workshops and/or field trip have been improved?

12 Responses

Get into the subject and presentations quickly and only take Field trips which clearly illustrate some issue in the general discussion. Generally speaking these think tanks are being attended by the already converted or the total sceptics

A clearer statement on the objectives and a constant reminder of whether we were still on track would be useful. On that issue of the objective, a short intro paper would have been useful to stimulate discussion early and ensure that people remain engaged. With so little information it was difficult to see if the investment was really there to commit two full days to the activity. It was not clear to me just what we were expecting to deliver for anybody at the end of the two days. Did not attend the field trip.

No field trips.

From comments there was a bit too much introduction on the first day. Perhaps a position paper would be useful

Lack of direction (was it NRM or was it communities and infrastructure) and out of the scope of the group.

Some discussion about the influence of climate change on community resilience

It's a one-off, so integration into existing programs is important

Perhaps a handout on each?

The think tank (my group in particular) did not seem to really come to grips with the problems. The water trip could have been more successfully conducted by video - we stood on a bank and look at a map! There are a number of interesting technical aspects of the pipeline project that could have been better presented. The FACE project was presented in a better manner. Field trip could have been done for all with photos and descriptions as part of the normal presentation, especially considering the few who went and the time taken.

A little more notice...seemed a little disorganised with the dissemination of information prior to the workshop (accommodation, travel arrangements etc) - but the actual 2 workshop days were fine

field trip was the least exciting part of the forum, however good to get out and about

16. Overall, how would you assess the value and importance of the Drylands Think Tank as a forum to discuss regional climate change adaptation issues and solutions?		
Very poor	0	0%
Poor	4	15%
Undecided	6	23%
Fair	2	8%
Good	12	46%
Excellent	2	8%
Total	26	100%

17. Do you have any other comments/suggestions regarding the Drylands Think Tank that may assist with planning future Think Tanks?

8 Responses

A small discussion paper to inform the audience and give potential attendees an informed opinion on the value of attending such a workshop. Thanks for the opportunity to provide my views.

The level of expertise in the room deserved a greater commitment from the region, I will to the best of my abilities strongly support any activity that addresses Climate change issues, and would like to thank you for the opportunity to express this conviction.

Ensure all the key players are there and on board.
not really

The presentations on research projects that indicate historical change were interesting, but from my position I think that an update of the current situation should have been emphasised more strongly. I expected the audience to be better informed than some appeared to be and that it was assumed by the organisers. The emphasis was meant to be on dryland farming systems/NRM, but we heard little from the farming systems people/NRManagers/ DPI, crop breeders, soil scientists etc. Key researchers for this region seemed to be missing

See above. Govt, Uni and community response/action must be the focus if we want to survive.

I though brining in an international speaker with a breadth of experience was a great move...this isn't just a Wimmera-Mallee/Australia problem, we can see it in a global context. Better correspondence in the lead up to the workshop may help in the future.

Broader and earlier engagement with stakeholders and potential participants to build the agenda and attract more participants

Thank you for your participation in the Victorian Centre for Climate Change Adaptation Research think tank. For further information on upcoming activities, please contact VCCCAR on Email: enquiries-vcccar@unimelb.edu.au Phone: +61 (03) 9035 8235 Or visit our website at <http://www.vcccar.org.au>