

Chapter One: Introduction

In Chapter One I introduce and contextualise this thesis within its geography and politics. I give a brief description of the town of Hillston where the majority of the research took place and the broader geographical area of the Murray-Darling Basin. Then I define terminology that is relevant to this study and conclude with an overview of the remaining chapters.

1.1. Setting the scene

Farmers in Southern Australia are being challenged to adopt sustainable farming practices in response to an increasingly drier climate as a result of climate change. As farmers are integral to the stability of society as the means of food production, it is vital they have the skills to cope with the demands of their rapidly changing environment. For farmers and irrigation communities living in the Murray-Darling Basin it may even be necessary to move to new careers as less water becomes available, therefore vocational training, education and skills will be needed to make the transition (Williams, Stubs, Miller and Verity 2009, p. 5). Researchers are beginning to look at ways farmers are learning. Percy (2004, p.127) claims that farmers may be assisted to learn by the participatory actions of educators and researchers, who could assist rural communities “to analyse and reflect on their livelihoods in a way that could be said to be empowering or transforming”.

My interest in this area began when a farmer in my family decided he was tired of trying to grow plants that did not want to grow and killing those that did. He resolved to let nature take its course and determine what happened, thus began his transformational journey toward sustainable farming practice. This interest in farming, added to my passion for education and the environment, led to research in the relatively new area of Environmental Adult Education.

This aim of this thesis is to report on the findings of discovery research carried out in the Riverina district of NSW, Australia, through the School of Education, University of New England. The primary questions this research looked to answer were:

1. How some farmers learned to change to more sustainable farming methods?
2. What motivated them to make these changes?
3. How they knew when and what to change?

As well as looking at the hands on methods these adult farmers used to learn the skills they needed, I was hoping to discover evidence of transformation in attitudes toward sustainable practices that would allow for continued natural resource management in an ever changing work place environment.

Ten farmers were interviewed, three in the western region and seven in the Hillston area of NSW, using irrigation and/or dry land practices but all sharing the concern of water conservation. Four rural community members who were not farmers were interviewed to provide a wider perspective.

Interwoven with the learning of new skills is the concept of sustainability. Sustainability, a major variable in this research, needs its definition framed within the farming context (see Chapter Five). The third aspect of this research, climate change, proved problematic once I went into the field (Muhlhausler and Peace, 2006, p. 458). The term 'climate change' was not widely accepted by my participants and was a point of tension so I bowed to local wisdom and referred to the interviewees having to cope with 'climate variability'. Although there is a conceptual difference between the terms and they vary in order of magnitude, using the term 'climate variability' allowed the interviews to proceed without the tension caused by the term 'climate change'. It was also an example of the researcher demonstrating respect for the needs of the participants. I want to make it clear at this point that I understand climate change science and accept it. I am not a climate change sceptic and do not endorse the idea that what is being experienced in more extreme weather events is climate variability.

Tied to climate change and living with uncertainty is the Murray-Darling Basin Plan, a major cause of conflict and tension in the Basin. The Plan was legislated into law

during the writing of this thesis and is so relevant to the lives of the participants I have included it in this research.

We live in challenging times. Climate change is increasingly being recorded as real, scientific research convincing all but the most determined sceptics. As a time of innovation and courageous change, it can be exciting if we let go of our fears (Johnston and Carter, 2011) and be part of a revolution toward a more sustainable way of being.

Developing a sustainable way of being will require more than just changing habitual behaviour. It demands from each of us a paradigm shift away from individualism toward an attitude that heeds the needs of the common good (Golding et al., 2009, p.544; Salleh, 2012, p. 141; Mathews, 2011, p. 2). This is a revolutionary change and some will do better than others. Although it requires first world behaviour to change the most, those struggling for survival in developing countries will also be required to take up the challenge of doing things differently. There are no simple solutions in a global marketplace driven by capitalism. On a national level in Australia there is a messy space, an area of conflict and tension, between those wanting the best for the environment and those who make a living from the land. Sustainability is a goal to strive for, a continuing conversation, a condition or set of conditions to be constantly negotiated.

“Wicked problems” (Kushreshtha, 2011, p.19; Golding et al. 2009, p.546) described as being “messy”, involve uncertainty and are difficult to solve. Golding et al. (2009, p. 546) goes on to say that “necessary adult learning [is seen] as wicked, in the sense of being highly resistant to resolution, using the limited and fragmented existing learning opportunities, organisations and systems”. In this United Nations Decade of Education for Sustainable Development, 2005-2014, the role of adult learning is seen as critical for “building equitable, tolerant, sustainable and knowledge-based societies” (RMIT, 2011).

Part of the messy problem is the identity of farmers as food producers. The Australian National Farmers’ Federation (2012) claims that “each Australian farmer produces enough food to feed 600 people, 150 at home and 450 overseas ...

produc[ing] almost 93 percent of Australia's daily domestic food supply". Yet Goldney and Kerle (2013) state that "80% [of Australian rural landholders] are 50 years or more in age and 20% produce about 80% of combined farm production in Australia. The remaining 80% need off farm income to survive, or live near peasant lifestyles".

Australian farmers would not identify as peasants, however "it is peasants, mothers, fishers and gatherers ... who meet everyday needs for the majority of people on earth" (Salleh, 2012, p. 141). Peasant agriculture has high yields and a "very rich tradition in every part of the world" (Chomsky, 2003, p.70). The dichotomy remains for Australian farmers. Are they the world food producers they believe they are? Or are they caught between a peasant existence and an agribusiness lifestyle?

Although Australian farmers are internationally competitive, the Australian National Farmers' Federation is calling for increased funding for research and development so that productivity growth can be maintained for an expanding market (NFF 2012). Salleh (2012, p. 142) insists that "climate smart agriculture cannot restore the life support broken by industrial capitalism" and yet this is the agricultural reform Australian farmers are learning about. She argues industrial efficiency (a hallmark of Australian agriculture), does not solve problems but displaces them to future generations (p. 144). Lawrence and Vanclay (1996, p. 34) were aware of the problem of environmentally sustainable farming practices nearly twenty years ago; this is not a new problem but rather one of increasing complexity and urgency.

Another area of related concern is the decline of towns and communities throughout rural Australia where loss of services and chronic youth unemployment are forcing young people to find work in larger urban centres. In the global context, "The new agrarian reform should be a fundamental pillar not only in the construction of food sovereignty, but also in the democratic transformation of society ..." (Chaiyarat, 2012). There is a need to find a better way to ensure a healthy future for our farmers and their communities.

A sense of place is associated with Indigenous people, but family farmers, especially those whose farms have been in the family for several generations experience a strong sense of place too. Their connection to their land contributes to the messy situation of

farming as a business while concurrently wanting to care for the land. I wanted to hear the farmers' voices come through their stories and retell them as authentically as I could. Their stories may tell a truth that responses to interview questions may not tell or would rather not admit to.

New ideas for the future expand the story of the past into new directions for working with the land, not against it. Australian colonial history is generally one of hardship, of taming the land, being dominant over it. Yet Indigenous stories, about the same place, are very different. It is time non-Indigenous Australians listened and respected their knowledge of place (Somerville, Power and Carteret, 2009, p. 209). Although many farmers today are experiencing difficulties, many exacerbated by unsustainable farm practices, their stories are worth hearing too. Many can pass on experiences of multiple generations, and recalling the 'bad' stories as well as the good, enables them to begin a new story, one of working with the land, toward sustainability.

Much has been said about the triple bottom line, 'people, place and profit' in regard to farming business practice, however Somerville believes this is too simplistic and does not take into account "the interrelatedness of environmental problems with economic and social issues" (2009, p. 210). Indigenous knowledge is about 'care for Country', while traditionally, immigrant colonial landholders' stories "are adversarial because of the harsh dry conditions [they] ... found so confronting" (2009, p. 211). Relationship to place determines the stories we tell and "enables a conversation about the complex social, cultural, spiritual, economic, ideological and political realities of Indigenous/non-Indigenous relationships to country but from very different perspectives ... From "a silent and timeless place [to] being brought into history by the energy of an industrious and resourceful society" (Somerville et al., 2009, p. 210-11).

1.2 Hillston, New South Wales

Hillston is a small rural township on the banks of the Lachlan River in marginal western NSW. It lies 683 kilometres west of Sydney, 590 kilometres north of Melbourne and 110 kilometres north of Griffith NSW. The average annual rainfall of

367 mm is often unreliable; January average maximum temperature is 33.4 degrees Celsius while the July minimum average is 3.8 degrees Celsius. At the 2011 census Hillston had a population of 996 (ABS, 2011).

Hillston was founded on land once occupied by the Wiradjuri people (Australian Heritage). Soldiers' blocks following WWI were settled by returned soldiers and Crown land along the railroad to Griffith was available for selection in the 1920s. Hillston declined in the period between the wars when many settlers and their families were forced off their land. Their blocks proved too small to be economically viable in drier conditions. However, in the wool boom years of the 1950s Hillston recovered only to once again decline in the 1960s and 1970s. The introduction of cotton and irrigation in the 1990s saw another growth period until the 2002 drought from which it is now recovering (Wikipedia, 2012, pp. 3-4).

Agriculture is the main industry, mainly the commodity crops; grain, cotton and wool. Hillston also produces livestock, and fruit and vegetables; made possible with irrigation from the Lachlan River and the large underground aquifer. Road transport companies are also run in Hillston. Hope for the future is in the form of twelve million dollars available from the Federal government for a new hospital incorporating the ambulance service, and new shire offices are also being built.

The Visitor Information centre brochure describes Hillston as “thriving”, which is something of a hyperbole since the 2002 drought, which caused a loss of population to the area due to loss of employment. However the positive attitude of its inhabitants cannot be denied. People I spoke to living in the area, without exception, expressed a love for the place, even those who have only recently arrived. Many described a generosity of spirit of the people, especially regarding efforts for charity. For example; Waste Not Want Not, a cooperative program run between the Uniting Church, the NSW Department of Primary Industries, the Carrathool Shire Council and local farmers delivers otherwise wasted produce to welfare agencies in NSW and the ACT. While strengthening communities, it promotes the agricultural diversity and productivity of the Carrathool Shire and highlights the generosity of rural people. The local population of Hillston see themselves as punching above their weight when it comes to giving.

Each summer, water permitting, Lake Woorabinda, constructed by members of the local community, is filled and used for recreational activities and is an important point of community contact, as are the Men's Shed and the coffee shop on the banks of the river. Townspeople are proud of their galleries and parks and are seeking ways to attract 'grey nomads' (tourists in retirement) to stop and stay locally.

Hillston Central School has a 'going green' policy beginning with local sustainability and moving to an understanding of global issues. The school motto, "Conserve and Cultivate" sums it up well (NSW Department of Education & Communities (n.d.)

Local Testimonies

Jack (2/8/2012) says Hillston is a good town, a nice community and since the drought is probably back to the families that have been there forever. The drought had a big impact on the town and businesses have not fully recovered. There is less employment around and the people who left during the drought have not returned.

Although the future of the town depends a lot on water, farming is becoming more efficient and therefore does not employ a lot of labour. Some share holder companies don't do any of their dealings locally.

Norman and Narelle (2/8/2012) believe the people of Hillston feel forgotten. Politically, farming communities are so tiny, so irrelevant, that politicians don't need to pay attention to them. They see Federal and State government cost saving measures working to the detriment of small communities like Hillston.

1.3 The Murray–Darling Basin

The Murray-Darling Basin comprises the catchment area of the Murray and Darling rivers and their many tributaries, including twenty three river valleys (see Appendix 1). The Lachlan River, which runs through Hillston, NSW, is a part of this system (Australian Government, 2011, Schedule 1, p.1).

The Basin is considered to be one of the most significant agricultural areas in Australia. It also “includes vast flood plains and wetlands that support biodiversity of national and international significance. The Basin includes one World Heritage site (the Willandra Lakes Region), sixteen wetlands listed under the Ramsar convention, and more than 200 wetlands listed in *A directory of important wetlands in Australia* (Australian Government, 2011, Schedule 1, p.1).

Being such a significant and sensitive environmental area, often subject to drought, tension between environmentalists and landowners over water extends across the Basin. No more so than the present time when the last drought, 2002 – 2012, seen as one of the worst in Australia’s recent history, threatened the health of this vast river system. The health of the Murray-Darling Basin has become a major political, social, economical and environmental issue. There is not enough water to meet the needs of all stakeholders and division has opened between those wanting to reduce the water available to irrigators; and the irrigators and members of those communities who are dependent on agricultural income for their continuing existence.

1.4 Definitions

The following terms are defined in this thesis for the purposes of clarity. As farming as a business is intertwined with land care, both economic and ecological perspectives are contained within some of the following definitions.

Absorb

When changes are absorbed into the status quo, it is business as usual. It may result in losses which are accepted and coped with by the land holder.

Agronomist

An agronomist is an extension officer whose job is to go into the field with the intention of educating land holders by increasing their knowledge and skills for the purpose of taking up new methods of farming, either to increase the quality and/or quantity of their production and therefore profit or to improve the sustainability of their farm eco system. An agronomist is tertiary trained and can be a government (Department of Primary Industry, often referred to as a district agronomist by farmers)

or non- government employee or self employed (often referred to as a local agronomist by farmers).

Adaptive co-management

“Is a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organised process of learning by doing. It combines the dynamic learning characteristic of adaptive management with the linkage characteristic of cooperative and collaborative management” (Olsson, Folke and Berkes, 2004, p. 75).

Adjust

When a farmer adjusts, he/she alters the methods of production to meet the change in conditions or alters expectations and life style to cope with a loss of income.

Adoption

Adoption is “a continuous process” of take up of a particular practice or technology. A farmer may take up or use the new practice or technology wholly or partially, entering the process at any point along the continuum, gradually or intensely, continuing or discontinuing the process, or in small units at a time (Wilkinson cited in Pannell and Vanclay, 1995, pp. 39 -47).

Agriculture

“Agriculture can be understood as a linked, dynamic social-ecological system based on the extraction of biological products and services from an ecosystem, innovated and managed by people, encompassing all stages of production, processing, distribution, marketing, retail, consumption and waste disposal (McIntyre et al., 2009)” (Sumner, J. et al., 2010).

Agricultural extension

“... to include public and private sector activities relating to technology transfer, education, attitude change, human resource development, and dissemination and collection of information. We emphasise that public extension is just one information source among many that landholders use” (Pannell & Vanclay, 2011, p.12).

Climate Change

Is a significant change to weather patterns in specific regions or globally over an extended period of time, from decades to millions of years.

Climate Variability

Is change within the range of long term averages of a local or regional weather pattern.

Country

The term “country’ without the preceding “the” is a concept and term used by Aboriginal and Torres Strait islander people to talk about the relationship they have with the land. The Australian Government has adopted this concept of “caring for country” in its national natural resource management program (Whitehouse, 2011, pp.

63-4).Dry land farming

Dry land farming is rain-fed agriculture.

Environmentalist

An environmentalist is a person who is concerned about the natural environment and takes measures to improve or protect it.

Experiential learning

Experiential learning is “The process whereby knowledge is created through the transformation of experience” (Kolb cited in Percy, 2005, p. 128).

Fallow

In the fallow method the soil is ploughed up to as many as five times within an eighteen month period between plantings.

Farmers

Farmers are ‘landholders who use their land to produce food and fibre as a significant share of their family income” (Pannell & Vanclay, 2011, p. 12-13).

Irrigation

Irrigation is the artificial application of water to the land or soil to assist in the growing of crops in dry areas and/or during periods of below average rainfall.

Minimum or no till cropping

This is where the stubble of the previous crop is left in the ground and the new seed is planted in rows between it. The soil is not ploughed as in the fallow method.

Resilience

Resilience is the ability to make the necessary changes to cope with stress and shock. It requires a focus on learning and critical reflection.

Shock

Shock is the sudden and acute change a farmer has to deal with such as a cyclone, flood, a drop in prices, loss of demand for product.

Stress

Stress is the constant pressure under which farmers have to work and live; pressure from a variable climate, pressure from a market driven economy, pressure from the social system in which they operate.

Sustainable development

“Sustainability is the capacity to create, test, and maintain adaptive capability. Development is the process of creating, testing, and maintaining opportunity. The phrase that combines the two, “sustainable development,” thus refers to the goal of fostering adaptive capabilities and creating opportunities. It is therefore not an oxymoron but a term that describes a logical partnership” (Holling, 2001, p.389).

The Brundtland-definition of sustainable development is “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987).

Sustainable farming

“A state where the business can continue profitably with its current methods of production, indefinitely, without degrading or consuming its resources – Natural, Social and Financial” (Napier, 2006, p. 8)

Transform

To transform is to completely change to a new system, a paradigm shift from a traditional perspective to one that is innovative and better suited to the new situation.

Transformative Learning

“Transformative learning offers a theory of learning that is uniquely adult, abstract and idealised, grounded in the nature of human communication. It is a theory that is partly developmental, but even more it is about where ‘learning is understood as the process of using a prior interpretation to construe a new or revised interpretation of the meaning of one’s experience in order to guide future action” (Mezirow cited in Taylor and Edward, 2007, p. 173).

Validity

Validity is an actual measurement of what is being measured. The measure accurately reflects the concept it is intended to measure (Babbie, 2011, p.160).

1. 5 Chapters

This thesis is set out in seven chapters. In Chapter One I have introduced the idea of a ‘messy’ problem which although it predicts my conclusion is an important concept to bear in mind as this research progresses through the following chapters. I have also attempted to set the study of how farmers learn to change within a context of uncertainty caused by changing climate and the Murray-Darling Basin Plan. The issues of sustainability, story and place have been briefly introduced.

The purpose of Chapter Two is to examine the literature concerning farmers’ learning and their resilience to a changing climate, sustainability in agriculture and government policy in the Murray-Darling Basin in relation to water allocation. The literature was read in an attempt to understand the issues relevant to this research and discover any gaps that my research could attempt to redress. In Chapter Three I describe the research process, and the methods used to collect and analyse data. The research process is critiqued in an attempt to maintain an awareness of the possibility of favouring one outcome over another.

The following three chapters examine the data collected from my observations and interviews. Chapter Four considers the data from the perspective of living with uncertainty. It contains testimonials from the interviewees and some of their ‘stories’ in an attempt to let their voices be heard. In Chapter Five I examine the data from the perspective of learning about sustainability while maintaining the use of testimonial and narrative, to hear the farmer’s voice. The perspective of learning about place is dealt with in Chapter Six where the remainder of the interviewees’ stories are told. I draw my conclusions and critically reflect on how the study could have been improved along with a brief discussion of further study and future directions for this work in the final chapter, Chapter Seven.

Chapter Two: Opportunities for Australian farmers to learn to change to sustainable methods of farm practice: a literature review.

This chapter discusses some of the literature related to the learning opportunities available to farmers in Australia as they progress toward developing sustainable farming practice. The first section looks at the family farm in an effort to understand the development of current farm practices. The second section explores the role of agricultural extension agents and farmers' education which is followed by a discussion of transformational learning as a method of learning to change. I then identify environmental adult education as a discipline that contrasts with government attitude to accumulating knowledge. Farming and sustainability are not discrete entities but are looked at as part of a larger eco-social system. I examine the factors that affect the take up of new methods of farming and the idea of placing a monetary value on sustainable practice. There is a brief report on the predicted impacts of climate change on the biophysical environment of the Riverina Murray area. The draft Murray-Darling Basin Plan was legislated during the writing of this thesis and had a strong influence on the responses of the farmers interviewed during the research phase of this project, so a brief review of its implications on the learning about water management follows and finally I draw my conclusions.

2.1 Family Farming in Australia

Ninety percent of Australian farms are family operated and as Australian agriculture has become industrialised over the last one hundred years, farmers are now part of a multinational system of food production, processing, distribution and consumption (Pannell and Vanclay, 2011). Smaller family farmers are finding it increasingly

difficult to remain viable in a system that favours larger and more highly capitalised farms. Vanclay and Lawrence (1995) and Leviston, Price and Bates (2011) maintain that as smaller family farmers experience less control over their livelihoods, lifestyles and landscapes (their triple bottom line), their emotional, mental and physical well being is becoming adversely affected, making it increasingly difficult for them to implement environmentally sustainable farm management practices.

However, Calus and Huylenbroeck (2010) argue that the family farm is in a unique position to take up the challenge of sustainable agriculture because they have the flexibility to take advantage of low wages and long work hours. They are multi skilled, independent and self sufficient, as well as being adaptable to seasonal stages of production and changing consumer demands that give them a level of resilience not experienced in non-family businesses. Some protection from shocks and whims of the latest market trend comes from long term planning, measured in generations rather than short term maximum profits. The concept of succession, that is, passing the farm on to the next generation in a better condition than when the current farmer took over, supports resilience and sustainable development, even if these are not the primary goals of the farmer.

Calus and Huylenbroeck acknowledge that industrialised agriculture within the modern market economy is placing pressure on the Australian family farmers who, like their European counterparts, need support to continue the operation of their family farms, seen as the “cornerstone of the Western agricultural system” by the European Union (2010, p. 654).

2.2 Agricultural extension agents and farmer education

Historically, government policy has been influential in supporting Australian farming. Following the gold rush of the 1850s, the Selection Acts financed small parcels of land for farming. These parcels were too small to make a living and were over used and quickly became degraded. This scenario was repeated with the soldier settlement blocks following WWI and WWII. Because people with little or no knowledge of farming were encouraged on to the land, there was a demand for knowledge and

“practical information” which led to a “proliferation of agricultural extension throughout the entire farming community” (Vanclay & Lawrence, 1995, p. xxiii).

Researchers David J. Pannell, Winthrop Professor and Head of School in the School of Agricultural and Resource Economics at the University of Western Australia, Frank Vanclay, Professorial Research Fellow in rural social research, University of Tasmania, and Professor Geoffrey Lawrence, University of Queensland, have contributed significantly to research in the area of agriculture and sustainable land management. According to Pannell & Vanclay (2001), extension agents continue to be an important resource to assist farmers to cope with the effects of climate change and implement changes to sustainable farm methods. They argue that past failures in land management have had more to do with deficiencies of extension practice than deficiencies of farmers. Pannell et al. (2006) contend that farmers actually hold a great deal of knowledge from a variety of sources and the role of the extension agent “needs to be more focused on credibility, reliability, legitimacy, and the decision making process” (2006, p.6).

Trust and credibility, built up over time, are essential for farmers to utilise the services and knowledge of extension agents or agronomists most effectively. A turn over of young, inexperienced staff with little technical farming expertise is therefore unhelpful in developing farmer/agronomist relationships. As well as developing relationships with farmers, Vanclay and Lawrence (1995) identified the need for agronomists to undertake a larger component of social science in their training and Percy (2005) argues they also need to be trained as adult educators because that is what they are.

Although traditional extension had many faults it generally was well intentioned and socially equitable for all farmers because it was free. Today the future of the government agronomist is dependent on funding and therefore less reliable in the long term. Vanclay and Lawrence (1995, p.111) and Nicholls, (2009, p. 9) have found funding restrictions for the work of extension workers have impacted negatively on farmers because of a withdrawal of available support. Lack of security for funding continues in today’s political climate, for example, in a decision by the NSW Government to reduce funding for rural extension work, NSW Primary Industries

Minister, Katrina Hodgkinson (ABC, 24/9/2012) tried to claim this decision was supported by farmers.

Due to funding pressures, group extension is seen as the way of the future and includes farmers and other stakeholders such as environmentalists, local community members, industry representatives, scientists and social scientists (Vanclay and Lawrence 1995). There is concern that with the advent of multinational agribusiness and private agronomists, the shift has changed from assisting farmers to assisting agribusiness because more and more farmers operate within the agribusiness model.

2.3 Transformational learning and change

The success of all environmentalists' efforts finally hinges not on 'some highly developed technology or some arcane new science' but on a state of mind': on attitudes, feelings, images, narratives (Buell quoted in Hunt, 2009, p. 424).

The mindset of the average Australian farmer will have to be challenged if he/she is to take control of the process of production and undertake sustainable land use. Farmers in Australia today are a cog in the agribusiness wheel where a positive identity is seen as one who succeeds at producing more of a product. Those farmers producing in an agribusiness model have lost control of many aspects of their lifestyle and livelihood, and are caught in a system of high inputs with no control over an international market. Although some may be asset rich, many are in debt with low incomes. In order to change their current situation and regain lost control, farmers must first recognise that their system needs changing and then want to do something positive about it (Newman, 2007).

Myles Horton and Paulo Freire, pioneers in education for social change, saw a time of significant change, such as witnessed now with climate change, as a "progressive revolutionary process", when educators need to be ready to help the people by

recognising what people know “in order to create a new knowledge and to help the people know better what they already know” (Horton and Freire, 1990, pp. 225-6).

Transformational learning is about how adults make meaning from their life experiences, especially major life events (Merriam and Caffarella, 1999, p. 319-20) and is seen by Haugen (2009) as the key to achieving sustainable change. Learning to change by the transformative process is integrated within a cycle of personal experience followed by individual reflection, concept development and the undertaking of something new (Kolb, 1984 cited in Haugen, 2009), involving cognitive processes, an emotional response and a follow up action.

Percy’s (2005) study examined farmer participatory research and extension from the perspective of Mezirow’s theory of transformative learning and identifies second-order experiences, reflection and dialogue as the most relevant to experiential learning. Where a first-order experience is described as a past and lived experience, it is not adequate to for experiential learning. A second-order experience on the other hand is a new experience that can be disorienting and challenges a past or first order experience. The challenge leads to critical reflection on the past or first order experience which has the potential to cause a modification of an existing practice. The following three stories about a shift to more sustainable farming are illustrations of second order experiences leading to change.

McFarlane and McFarlane (2003), two Western Australian farmers who changed their farming methods from producing on degraded land to working toward “sustainable farming in a non-degraded landscape” (p. 39), describe their second order experience as “constantly re-discovering the farm and its processes” (p. 39). Their experiences were incremental as they gained new knowledge and skills from attending workshops, reading literature and participating on advisory committees. Their observations raised their awareness of the local landscape and increased their appreciation of biodiversity.

Another illustration of a second order experience was encountered by a South Australian farmer Millie Nicholls (2009). She discovered that “after ten years of spending lots of money and getting no results, we started to think – at last. What were these grasses that refused to die?” (2009, p.8). As a result of this realisation, she

began working with people and community groups in a project aimed to raise awareness of local grassland which led to the establishment of a Landcare group that focussed on grasslands. This was followed by the formation of the Mid North Grasslands Working Group which managed grasslands for both conservation and grazing. Millie concluded the project was successful due to community involvement and support, adequate government funding and time which facilitated the opportunity to experience, reflect and dialogue, fundamentals of transformational learning.

In her research, Deb Anderson writes about a participant farmer whose second order experience was to read a book about organic farming, which caused him to “rethink his farm as part of an ecosystemic whole” and he realised that “dominant agricultural monocultures [were] destroying conditions for diverse species to exist; dominant knowledge was destroying the very conditions for alternatives to exist” (2010, p. 92). He questioned the technology, science and capitalism involved in farming today and reflected how it has changed since his grandfather’s day. His action after critical reflection was to become more sustainable by using simpler methods on smaller holdings and accepting a more modest lifestyle, but one which supported a stronger community because he favoured labour over huge machinery (2010, pp. 92-4).

For farmers to radically change to environmentally sustainable practices requires not only acquisition of new skills and capital equipment, but also a transformation of their inner core values and beliefs (Fischer et al., 2012, p.2) because their way of environmental knowing is “personally constructed, habitual, affective and culturally conditioned” (Mahony, 1995, p. 15). The majority of farmers have learnt their values from the traditional family farming system, which is the interaction between family virtues and farming as a business, that is, living and working on the farm (Calus and Huylenbroeck, 2010, p.640).

As the most effective motivation to change comes from within (Merriam and Caffarella, 1999), an intrinsic concern for the environment incorporated within the farm goals could be argued as the most effective route toward the take up of sustainable agriculture. It is therefore necessary for the extension agents, as adult educators, to understand the motivation of farmers to change and to be aware of the power relations which affect their decisions (Vanclay and Lawrence, 1995; Horton

and Freire, 1990). If farmers are resisting change, it is vital for agents to genuinely listen and help affect changes needed to increase the well being of both the farmer and the environment. Transformational learning will be facilitated by an extension agent or agronomist, who is a skilled listener, encourages positive group interaction, is proficient in conflict resolution practice, encourages social networks among learners, only gives advice when asked, encourages critical self reflection and dialogue, and supports consequent learner action (Horton and Freire, 1990; Percy, 2005). These processes are time consuming and may not always lead to conflict resolution. However, the benefits of conflict, if managed in a non confrontational manner, are that it can raise the consciousness of the participants, leading to increased motivation to learn new ways and to change the system (Horton and Freire, 1990, p. 187).

Not all significant learning is transformative. Knowledge and skills can be gained through experiences that are not necessarily life events, but can be a result of a formal or non formal learning situation. However, for any learning to be effective it must be relevant to the needs of the learner and take his/her experiences and prior learning into account. Of less relevance to the learner and contrary to meaningful learning is the information-deficit model, viewed within a framework that Freire terms the ‘banking’ method of education, where large amounts of information are deposited into the learner (Merriam and Carfarella, 1999, pp. 319-324). This type of learning is less likely to increase consciousness and motivation that leads to action for change.

2.4. Environmental Adult Education

Environmental Adult Education (EAE) is a relatively young approach to learning and is aimed at the adult community within the environmental perspective. As a learning model it draws from the theories of popular education, formal, and informal learning in an experiential, dialogical and community based approach (Haugen, 2009, p.1). Blair’s (2008) research shows that “environmental adult education strategies can empower community members to critically evaluate [and act upon] local environmental issues” (2008, p. 45). While the EAE focus is that learning occurs within the context of the community (Haugen, 2009, p.8) it also advocates that to be

successful it must be transformative at the personal level (Yarmol-Franco, cited in Haugen, 2009, p. 3).

The participatory learning approach recommended by Vanclay and Laurence (1995), which is also embedded within the framework of EAE, lies between the extremes of a top down and bottom up learning method. In group meetings, the educator which could be the agronomist, does not deliver a product but encourages active cooperation by the participants. Learning theories and practices embraced by EAE are necessary components of the training process of agronomists if transformational learning is to be effective and successful.

2.5 Government attitude to learning

In their paper on *Communicating Climate Change: Public responsiveness and Matters of Concern*, Potter and Oster (2008) make the claim that the attitude of the Australian government to learning about climate change and sustainability is to increase public knowledge. The National Greenhouse Strategy of the Commonwealth of Australia states “Information and education programs ... complement scientific research and can foster broad community understanding of climate change issues” (Commonwealth of Australia quoted in Potter and Oster, 2008, p. 119). Dissemination of information as a strategy to cause people to transform their behaviour is known as the information-deficit model and is one that has been widely used. The individual has been the recipient of much information, especially from public media, including “Tim Flannery’s *The Weather Makers* (2005), Al Gore’s *An Inconvenient Truth* (2006) and ABC TV’s *Carbon Cops* (2007)” (2008, p.116).

The above model, targeting the individual as the primary agent of change, assumes that when enough information is given to the public it will result in individual and collective action. The information–deficit model takes a linear approach, from “source to audience to action” (Potter and Oster, 2008, p. 119) and might explain the slow take up of environmentally sustainable practices by the general community. Potter and Oster’s (2008) research also points to a lack of trust in government agencies as a

reason for low take up. They found that despite increased personal knowledge, most individual decisions are made within the context of relationships within a social and cultural setting.

In their study on learning relating to the drying of the Murray-Darling Basin, Barry Golding and Jennifer Angwin, found there were extensive programs prior to 1998 to help water users learn about changes and adapt to natural drought. However, since 1998 government information available to water users about changing conditions, especially climate change, has become less accessible (2009, p. 480). Many irrigators had been forced to learn water efficiencies through economic necessity and government incentives, and have made the efficiencies, only to have their allocations further reduced (2009, p. 482).

Their research concludes that experiential knowledge has limited value for farmers facing rapid eco-social change and there was no locally available adult learning organisation with progressive programs of change. While adult learners are restricted to industry, government and community based education systems and the popular media, there remains a pressing need for new information and discourse to deal with future situations and water management issues. They concluded that the community was left insufficiently prepared by governments to learn about the risks that will confront it in a future with less water (Golding and Angwin, 2009, pp. 494-5).

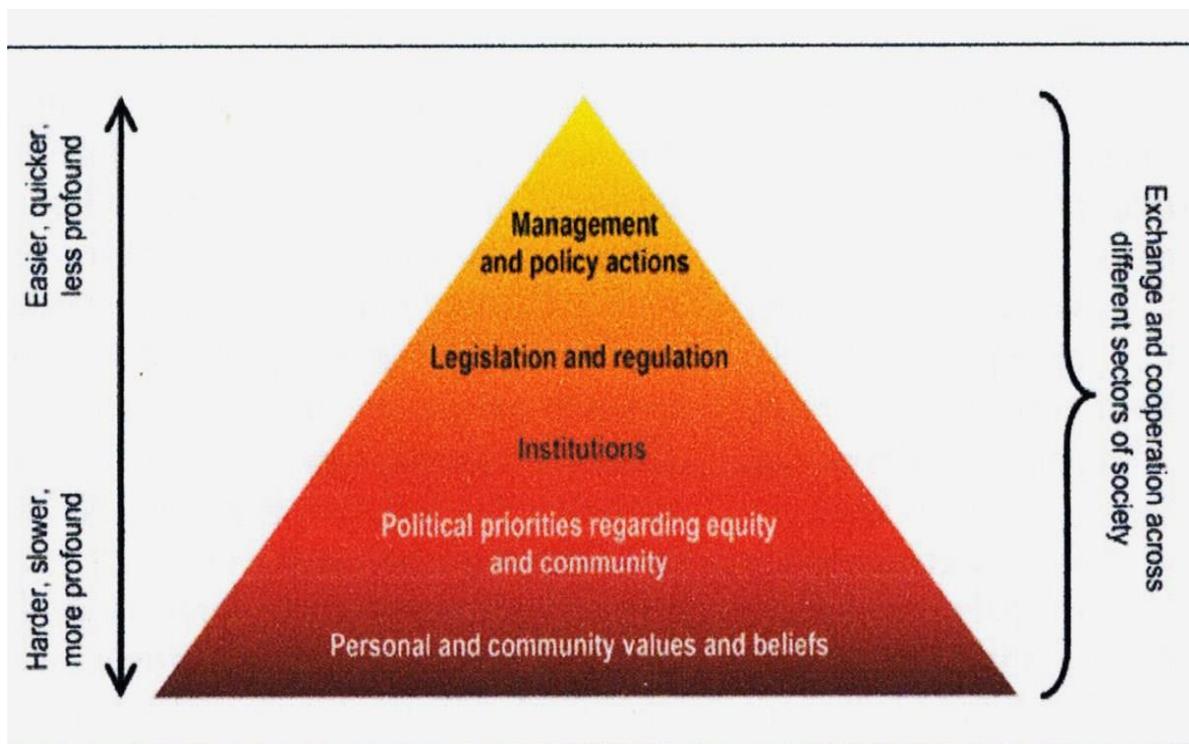
2.6 Sustainability

Change as a part of a system

“The pyramid of priorities for societal change” (Fischer et al. 2012, p. 2) places the farmer and his/her farm within a larger system, the responsibility to change being at all levels of civil society. In their paper *Human behavior and sustainability*, Fischer et al. (2012) claim that “ultimately, profound changes will be necessary for human behaviour to become sustainable” (p. 2) and for human behaviour to change on a large scale will require significant pressure from within civil society. They believe the

issue is not necessarily a lack of knowledge, rather the need to act upon available knowledge.

Pyramid of Priorities for Societal Change



(Fischer et al. 2012, p. 3)

The top of the pyramid (2012, p.3) is action at the Federal level, for example, the integration of sustainability across all levels of the new national school curriculum. The second level would be characterised by addressing the causes for environmental problems, such as a tax on carbon. The third level requires legal change to facilitate the first and second levels. The lower two levels are the less formal areas of civil society, such as “community groups, non-government organisations, foundations and cultural groups” (2012, p.3) that effect consumption and population growth, equity

and social justice. The lower level, and the one I am concerned with, represents the individuals, and in particular farmers, who will need to reflect on deeply held personal value and belief systems if they are to transform their attitudes and behaviour. Fischer et al. contend the knowledge is there and it is time for action across all levels and between all levels of civil society (2012).

Farming as part of a system

Darnhoffer, Fairweather and Moller (2010) took a systems approach to their research on sustainability in agriculture and maintain that for a farm to be sustainable it must be adaptive and changeable which in turn builds resilience. Fundamental to resilience thinking is an awareness of the world as a system that is complex and adaptive. Within this approach the farm is conceptualised as a complex adaptive system made up of the farmer, who has social and cultural capital, and the physical farm, that is the natural and economic capital. A farm can be organised in many ways such as family, cooperative or corporation, who use a combination of strategies to successfully navigate change toward sustainability and hence resilience to stress and/or sudden shocks such as extreme weather events. Regardless of the structure, as it is the farmer who makes the final decisions, it is important to understand a farmer's decision making process.

Darnhoffer et al., (2010) recognise the need for more research on the many factors which influence farmers' decision making. They claim the majority of Australian farms are family run units and the needs of other family members are often considered. This has the effect of maintaining the status quo, especially in times of stability where there is no apparent need to change. However, they argue for a farm to become sustainable and resilient, farmers will benefit from taking a universal approach when making decisions and consider all forms of available knowledge. To achieve sustainability and resilience in a market where the emphasis is on production and efficiency, the importance of learning and adaptability cannot be over estimated, because farmers benefit from taking advantage of current opportunities while continuing to look for future possibilities (Darnhoffer et al., 2010).

Adaptive co-management as a strategy to cope with uncertainty and change is discussed by Olsson, Folke and Berkes (2004) who advocate sharing the responsibility for local eco-management within the system of user groups and communities as well as government agencies and non government groups. For example, farmers who wish to become more sustainable or those actively involved in their local Landcare or Catchment Management Authority group that is working on managing a local ecosystem, have the opportunity to collaboratively learn and share knowledge. Even though adaptive co-management is placed within a widespread system, its supporters value local ecological knowledge, culture and practice because they have been developed, often over a long period, through learning-by-doing, building knowledge and experience. Olsson et al (2004) understand that it is important to bring all interest groups together in the process of learning about ecosystems and for farmers to integrate that knowledge toward sustainable land management practices.

A major problem in Australian agriculture today is that declining financial profits result in the farmer's aspirations for the natural and social elements of his/her farm are being left unfulfilled (Napier, 2006, p.8). The aim of Tim Napier's study (2006) was to find where changes in the mainstream farm system could be made to achieve sustainability in agriculture. He defined sustainability as "A state where the business can continue profitably with its current methods of production, indefinitely, without degrading or consuming its resources – Natural, Social and Financial" (2006, p.8). Napier used the elements of the triple bottom line to measure the level of sustainability of a farming business, measuring the economy, ecology and community. The profit of any business is a quantifiable measure of success but it is more difficult to quantify the "ecological and social impact of any given production system, let alone the individual farm within that system" (Napier, 2006, p. 11).

Napier recognises the relationship farmers have with their land and the responsibility they have to care for it. However, the triple bottom line also means they need to be able to afford the care and that responsibility needs to be shared with consumers who must pay fairly for what is produced. Multinational agribusiness and governments too must take their share of responsibility for land degradation and excess water use because their policies also impact upon a farmer's triple bottom line (2006, p.12).

According to Napier, farmers who have a positive attitude toward sustainability will manage change more easily and successfully than those who change only because they have to. Farmers who understand the need to change are alert to trends, can project their plans into the future, are able to consider many variables in the decision making process and consequently are more in control of the long term management of their farming business (2006, p. 23). As a result their triple bottom line will benefit in the long term, which is a more reliable measure for sustainability than measuring short term success. With a reasonable profit and sustainable practices, the farmer and his/her family will be assured of a more certain future which in turn will be reflected in the confidence of the local community. By ably managing the triple bottom line or adaptability cycles; the farmer, the land and the profit will be better able to withstand the variable weather patterns that are an inevitable part of farming in dryer regions of Australia (2006).

2.7 Factors affecting the take up of new methods

According to Pannell and Vanclay, (2011), the adoption of new measures by farmers is complex and depends on many variables. The most important of these are economic motivation and the ease of implementing the new measures (2011, p.12), with both needing to advantage the farmer or be in keeping with his/her goals before a positive decision will be made.

Economic motivation or “relative advantage” (Pannell et al. 2006, p. 4), includes: 1) input and adjustment costs, 2) profits, 3) impact on the whole farm system and riskiness of production, 4) compatibility with existing practices, 5) complexity, 6) government policies, 7) lifestyle, 8) self-image and 9) the perceived environmental advantage of the new practice. The factors influencing the ease of implementing a new practice, or “trialability” (Pannell et al. 2006, p. 5) are 1) able to be trialled on a small scale, 2) observing the results of the trial, 3) time between adoption and benefits, 4) complexity, 5) cost, 6) risks, 7) quality of the trial, 8) similarity to an existing practice, and 9) affect of neighbours’ practice. Once again, the farmer needs

to be able to understand the risks and advantages and learn the skills before taking up the innovation.

The social, cultural and personal situation of farmers also influences their take up of sustainable farming methods. These include: 1) The personality of the farmer, 2) the family situation, 3) availability of time, 4) ease of accessing the information, 5) the physical health of the farmer, 6) his/her age, 7) support systems, 8) the perceived need to change, and 9) self confidence to take the necessary risks involved in the change process (Pannell and Vanclay, 2011, pp.14-16). Further factors affecting a farmer's decision making process are: 1) the strength of a farmer's social network, 2) his/her proximity to other farmers - particularly early adopters, 3) proximity to information, 4) relationships with those who advocate the new technology such as agronomists and scientists, 5) ethnic and cultural divisions between farmers and change advocates, 6) marketing programs and promotions, 7) financial viability and 8) access to income (Pannell et al. 2006, p. 3). Although it may be seen as a compromise of ideology, Pannell (2003) believes it is

Better to harness and use the motivation of self-interest to act in the best interest of the environment. To some extent this may mean modifying farmers' attitudes towards the environment, but it is likely to be more effective to introduce incentives which result in benefit to the environment, while farmers continue to pursue their own interests (2003, p. 1).

Consistent with the ideas of Pannell and Vanclay (2011) is Hunt (2009), who in her study on orchardists in New Zealand, researched the relationship of the (orchardist) farmer to his/her land and how it affected decisions regarding sustainable and resilient practices. She found that for environmental policies to be successful they need to be flexible enough to allow farmers to change their practices in ways that, while achieving environmental sustainability, they also meet other aims they have for their land (2009, p. 417). Knowledge used to construct the farm business, to increase financial gain, to improve environmental sustainability or build capital equipment all reflects on the identity of a farmer whose positive self image is important for self confidence which is necessary to adapt and to risk change (2009).

A study of socio-cultural dynamics influencing the adoption of improved land management practices by farmers in NSW by Zoe Leviston, Jennifer Price and Lorraine Bates found that despite a diversity of values and motivations among landholders, there are common issues that prevent them taking up environmentally sustainable land practices. The social and community lives of farmers that are important forums for dialogue and transference of knowledge and vital for the take up of initiatives are being adversely affected by: 1) dealing with bureaucratic paper work, 2) over work, 3) stress, and 4) lack of money. Because of the need to own larger farms to survive, many smaller traditional family farms are being sold to large companies and/or the size of the family farm is increasing, therefore the number of farmers is decreasing and the culture of rural areas is changing (Leviston et al. 2011, pp. 147-8). This results in declining forums for dialogue and transference of knowledge which as stated above, are important for the take up of new ideas.

As well as the social and community aspects of farmers' lives affecting the take up of innovation, Leviston et al. (2011) found economic factors, beliefs and self-concepts are important. For example, farmers are more likely to move toward sustainable practice when they are self confident and have ownership of the process and are in control of achieving their goals. Finally, an absolute concern, for the natural environment, what Matthews describes as "deep ecology" (2011, p. 1), has a higher influence on take up than a relative concern, (Leviston, 2011, p.154) or "shallow ecology" (Matthews, 2011, pp. 1-3).

In contrast to Pannell (2003) and Hunt's (2009) findings of using self-interest as a motivation for caring for the natural environment, Professor Edward Lefroy (2003) asserts this attitude has huge implications for the success or otherwise of land management. He deems we need to change valuing nature as a commodity and take an ecological approach to farming if we are to develop sustainable agriculture. With thirty percent of Australian farmers involved in Landcare, committed to working towards a sustainable model of farming, it gives hope and some evidence that ecology in agriculture is beginning to take hold (2003, p. 21-22).

Notwithstanding such hope, self motivated sustainable farmers such as Andrews (2007) have faced many challenges. In fact Peter Andrews, a NSW farmer, suffered

considerably for his innovative ideas before they were accepted (Andrews, 2007, p.xii). His ideas were dismissed for thirty years; he faced bankruptcy and family break down.¹ Through close and careful observation Peter Andrews concluded that European farming and settlement has altered the natural courses and ways water and nutrients moved across Australia, with detrimental affects. His idea is to divert water from running down the channels that have been made by Europeans in our river systems, allow the chain of ponds that once occurred naturally to reform and let swamps and wetlands fill on the flood plains. He successfully introduced his controversial Natural Sequence Farming approach to his own property, gradually gaining him respect from those who had formerly ridiculed his radical ideas.

2.8 Placing a Value on Sustainable Practice

Restoration-landscape ecologists, Goldney and Kerle (2013) maintain that to integrate nature conservation and farming, it is vital to have the cooperation of private landholders who, they say, manage about eighty per cent of land in Australia. Of that eighty per cent “twenty percent of farmers produce about eighty percent of combined farm production in Australia. The remaining eighty percent need off farm income to survive ... the latter group makes the greatest contribution to land degradation” (p. 1). If farmers, particularly the eighty per cent who do the most damage, were paid for land care, it could transform farmer attitudes. Research on such payments indicates positive responses from landholders, not least due to landholder self-esteem remaining intact (p.4).

In support of this philosophy, (Calus and Huylenbroeck, 2010) have found that in Europe, farming, especially family farming, is valued for its impact on “non-commodity outputs such as biodiversity, landscape, safeguarding the rural environment, food security and rural viability” (p. 653), which are seen as beneficial for the wider community and for which they are afforded income support. Goldney and Kerle (2013) argue a case for Australian farmers to receive payment for non-commodity outputs in an attempt to repair land degradation such as soil, erosion,

¹ ABC Australian Story 2005
www.abc.net.au/austory/content/2005/

sedimentation, salinisation and desertification. Although most family farmers' goal is to leave their land in better shape than when they took it over, under difficult conditions they usually push their land to maintain their income (Goldney and Kerle, 2013).

Having identified self-interest as a prime motivating factor for farmers to implement new methods, Pannell (2003, p.28) recognises that if costs of sustainable practices exceed their net benefits there is little chance they will be adopted. He suggests making sustainable agriculture "more attractive through such things as subsidies, tax concessions, or, in the extreme, taxes or legal penalties for non-adoption" (2003, p.28).

2.9 The Predicted Effect of Climate Change in the Riverina Murray Region and the Draft Murray-Darling Basin Plan

The predicted effect of climate change on the Riverina Murray region is documented by the NSW Government Department of Environment, Climate Change and Water in its paper NSW Climate Impact profile, The impacts of climate change on the biophysical environment of NSW (2010²) This profile predicts that temperatures across the region will increase by one point five to three degrees Celsius in all seasons and a change in the rainfall pattern, with the spring, autumn and winter rainfall being significantly reduced while the summer rainfall will be moderately increased. The overall effect will be a hotter and drier climate. The expected increased evaporation will negatively affect vegetation cover, making soil more vulnerable to erosion. Droughts are likely to be more severe and flooding could be more frequent.

These changes could adversely affect Aboriginal cultural sites such as loss of culturally significant trees and damage to burial sites. Ecosystems already under pressure such as riverine, wetland and floodplain are expected to be further threatened, as are seed and nectar producing plants which will in turn affect those

² Website: www.environment.nsw.gov.au
ISBN 978 1 74232 259 9
DECCW 2010/171
June 2010

species that depend on these plants for food. These include pollinators such as honeyeaters, possums, gliders, flying foxes and some cockatoos (NSW Climate Impact profile, p 101) The entire ecosystem will undergo change, of which the farmers and rural communities are not insignificant participants. The Murray-Darling Basin Plan was legislated in November, 2012 to help manage the outcomes of these changed conditions, especially in regard to water usage. Its implementation will have a major impact on the lives of people living in the Basin.

To rectify the problem of over allocation of water to users of both surface and underground water in the Murray-Darling Basin, the Australian Government Murray-Darling Basin Authority (MDBA) put forward the draft Murray-Darling Basin Plan (MDBP) in 2011. This plan aims to restore health and resilience to the failing Basin system and is challenging many communities and landowners in the Basin who are reliant on the water for their survival. Therefore, crucial to their well being is the model of management they choose to deal with forthcoming issues.

The Australian government's (2011, Schedule 1, p.1) MDBP acknowledges the likelihood of climate change to cause a loss of environmental resilience within the natural system and increased hardship on Basin communities caused by more severe droughts and floods. Bridging the gap between the Basin citizens dependent on a reliable water flow from the river system and those concerned primarily with the ecological health of the Basin is proving challenging to those involved in reform. This is an emotional issue as much as anything, affecting the progress of discourse and decision making.

Approximately forty two percent of the annual surface water run-off to the Basin is diverted to human use, supporting both dry land and irrigation farming (forty percent of Australia's total agricultural production); and to a lesser degree industry such as processing agricultural products and mining. Over two million people who live in the Basin, including Canberra, use this water for domestic purposes (Australian Government, 2011, Schedule 1, p.2).

Indigenous people who inhabit the Basin have a strong connection to the area and the MDBA's term 'cultural flow' encompasses the complex relationship Indigenous people have with the water and land, which sustain their cultural and spiritual life.

They are part of the land and a healthy river system sustains their health and well being (Australian Government, 2011, Schedule 1, p.3), however the Authority has no measure as to how much water is required to achieve a cultural flow (Australian Government, 2011, Appendix B, p.2).

Changing our approach to water in the Murray-Darling Basin, and to Aboriginal cultural place knowledge and attachment, then, requires the development of fundamentally different and new approaches to how we understand the region, its people and its communities (Somerville, 2009, p. 210).

Comprehensive consultation by way of formal submissions, studies and feed back from interest groups and academics were sought in the development of the MDBP. While economic models were used to predict affects on agricultural production and communities, I question how much social modelling was carried out. The Authority acknowledges that the costs for the overall environmental improvement of the Basin “will likely be borne by specific communities... in areas that have small populations and high dependence on irrigated agriculture, and communities which are more geographically isolated relative to others across the Basin” (Australian Government, 2011, Appendix B, p.1).

The Authority believes that over time “businesses and farmers may be able to reorganise their production processes and use of resources to maximise their returns in a future where less water is available” (Australian Government, 2011, Appendix B, p.1). Golding and Angwin report that many farmers in these areas have already implemented new technology and conservation farming methods to become water efficient.

The [Government] has encouraged irrigators to build up this infrastructure to establish all the recycling systems, the more efficient pump systems, better lined channels, [ensure] farmed country doesn't have any seepage problems ... and now to find out the water may be taken away from you (Golding and Angwin, 2009, p. 482).

A comment from a farmer I interviewed was that the MDBP is the ‘drought which has no end’; in other words there is no hope. Loss of hope has detrimental effects to mental and physical well being. The MDBA also understands that continuing trends observed during the drought “could result in a number of social changes, such as loss of population, change of population mix and change in community identity, increased mental health problems and increased demand for social services” (Australian Government, 2011, Appendix B, p. 1). Support for learning new skills to cope personally with such an event and/or move to alternative activities is crucial to this time of change.

Of real concern to those affected is the cost of maintaining the infrastructure by fewer irrigators. They fear they will not be able to bear the cost, which is already quite high and must be paid even when no water is available as in times of drought. However the cost to the natural ecology and all those who live in the Basin could be higher if the MDBP is not implemented. The Australian government must also fulfill its international obligations regarding environmental protection which include water-dependent ecosystems in the Basin. While the plan aims to establish Sustainable Diversion Limits, meet high water quality objectives, improve water security and optimise “economic, social and environmental outcomes ...[the] MDBA has been required to exercise judgment in balancing and considering the outcomes of the socioeconomic work, and other areas of work” (Australian Government, 2011, Appendix B, p.2).

The MDBP, (Australian Government, 2011, Appendix B, p.2) also claims that “other factors, including long term demographic change, commodity price fluctuations, industry diversification and community adaptability will play significant roles in how communities adapt [sic] to a future of less water”. Many farmers in the Basin have been adapting to new conditions, prices and reforms since the 1980s (Australian Government, 2011, Appendix B, p.3). Farmers and communities affected by the proposed MDBP have until 2019 before the plan is enforced. During this time the Australian and State governments plan to continue working with communities to identify areas that may need assistance to adjust, with the idea that local communities will eventually take control of their future.

While “government policies and programs *could* (my emphasis) mitigate the extent of the costs borne by those irrigators and local communities likely to be most affected” (Australian Government, 2011, Appendix B, p.3), nothing is certain. Despite undertaking “to develop a fuller understanding of the benefits and costs of the Basin Plan, which will inform its adaptive management approach ... includ[ing] further scientific and economic research” (p.3) there is no mention in this section of further social research. Whilst acknowledging the importance of the scientific and the economic perspective, of equal if not primary importance, is the well being of the people whose lives will be adversely affected. The disenfranchisement of the indigenous people who were pushed off their land is an ongoing social issue. Do we want to see a repetition of these social issues with this later wave of occupants who also identify with their land?

Although the MDBP “recognises the importance of harnessing local expertise and leadership” (Australian Government, 2011, Appendix B, p.3), the focus is on resource management. Grief and loss management, and resilience and adaptability, which lead to personal transformation, are not mentioned. The mental, emotional and physical well being of those people who are expected to lead the resource management process is paramount to its success. Of the ten socioeconomic reports commissioned by the MDBA, only one was wholly concerned with community consultation and two included it as a part of their study. One report considered the impacts of the plan on indigenous people, but no consultation is evident (Australian Government, 2011, Appendix B, p.5).

One criticism of the MDBP is that it is modelled on hydrology, not ecology (Muir, 2012, p. 5). The overall objective of the Basin Plan is to have “a healthy, working Basin...through integrated management of the water resources of the Murray-Darling Basin” (Australian Government, 2011, Chapter 5, p.1). The language used in the Basin Plan contains the terms “adaptive management” and “ecological resilience” as opposed to “balance”. Balance infers that there is equilibrium to be maintained, whereas adaptive management is all about optimising production. According to Muir, (2012, p. 5) this theory underpins much of modern environmental management.

Craig Knowles, NSW Planning Minister in 2011, supports resilience theory, sometimes labelled “new sustainability science” (Muir, 2012, p.5). Resilience, the capacity of an ecosystem to survive a sudden shock without collapsing, requires an adaptive management style, able to adjust when necessary. For CSIRO’s Brian Walker and David Salt, resilience thinking is “part philosophy and part pragmatism” (Muir, 2012, p.5), recognising that humans are part of nature and that societies and ecologies form intertwined, intricate systems. Notwithstanding the NSW Planning Minister Craig Knowles using terms “adaptive management” and “ecological resilience”, and the Authority wanting the adaptive management plan to be informed by local knowledge, Knowles introduced legislation that stripped local communities of the right to be consulted about major infrastructure developments affecting them (Muir, 2012, p. 5).

Cutting funding for support to basin communities means that resources for understanding the social issues which will occur as a result of the plan could be neglected. Eastburn claims “Sustainability is about investing in the future of our land and its people. The relative lack of investment in individual and community capacity building means that the residents of the Murray-Darling Basin are being prevented from even a ‘fighting chance’ of dealing with the ‘crisis of sustainability’ in their communities, despite their great potential to do so” (2001, p. 5).

The Wentworth Group of Concerned Scientists, with Professor Chris Miller and Associate Professor Fiona Verity from Flinders University see the crisis in the Murray-Darling Basin as an opportunity to rebuild “more resilient communities and healthier rivers” (Williams, et al. 2009, p. 1). They also see a need for a “well balanced three legged stool approach” (2009, p.2) which at the moment only has two legs apparent, that is water buy-back and infrastructure improvement to increase efficiency. They contend that the third leg needs to address the social implications for the communities making big adjustments with little government support. To assist these communities in the Murray-Darling Basin rebuild a future with less water they propose a model of Integrated Water Resource Management. The three aims of their management project, 1) economic efficiency, 2) equity and 3) environmental sustainability are to be delivered by bringing together community knowledge with scientific and socio-economic knowledge of a future vision. This knowledge is used

to inform discourse across districts where people can talk together about their wants, needs and visions for the future. It is important to include government and non-government organisations with the communities in order to achieve coordinated action (Williams et al. 2009).

In their work on natural resource management, Holling and Meffe (1996) claim in areas of high capital investment where diversity is reduced, such as mono-cultural high energy farming, continued success depends upon controlling nature. Capital, time and energy are put into increasing efficiency and reducing costs (1996, p.331). When this happens the method of management is usually highly regulated and rigid command-and-control that results in inflexible, dependent and selfish economic interests which create “lobby groups [that] battle other lobby groups” (1996, p. 331), as witnessed in the wake of the Murray-Darling Basin Plan.

An illustration of this is the misinformation about the needs of the Basin’s river systems being communicated by lobby groups who see they are losing control of their livelihood. The irrigators’ lobbyists present themselves as stewards of the land who help feed the world while the Australian Ricegrowers’ Association used global hunger as a reason to maintain its current water levels. “It claimed that Australian rice feeds forty million people every day (except in 2007-8, when drought slashed allocations and rice growers decided they could earn more money selling water than growing rice). In a lean year, given the size of Australia’s rice harvest, that daily meal for forty million people would barely cover a fifty cent coin; even in its bumper years, Australian rice accounts for less than half a percent of global production” (Muir, 2012, p. 4).

Alternatively, Margaret Somerville (2009) argues that anthropocentric attitudes toward the environment are deep seated in the Western psyche, where only humans really matter. Dams and irrigation schemes are a result of a “profound belief in the possibility of restructuring nature and reordering it to serve human needs and desires” (Adams and Milligan quoted in Somerville, 2009, p. 208), whereas indigenous people everywhere have been sustainable in their use and management of water throughout history (Shiva cited in Somerville, 2009, p. 208).

This is significant because although Aboriginal people live in the Murray-Darling Basin and there is a recognised need to involve them in discourses concerning the future of the Basin, their practices have largely been ignored. The reason for this is seen as a “lack of respect and understanding of Aboriginal culture and its relevance to natural resource management” (Ward et al., quoted in Somerville, 2009, p. 209). For Indigenous people, justice, history, identification and recognition are part of natural resource management. This enlarged scope necessitates those working in this area become literate in cultural landscapes. However, key stakeholders do not seem willing to engage at this level.

2.10 Conclusion

This exploration of the literature on sustainability and water issues discusses whether self-interest should be acceptable as a motivation for farmers to change to sustainable methods that will be enduring in the long term, or whether for this to take place, the motivation needs to be an absolute concern for the natural environment.

The many factors affecting the take up of new methods have been considered. These include values learned from family farming systems, economic considerations because farmers need the changes to be cost effective; the social, cultural and personal situation of the farmers and the antagonism of some farmers towards government agencies.

Discrepancy between the education currently offered to rural land holders and their need to embrace more radical farming methods if they are going to cope with the predicted stresses and shocks caused by climate change has also been considered. It does not seem farmers are suffering from a lack of knowledge or opportunities to learn but there is a case for transformational adult education of farmers as they move from traditional farm methods to those that are more environmentally sustainable. Transformational learning means that it is only by changing their mindset will farmers develop attitudes conducive to natural resource management.

Farmers also need to recognise that decisions they make concerning their farm impacts on the greater eco-social system and that their cooperation is necessary for the natural resource management of major tracts of land in Australia, in particular the Murray-Darling Basin where the Murray-Darling Basin Plan is being implemented.

The next chapter will discuss the methods used to research the ways farmers are learning to change (or not) to more sustainable farming methods and the influences on their decision making.

Chapter Three: Research Design

As discussed in Chapter 1, the aim of this study is to report on the findings of discovery research on how farmers, in particular in the Murray-Darling Basin, learn to change their farming practices to more sustainable methods in order to cope with the effects of climate change. One objective is to tell the farmers' stories and to let their voices come through the data by way of testimonials and narratives. The other objective is to provide a full, deep description of what is discovered to facilitate future explanatory research (Punch, 2005, p. 15). This Chapter begins by describing the research process that includes looking at 1) my standpoint, 2) the theoretical conceptual framework of qualitative research and the transformative paradigm used to guide the 3) method used to collect data. I then go on to discuss the time line of the data collection and any ethical concerns. The next section is a description of the interviews with a reflection on the process which is followed by a comparison of the similarities and differences between the interviewees. Finally I describe Colaizzi's Seven-step Framework which is the technique I used to interpret collected data.

3.1 Research Process

The difference between methods and methodology is discussed by Walter (2010, p.3) who defines the latter as being "the world view lens" which incorporates i) the

standpoint of the researcher, ii) the theoretical conceptual framework and paradigm; and iii) the method of data collection of the research project. I will construct the research process using the above methodological format as I describe and discuss the learning, values and experiences of this project.

Standpoint

My standpoint or position is primarily that of an educator. My working life has been involved with educating children, but later studies have developed a keen interest in adult education. It was in the adult education studies that I was introduced to the philosophy of Myles Horton and Paulo Freire, two adult educators committed to transformative learning to empower their learners for social change (Horton & Freire, 1990). The commitment of Horton and Freire to empower, through education, the poor and marginalised in their society is inspirational.

Australian farmers in the Murray-Darling Basin, already coping with the uncertainty of markets and weather, are going to have to cope with even less certainty in the future as more water is taken from irrigation and redirected to environmental flows. While this is seen as environmentally necessary to restore health to an ailing river system, most farmers felt powerless in the decision making process and rendered silent by society at large. Many complain of not being heard by government officials and being misunderstood by the general urban community, especially those living in cities east of the Great Dividing Range. In the light of this struggle, my commitment to the interviewees was to let their voices come through the data and to retell their stories as authentically as possible.

While never having lived on a farm, I have strong family connections to farmers. Walking beside them as they managed the long drought and consequent flood was a deep learning experience and one in which I remain involved. However, my reality is urban, having lived most of my life in a large regional centre and now Sydney. Conducting research in a rural community has the potential to be problematic due to the difference of reality between myself as the interviewer and the farmers, the interviewees (Walter, 2010, p. 16). In an effort to understand life in the bush more

deeply, I have had many conversations with farmers and those living in rural communities. I have also read the rural newspaper, *The Land*; and read, listened to and viewed as much as I could about life in Western NSW. Despite this, I was not “able to walk in the shoes” of my interviewees. I have endeavoured to overcome this problem by remaining conscious of my reality and the differences while I conducted the interviews and analysed the data.

Theoretical Conceptual Framework and Paradigm

The motivation for undertaking this study came from previous study in the field of adult education where I was introduced to the concept of transformational learning and environmental adult education. Environmental adult education begins by bringing people’s ecological knowledge together through conversation and discussion, respecting spiritualities and connection to the land (Clover, 2003, pp. 11-12). I want to begin by retelling the authentic stories of farmers whose lives are being deeply affected by climate change and government policy.

The transformative paradigm was developed in the 1980s and 1990s (Mertens cited in Mackenzie and Knipe, 2006, p. 195) and its philosophy is the most relevant for this work because it adds the concept of action for empowerment and change to the interpretivist/constructivist paradigm.

To carry out this discovery research under the umbrella of the transformative paradigm, I used basic qualitative study (Merriam, 2009, p.24). It was especially appropriate for this project because I was in relatively uncharted territory and “when little is known about a topic, qualitative research should usually initially be favoured” (Patten, 2007, p.22). The transformative paradigm required that as the researcher I went to where the people were to collect data. It also required me to be aware of the influence my standpoint made on my findings. Because my urban reality differs from the rural reality of the interviewees it is important I adopted a reflexive position in my personal interactions and when interpreting the data (Brewer, 2000, p.5). To be aware there is more than one way of looking at an issue and to try to understand data from

the perspective of the interviewee was vital if I was to produce authentic findings and hear their voices (Merriam, 2009, p.38, Walter, 2010, p. 26, Siegle, 2002, p. 1-2).

Interviews are potentially valuable for making strong knowledge claims, but only after careful consideration. Social, economic and political forces shape interviewees' responses, and a more reflexive pragmatic approach to qualitative research examines an interview from the perspective of challenging interpretations and looking for ambiguity. Here, "reflexivity means working with multiple interpretations in order to ... produce rich and varied results" (Alvesson, 2011, p. 107). Pragmatism recognises the limits of time and distance that affect the research. The distance, 684 km, from my home in Sydney to the location of the interviews at Hillston had the biggest impact on the research. It meant I could not easily build a relationship and revisit my interviewees so I had to extract data from one interview with each interviewee. As I was working within a two year time frame, time was not as restricting as the distance factor.

Method

While a loose design was in place before I undertook the fieldwork, aspects of the research clarified as I went along. Originally I thought I would engage farmers and some rural community members in semi structured interviews from a wide geographical area. I decided to use the snowball sampling method (Adams et al. 2007, p.91; Creswell, 2006, p. 127) to enlist interviewees which raises potential ethical issues of privacy, which is discussed later in this chapter. However only the third interviewee was selected by this method, that is, he was invited to be interviewed by a farmer who had been interviewed before him. The first interviewee was introduced at a Uniting Church function I attended early in the year and the second and fourth were both known to me. The remaining eight farmers and four community members were enlisted by the Assistant Uniting Church in Australia (UCA) Rural Chaplain, Sue Chapman, in Hillston. Contrary to my expectations, this did not result in a homogenous group from the Uniting Church because Sue also used her links with the local school to recruit participants. There was only a minority who attended the Uniting Church.

When I first decided to do this study I was concerned how I would find farmers willing to be interviewed. Fortunately in January 2012 I had the opportunity of accompanying my husband on a series of public meetings in the Riverina that were organised by the Rural Chaplain of the Uniting Church in Australia (UCA), Julie Greig. The meetings were designed to discuss the effect of the Murray-Darling Basin Plan on their communities. It was during this visit that I met several of the farmers and members of local communities. It was a wonderful introduction because it established a level of trust with those who attended the meetings. It afforded me insights into the concerns of people directly affected by the proposed water restrictions of the Murray-Darling Basin Plan and helped break down country/city barriers.

The cooperation of the chaplains and the early establishment of relationships were secured due to my husband's position in the UCA. This meant the church effectively became a research partner, introducing me to a group of people sharing the same values, many of whom were known to each other. Of the first four participants, three were members of the UCA. However, not all the farmers interviewed at Hillston belonged to the church. The Assistant Chaplain, Sue Chapman also had an affiliation with the local school, where several teachers are married to farmers. One participant was recruited through this connection. Sue also worked voluntarily at the visitor's information centre and it was through this link to the broader community she also recruited participants, one of whom gave her the name of a third farmer who agreed to be interviewed. Two of the farmers were members of a local church other than the UCA.

Using my connection to UCA for recruitment caused me some initial concern that the participants would all be members of the church and this might skew the findings. Of the total eighteen interviewees, four had no affiliation with any church. Only one interviewee, Harry³, spoke in Christian terms of stewardship of the land, but this value was evident to some degree for all the farmers interviewed regardless of their religious beliefs. The farmers represented a broad cross section of cropping and

³ Pseudonyms are used for the interviewees to protect their privacy.

grazing, farming methods, size of farms, age and wealth. Farmers who were approached did recommend other farmers, especially those who were doing things differently from themselves.

I began the interviewing process in April/May 2012 with the first four interviewees and the ten Hillston interviews were carried out July/August 2012. Letters outlining the research project and questions to consider during the interview,⁴ plus written consent forms were emailed to the first four participants and I rang each one and spoke to them prior to the interview to finalise arrangements. These forms were also emailed to Sue Chapman in Hillston as well as sending hard copies in the mail. Sue did follow up telephone calls (Fowler, 2002, p.66) and other early communication including sending emails to Hillston participants. She had sent out not only my correspondence but also her own letter of request to prospective interviewees. Her gate-keeping had the potential to be problematic, particularly in light of the ethics agreement so I spoke to her about maintaining privacy and anonymity among the interviewees. She complied with the ethical standards required and there were no reasons for concern. She emailed me a time table of interviews, complete with names, addresses, and some back ground information on each participant. I telephoned each participant in Hillston before setting out to the interview.

The opportunity to interview twelve participants in ten interviews from the Hillston district was helpful. It was convenient because the farms were clustered around the township of Hillston where I had accommodation, contacts and support. The long distance travelled to interview the respondents was counterbalanced by the advantages of having a small number of respondents which were manageable as far as time and cost were concerned (Adams et al. 2007, p. 91). This study was self funded so there was no external budget so naturally expenses had to be realistic. The main costs were travel, followed by audio-recording equipment, stationary and telephone calls. To make data collection efficient, the introductory stage was done in writing, telephone conversations and email. Appointments for interviews were made so that several respondents were seen each day for the three days I was in Hillston.

⁴ See Appendices 1 and 2

3.2 Timeline

Tuesday 31st July 2012

2 pm: Evan, farmer, twenty minutes south of Hillston.

Wednesday 1st August, 2012

9 am: Fran and Frank, farmers, thirty minutes south of Hillston.

1pm: Glen, farmer, thirty minutes east of Hillston.

4.30 pm: Harry, farmer, in Hillston because his farm was inaccessible except by 4WD.

7.30 pm: Ivan, community member, in Hillston

Thursday 2nd August, 2012

9am: Jack, farmer, thirty minutes north of Hillston.

11 am: Kevin, farmer, twenty minutes north of Hillston, near Jack's farm.

1 pm: Larry, farmer, fifteen minutes north east of Hillston.

3 pm: Martha, community member, in Hillston.

6.30 pm: Norman and Narelle, community members, in Hillston.

3.3 Ethics

The design of this study went before the Human Research Ethics Committee of the University of New England prior to commencement of the research component⁵. The recruitment of participants by the snowballing method raises ethical problems and as such is not approved by the University of New England because “disclosure of personal information relating to a third party, without consent, breaches privacy provisions” (University of New England, p. 3). This potential problem was overcome by writing a letter of introduction, an information sheet of the proposed research and a consent form to be signed by the interviewee. The initial respondent will pass these onto those whom he/she thinks may be interested in being interviewed for the study. I then wait to be contacted by those who may be interested (University of New England, p. 3).

⁵ Approval number HE 12-070. See Appendix 1 for Letter of Introduction, Consent Form, Information Sheet and Interview Guide.

The respondents were all voluntary and as such it was crucial their privacy was respected at all times. To maintain anonymity the interviewees were designated a pseudonym. They knew they were free to leave the study at any time. This was clarified from the outset, the interviewees being provided with all necessary information clearly written (University of New England, p. 4; Babbie, 2010, p.67-9). This included information about data recording and how their personal responses were used. Vital to research is confidentiality which was maintained at every level and at all times throughout and following the research process. I endeavoured to remain open and honest and responsible, making sure all collected data is securely held at the University of New England (University of New England, p. 6; Babbie, 2011, p.71-74). The respondents had the opportunity to access the coded analysis of the data and discuss the findings if they chose (Ary et al. 2006, p. 585-6).

The farmers and members of the Hillston community were keen to have their town represented in the study. This risked contravening the anonymity and privacy issue. To preserve this, the identities of the interviewees are not disclosed but the two persons who assisted with recruitment are named with their permission. When I arrived in Hillston I contacted each interviewee by telephone prior to travelling to their home or farm to conduct the interview. At the interview I collected the consent form, asked if there were any issues that were of concern and made it clear the results of the study would be available to them if they so requested. I explained the recorded transcripts would be preserved at the University of New England and deleted from my recording devices as soon as the transcripts had been made.

3.4 Interviews

The primary instrument of this research was the semi-structured interview (Patten, 2007, p.21; Ezzy, 2006, 37, 39). Although I used the semi-structured interview technique, I found some structure helpful at the beginning of the interview because as Punch (2005, p.26) advocates, data collection is more effective and efficient if there are some well thought out initial questions.

Personal involvement with the interviewee is desirable (Fowler, 2002, p. 61) but not always possible so starting each interview in a friendly manner while collecting the signed consent form and reiterating the purpose of the interview was a useful way to begin. Meeting the needs of interviewees as much as possible, such as conducting the interviews at a time and place of their choosing, were important in establishing rapport (Minichiello et al. 2004, p.415). Being subjective research, I needed to be able to empathise with the interviewee (Walter, 2010, p.26), particularly in the light of the recent drought which caused significant hardships to the respondents and the proposed Murray-Darling Basin Plan which was unpopular with them.

I used an interview guide to check that the information remained relevant and I had covered as much as I could (Minichiello, et al. 2004, p. 419). A copy of the guiding questions was sent to each interviewee prior to the interview so he/she had a good idea about what was expected⁶. These questions were developed following the initial four interviews because I discovered farmers wanted to talk about the technical changes they made and I had to maintain the focus on how they learnt, rather than what they did on the farm. It remained important not to lose sight of the fact this was discovery research, and therefore important to remain “open to any type of information” with the expectation that questions will come from the data as it is collected (Sarantakos, 2005, p.117).

Information from secondary instruments, such as observations and field notes, were incorporated into the data as applicable. For observations to occur it was helpful to have the interview setting in the natural living environment (Babbie, 2010, p. 343). Observations were an important aspect of this research because to an extent it was ideographic (Gray, 2009, p. 202), as I sought to discover and understand a pattern of behaviour and attitudes toward the natural environment. To witness the farmers on their farm gave me an understanding of the intrinsic nature of the relationship they have with their land. It afforded me a depth of insight no interview question could have satisfactorily answered. It was especially pertinent because despite an avid interest in the land I am from a city environment and it is difficult to experience total empathy, especially given the short time frame of the interview component of this

⁶ See Appendix 2.

project. Although each interview only lasted approximately one hour, the on site interviews gave me a more authentic understanding of the relationship between the farmer and his land than the three interviews that were given off site.

The interviews were conducted and analysed by a single researcher, myself. Each interview was audio-taped and transcribed onto the computer as soon as possible. Although it is preferable that the transcribing takes place that evening while the researcher is still in the area; due to ten interviews being conducted in two and a half days I transcribed them as soon as possible once I returned home. The disadvantage of this was the distance from the interviewees if any further contact needed to happen following the interview. The relevant observations and field notes were added to data during the transcription process.

Reflection

The importance of establishing positive relationships between the interviewer and interviewees has been acknowledged. Because farmers are busy and the distances between properties are large, it was inconceivable these interviews would be held anywhere but in a location best suited to the interviewee. This allowed me the benefit of making direct observations of the interviewee on his land and observing the land itself, thus conducting the interviews on location was mutually beneficial. This process added a minor ethnographic element to the study. Travelling between farms allowed me to appreciate the distances farmers in this area have to travel just to get to town; it gave me the opportunity to observe and enjoy the landscape and to connect with the time and space that is so different from the rush of a city.

3.5 Interviewees: similarities and differences

The first interviewee, Alice, was a science teacher from the Riverina district. On her request I conducted her interview in Newcastle where she was visiting her mother. The second interview was conducted in the Sydney home of fifth generation farmer Bob and his wife, Beryl, from Henty in the Riverina district of south western New South Wales and now working off the dry land family farm. They introduced me to

Clive and Cheryl, retired dry land and irrigation farmers originally from Narromine in the Macquarie Valley on the edge of the Dubbo Western Plains and also residing in Sydney. The fourth interviewee was Doug, a tertiary educated farmer from the Lachlan Valley, with a history of family farming. He has also worked for the Central West CMA. I interviewed him on his farm near Parkes in central west NSW. These first four interviews were friendly and it was here I practised my technique and use of recording equipment⁷.

Of the eighteen interviewees, twelve were resident in the farming district of Hillston in the Lachlan Valley. Of these twelve, eight were farmers and four were members of the local community. The eight farmers around Hillston included irrigators and dry land farmers, five on large family farms, one smaller concern and one company farm run by a manager. The ages were all within a middle age bracket 40 – 60 years with the exception of Jack, who was in his twenties, and Clive and Cheryl, retired, and Harry who is about to retire.

Apart from the company farm manager all the farmers were on family farms, some families being in the district for five generations. Four of the six older farmers had tertiary educated children and at least two of them had tertiary qualifications themselves. The young farmer, Jack, had attended Agricultural College. Two farmers had no tertiary qualifications and to date neither had their sons although one had a daughter qualified in an unrelated field. Of the thirteen farmers interviewed, ten were male. In three interviews their wife was with them and added to the data. The three women present at the interviews have been given the title of farmer and have been counted as an interviewee. The women gave a slightly different perspective to their men about managing life on the land⁸.

Variables

	Location	Occupation	Appr Age	Gender	Education	Interview site	Opportunity for observation
Alice	Leeton	Teacher	60	F	Tertiary	Home	Nil/na

⁷ I was still not confident using the recording equipment but all the interviewees could relate to that and I think it made them feel more relaxed.

⁸ See Table of interviewees p. ix

Bob	Henty	Farmer	50	M	Year 12	Home	Nil
Beryl	Henty	Farmer	51	F	Year 12	Home	Nil
Clive	Narromine	Farmer	78	M	Tertiary	Home	Nil
Cheryl	Narromine	Farmer	76	F	High school	Home	Nil
Doug	Parkes	Farmer/ CMA	60	M	Tertiary	Farm	Good
Frank	Hillston	Farmer	50	M	Unknown	Farm	Good
Fran	Hillston	Farmer	45	F	Unknown	Farm	Good
Glen	Hillston	Farmer	55	M	Unknown	Farm	Good
Harry	Hillston	Farmer	65	M	Unknown	Off site	Nil
Ivan	Hillston	Local Business	55	M	High school	Home	Nil/na
Jack	Hillston	Farmer	28	M	Tertiary	Farm	Good
Kevin	Hillston	Farmer	55	M	Tertiary	Office on farm	Fair
Larry	Hillston	Farmer	48	M	High school	Farm	Good
Martha	Hillston	Chaplain	55	F	Tertiary	Home	Nil/na
Norman	Hillston	Teacher	55	M	Tertiary	Home	Nil/na
Narelle	Hillston	Teacher/ Chaplain	50	F	Tertiary	Home	Nil/na

3.6 Interpreting the Data

Colaizzi's (1978) Seven-step Framework

The principles of Colaizzi's Seven-step Framework for data analysis (Deal, 2010, p 852-863) were used as a guide for looking more deeply at the interviews.

The following is a broad outline of the framework.

1. Repeatedly read each interview transcript to gain a sense of the authentic experience by the interviewee.
2. Highlight and extract the significant statements.
3. Identify categories for main ideas in each interview.
4. Place each significant statement under its category heading.
5. Write a detailed description of the statements for each category.
6. Validate each description with interviewees. I did not do this step as the interviewees were given this opportunity but none requested it.

7. Summarise each detailed description to identify the fundamental issues.

This framework supports the credibility and dependability of the research by the use of a disciplined, rigorous analysis, while maintaining authenticity (Hall, 2008, p. 78-80). Although this method is primarily used for a phenomenological approach it is appropriate for this study because of my commitment to the interviewees to retell their story as authentically as possible. Using this method of data analysis allowed the voice of each participant to be heard, including inferred meaning from within the context of each interview.

I reread each interview several times and highlighted the significant statements which were put together. The significant statements were reread to discern main ideas. The main ideas were given a category label. I tried to use consistent labels for all the interviews however some interviews contained different main ideas or differing perspectives on a main idea.

For each interview I used the cut and paste function on the computer to cut each highlighted significant statement and past it under a category label, after which I wrote an exhaustive description for each category. The categories were further classified into main concepts.

Fourteen interviews involving eighteen interviewees were sufficient because the data collected was rich and deep, thanks to the openness of the participants (Johnson, 2004, p.362). Throughout I have endeavoured to maintain the authenticity of each interviewee, which is an indicator for credibility (O’Leary, 2004, p. 56) and it is only in Chapter 7 that I draw conclusions and make judgments.

The detailed descriptions are used in Chapter 4, Learning about uncertainty, Chapter 5 Learning about sustainability and Chapter 6 Learning about place, to describe how learning took place for each participant in the categories relevant to them. These chapter titles are the categories derived from the analysis of the main ideas in the data collected from the farmers. The identified fundamental issues of learning to change, motivation to change and attitudes towards uncertainty, sustainability, place and learning are discussed in the concluding Chapter 7.

Chapter Four: Learning about uncertainty.

This chapter opens with stories of interviewees Alice, Frank and Fran, Kevin and Martha as they talk about working with uncertainty in the Murray-Darling Basin. I have included their stories because “when we listen to someone’s story ... it builds trust and leads to people saying more about their ideas and passions. Without conversation there is no trust; without trust there is no expression of passion; without this there is no change” (Stewart quoted in Eastburn, 2001, p.12).

Testimonies from interviewees are used in the remaining sections of this chapter to facilitate the authenticity of their voices coming through the text. Following the stories is a discussion on uncertainty and the need for control before addressing concerns the interviewees have about the Murray Darling Basin Plan. I then describe farmers’ ways of learning about uncertainty from agronomists and information technology, marketing, talking to other farmers and looking over the fence, and drought and water. The section after that considers the effect being conservative has on learning about uncertainty and concludes with a reflection of the findings on learning about uncertainty.

4.1 Stories

Alice

Alice is an experienced secondary science teacher. She has taught in the Riverina district for forty years and is an active and committed member of the local community. The situation in the Murray-Darling Basin and the impending implementation of the Murray-Darling Basin Plan continues to cause difficulties for teachers of science and environmental studies in the district. As part of the community Alice understands the needs of the farmers and local community, while maintaining a professional understanding of environmental issues that impact on their livelihoods and life styles.

While Alice has endeavoured to introduce updated information and new ideas in the schools where she teaches, she has faced resistance in a small, isolated community

that values above all traditional and local knowledge. She says in larger regional centres that are exposed to research scientists and Department of Primary Industry and CSIRO research stations, there is less resistance to new ideas.

Alice has used local scientists to address her classes. She found that both their expertise and input from their children invoked helpful classroom discussion. She considers their contribution beneficial to the implementation and acceptance of new ideas in the school which impacts the broader farming community.

The introduction of the Murray-Darling Basin Plan is causing concern about loss of employment and income in the local community. Alice feels the uncertainty caused by piecemeal information handed out by government agencies is largely responsible for generating the fear that has gripped the people, including the children, concerning their future. Their fear is stifling their ability to see past their traditional and local knowledge. Alice sees the Department of Primary Industries and CSIRO important educators to assist with the acceptance of new ideas. Unfortunately their services are being scaled back, and many research families have left the district.

Alice asks that the authorities present an honest and comprehensive plan that is implemented slowly, with consideration of the needs of the local farmers and broader community members. This would be the most acceptable way to expose new ideas to people who value traditional, local knowledge.

Frank and Fran

Frank and Fran work together on their farm out of Hillston. We drank tea and ate cake still hot from the oven while they shared their experience of life on the land. Their close connection to each other and their family was apparent from the beginning. Frank and Fran are from established farming families in the district and are part of the fabric of the local community. They are expanding their farm as their sons are coming home to work. Farming is their identity and they take just pride in their country. After three good seasons it looked wonderful that day and I come away with some fresh produce from their garden and gratitude for their generosity.

Despite this seemingly idyllic lifestyle there are elements of conflict in their story. Frank and Fran's story is also one of hard work, stress and disappointment. Farming is becoming less of a lifestyle and more of a business, and like other farmers in Australia, they have been forced to engage in learning and the take up of new ideas. They don't always feel comfortable or confident with this new knowledge.

Frank works hard physically while Fran deals with the paperwork and keeps records. Frank has increased his cropping hectares three fold in an effort to provide for his sons and to hedge against variable grain prices. This has put pressure not only on his work load, but financially, as costs incurred by planting and harvesting are high. He has purchased machinery and farm equipment to cope with the extra load, which in turn has increased his debt to the bank.

A major hurdle for them is marketing of the grain. With changes to the AWB in 2008 (Australian Wheat Board [AWB], 2002, para. 5) farmers are responsible for marketing their own grain in an international market. As there are no floor prices any more, grain prices are one more variable that make up the uncertainty characterising farm businesses and with it, farmers' lives.

So while they are coming to terms with the revolutionary technique of minimum or no tillage cropping, rising costs of chemicals and fuel, farming in marginal country with more dry years than wet, plagues of mice and locusts, paying off a new property and new machinery, Fran and Frank also have to cope with an uncertain income. As Fran lamented, "We just get up and something kicks us in the guts so to speak. Every harvest there is always something ... A disappointment every harvest". Yet she also reflected that "We seem to have everything we need. We are pretty lucky really."

Kevin

Kevin is a highly motivated manager of a large company property with wide farming and managerial experience in Australia and overseas. An innovator with an eye to markets and profit, Kevin also understands the need to care for and protect the land that feeds him. He is enthusiastic about learning and sharing knowledge, working cooperatively with neighbours and contractors with whom he comes in contact.

Kevin has been actively involved in committee work with government bodies on developing local water action plans that took into account rainfall, access to water, soil, temperature, sunlight hours; every variable. He considers the Murray-Darling Basin Plan is being delivered in a top down approach that overlays the work that has been done on more local water plans. In his view, the government would benefit from listening to the people and aligning their goals with those of the landholders. “If I could ever have anything to do with the government or influence them, it would be to say you need to be more intimately involved with the location where you are applying the rules”. He is critical of the autocratic approach taken by the government in its relation to farmers who feel their knowledge is not respected and their voices are not heard.

Kevin is worth listening to. His deep knowledge of agriculture from an agronomic and economic perspective makes him an asset to his community. He regularly attends conferences and hosts field days, willingly sharing his knowledge with anyone who asks. He values the work the district agronomist does in developing networks in an effort to keep everyone updated with the latest and best methods available. Kevin sees himself as a co-learner.

They ring and say can we come and talk about this and we say sure, come on up because as they come we learn just as much off them and to see that interaction and knowledge is really good. If my neighbour gets a really good yield we go, that is fantastic, how did you do it? So we can learn from them and so there is that openness (2/8/2012).

Martha

Martha has not lived in Hillston long, yet as a chaplain she has quickly become an integral member of the community. Her story spans a city life, a farmer’s life and now a life of a community support person. Martha genuinely cares for the people and communities she visits. She observed the devastation of the drought and the debilitating effect it had on the farmers and town people alike, and their rejuvenation

as the rains came. Martha holds out hope for her small town and can see many possibilities for growth and increased prosperity.

Her frustration comes from not being heard. She is concerned about the uncertainty caused by government cuts to services and policies that discriminate against small rural towns in areas of health, education and business. Her concern for issues of rural mental health, educational opportunities, improvement of services and farmers who have been left behind in the rise of technology motivate her as she works tirelessly as an advocate for the people in rural NSW. While Martha is overwhelmed by the creativity and generosity of spirit of the people with whom she works, she sees there is so much more that can be done.

4.2 Uncertainty and the need to take control

... command and control is often sought as the primary solution in an effort to move human or ecosystem behaviours to a predetermined, predictable state. Consequently, much of natural resource management has been an effort to control nature in order to harvest its products, reduce its threats and establish highly predictable outcomes for the short term benefit of humanity. ... The purpose of engineered constructs and manipulations is to turn an unpredictable and “inefficient” natural system into one that produces products in a predictable and economically efficient way. When unanticipated environmental problems then arise, the a priori expectation of certainty is not met and results in surprise and crisis (Holling and Meffe, 1996, pp. 329-330).

Farmers are continually learning to farm ‘Australia’ and deal with uncertainty. Taking control of the natural environment for production of food and fibre is a historical and ongoing challenge. The need for “efficiency, constancy and predictability” and concentrating on stability is their modus operandi (Holling and Meffe, 1996, p. 330). Resilience is perceived as successfully managing uncertainty

and quickly returning to a stable state where production is maintained. Family farms, being inherently flexible, have aided this process because family members can vary time spent working, income received and working conditions (Calus and Huylenbroeck, 2010, p. 649).

Prior to conducting the interviews I had the opportunity to attend community meetings in the Riverina towns of Finley, Coleambally, Griffith, Leeton, Lockhart and Hillston where the discussion was the impending Murray-Darling Basin Plan or the floods which followed the drought. Of all the issues facing these people, the most distressing was uncertainty of future water supply. For dry land farmers this has always been the case but irrigators are feeling vulnerable and afraid. The communities of Griffith and Coleambally have been developed around irrigation and they fear the future of their towns is in jeopardy. There was a certain amount of skepticism of the science determining the water allocations of the Murray-Darling Basin Plan and many people in rural communities have a local perspective and will take on any doubt about the science of the plan and climate change (Golding et al. 2009, pp. 555, 561). The memory of lived experience of droughts and floods shapes people's interpretations of climate and water flows (Anderson, 2010, p. 90; Lawrence and Vanclay, 1996, p. 34).

The following testimonials are examples of how some family farmers in the marginal country around Hillston, NSW are dealing with uncertainty.

Frank and Fran (1/8/2012) have decided to increase their investment in land and new machinery, trebling the hectares they crop. Glen (1/8/2012) on the other hand, credits the diversity of his two farms and staying debt free with getting him through the drought. Lazed irrigation, which is more effective and prevents salination, has replaced flood irrigation for cropping and to grow supplementary stock feed when necessary. He has increased his cropping with a variety of grain crops and cotton and has reduced stock numbers. In a good year Glen stores grain in silage pits to provide stock feed in dry times. The many trees on his property were sourced for stock feed during the drought.

Jack (2/8/2012) is a fifth generation family farmer and has introduced centre pivot irrigation⁹ using bore water to grow stock feed to store for dry seasons. Centre pivot irrigators were chosen for water efficiency. The farm is on marginal country and carries 15 000 merino sheep and 600 beef. Limited commercial cropping is only carried out in good seasons when there is enough water. Recent dry times have placed emphasis on irrigation to carry them through “the tighter pinch, so yes we have definitely changed our practices quite a lot out of need. The irrigation is more of a sideline to us but it is an essential part of the operation when it does turn dry.”

Kevin (2/8/2012) manages a large company property that grows a variety of commodity crops such as maize, cotton, canola and wheat. During the drought the company sold its substantial water allocations back to the government because river water for irrigation had dried up and the cost of maintaining water licences locked up capital. All irrigation now is from bore water, which is more expensive to operate than river water but it is available during a drought when it is most needed. Resilience is built in with three different irrigation systems which are expensive in the short term but are designed to be effective through dry weather in the longer term. A variety of crops and livestock also build resilience. Kevin talks about the triple bottom line, people, place and profit. He admits to being economically driven, as “sustainability has to have economics in it. You can’t separate it from the environment. The triple bottom line; if you are not caring about your environment, you are not caring about your business. If you have to identify it as a separate unit then someone has been doing it incorrectly, that is the point”. Due to the many variables they have to deal with, Kevin’s goal is working toward security. As Holling and Meffe report “stabilising forces are important in maintaining productivity and biogeochemical cycles” (1996, p. 330).

Counter to Kevin’s aim to maintain stability by high investment, Holling and Meffe argue that by investing in high capital requires maintaining productivity and thereby controlling the environment. “The composite result is increasingly less resilient and more vulnerable ecosystems ... and more dependent and selfish economic interests all attempting to maintain short term success” (1996, p. 330). It is internationally

⁹ Centre pivot irrigation is a method of irrigation in which equipment rotates around a pivot and crops are watered with sprinklers.

recognised the Murray-Darling Basin is a system in distress (Somerville, Power, and Carteret, 2009, p. 208) and while most Australians have benefited from the development of the Basin, it has been at the cost of the health of the river system.

The 2000's drought marked a shift in public awareness of climate change and heightened the nation's consciousness that the Murray-Darling river system was in crisis. Many irrigating communities, fragile from years of drought, saw the Murray-Darling Basin Plan as a government induced drought. However, seen more positively, this crisis offers an opportunity to all Australians to work towards healthier rivers and less vulnerable communities. Williams et al. (2009, pp. 2-5) advocate we take responsibility to assist our communities to make the required adjustments by bringing people together for meaningful discourse to communicate community, scientific and socio-economic knowledge so that we achieve a concerted and coordinated action.

4.3 Concerns about the Murray-Darling Basin Plan

The Murray-Darling Basin Plan (see Chapter 2 for background) is an attempt by the Federal Government with the support of the Basin states to reinstate health to the river system. Holling and Meffe (1996, p. 330) claim that as a result of command and control, when a system is in difficulty "lobby groups battle other lobby groups and generate the gridlocks and train wrecks" that are evident in the implementation of the Murray-Darling Basin Plan. Williams et al (2009, p. 1) see it as an opportunity to "rebuild our Murray-Darling heartland" but the current approach is flawed and "irrigation communities already suffering see it as another attack on their livelihoods".

In public meetings on the Basin Plan, I heard the anxiety expressed by members of rural communities due to the increased uncertainty it caused. Coming out of a debilitating drought their distress is understandable but Kevin (2/8/2012) believes much of the fear is unjustified and has been caused by the way the plan was introduced, echoing the sentiments of Williams et al (2009, p.1).

Alice (12/4/2012) thinks fear in the community has affected her students, who express it as resistance to new ideas. Most of the losses, real or perceived, are in employment in related industry and shrinking populations in larger areas of Leeton and Griffith. The not knowing plays a large role in generating fear. The farmers and community members feel they are not being told the whole truth, they don't know the extent of the changes that will occur and the subsequent losses they will endure. Alice wants a healthy environment, but she also wants up front honesty, facts and an easing in of change.

For communities to begin to shape their futures it is so important that there is honesty and transparency in the magnitude of the water extraction that is compatible with a healthy Murray-Darling. I am not sure that has been done (Interview, 12/4/2012).

Alice understands that the top down approach of knowledge transmission does not work in her community and change needs to be incremental if it is to be accepted with any good will. She agrees with Kevin (2/8/2012) when she says there is a the need for assessment of smaller geographic areas, as the same river has a diverse range of natural environments.

The biggest issue for Glen (1/8/2012) is the river. There is real fear more water will be allocated to the Murray-Darling system than is stated in the plan. He sees it as political

and the worst part is I think they are going to sign off on it just to get it off their back ... This is a very productive irrigation area but you need water to be able to do it (Interview, 1/8/2012).

For irrigated crops that are forward sold like maize and cotton, reliable water supply is vital when calculating future production. For Glen's enterprise to survive and maintain its value he must have affordable irrigation water because he says he is getting the same money for wheat, maize, sheep and beef that he was getting thirty years ago. He fears he could be priced out of being a land holder. Glen is frustrated at the lack of respect agriculture has and the lack of control he has over his input and

output costs. Water is a political issue but Glen feels farmers have been underrepresented on management committees.

People put valuable time into it and go to the meetings and they just don't get heard. You get some bloke who has given up his good valuable time and he goes away to Forbes or wherever for meetings and in the end they just give up (Interview, 1/8/2012).

The irrigators in the Lachlan valley had negotiated a good environmental flow. The government then took another 30% of water from them. Glen thinks they will demand more.

Larry (2/8/2012) reflects;

They have already taken bore water off us and river water and the off allocations water¹⁰. They have been nibbling away at us and the prices are going up and up and up. They took water off us and they bought water off us and now they are going to try and price us out. Only a few years ago it was only \$10 and then you have to pump it and pay for power so [now] you are up to around \$50 a meg (Interview, 2/8/2012).

Larry is pessimistic as he expresses his perception of the rising cost and loss of availability of water that he thinks will continue as a result of the Murray-Darling Basin Plan.

4.4 Learning

Learning from agronomists and technology

Alice (12/4/2012) thinks scientists, research centres, and the Department of Primary Industry (DPI) are valuable to learning for farmers and for those within the broader community. She appreciates the intellectual stimulation they provide to her

¹⁰ Off allocation water is extra water allowed to farmers in times of high river flow.

personally, as she is sometimes drained from negative work experiences. As a teacher, she values the contributions from their children because they add a broader dimension to the often traditional attitudes of rural students. She believes she has more success in schools in larger regional centres due to the influence of scientists and DPI personnel.

Clive (8/5/2012) was innovative and changed his farming methods over forty years in response to climate and economic conditions, being one of the first in Australia to try canola. To eliminate one form of uncertainty, availability of water, he was proactive and joined a government committee to ensure irrigation came as far as his place. He was a member of a farm management club that employed an advisor who helped the members record details of their farming operations onto a computer which initially the University of New England interpreted. Clive soon learnt the program and accessed his records to predict the most profitable operations for himself. He understood how information technology revolutionised his farm work and although he did not use all the programs available he used what he needed and was not afraid to learn. He also accessed information from the Trangie Research Station which ran field days and he had contact with the Conservation Farming Association.

With irrigation Clive tried different things, learning from the interpretation of his records and trial and error. He learnt what was working for other farmers and gave it a try, such a minimum tillage and new machinery. Because Clive was an innovator, trial and error as well as agronomist support and technology were significant learning strategies.

Bob (15/4/2012) used a computer from the early 1990s, although he laments poor internet connections were, and in some places continue to be, a source of frustration to many farmers who use it to access information demanded by the business model of farming. He realised his farm was changing from a lifestyle to a business that required additional managerial skills. The business model was exacerbated by the deregulation of the grain market with farmers now being responsible for their own research into marketing options which makes them more competitive with each other than they had been in the past. Unprecedented rising costs coincided with the drought which caused consideration of costs to be even more important. Increasingly farms

had to be run as an efficient market and cost driven business where all decisions are economically rationalised.

The Department of Primary Industries offers invaluable help to farmers on the ground and Frank (1/8/2012) is concerned about government threats to close their district offices. He attributes most of his learning to the district government agronomist and his field trips although he also uses the local agronomist and the commercial advisors too, because they are trusted, grounded and practical. He is a member of the Central West Farming Systems which performs trials and looks at various farming techniques, and he attends their field trips where he has the opportunity to talk to innovative farmers who are trying new machinery and techniques. Frank expressed it as “It might be the old farmer versus the new boys and an old farmer might be hanging in there”.

When Jack (2/8/2012) installed a new irrigation system he sought the advice of water engineers. Of all learning situations, Jack prefers field days.

You go to field days and that sort of thing and you see all the articles they have there and you source all your information from those sorts of days ... We basically find all we need from those sorts of things. You can never be too well informed in this game, so the more field days you go to the more informed you are going to be (Interview, 2/8/2012).

Kevin (2/8/2012) and his staff regularly attend conferences, workshops and field days. He says, “One of the joys of the cotton industry is they are incredibly open, there is a sense which I am not your competitor” because competition inhibits sharing of information. He says that farmers who enter the cotton market have immediate access to stable markets, all the tools for forward selling, infrastructure and agronomy support right around them. One of the things that have kept the cotton industry in a

very good position is the Cooperative Research Centres¹¹, providing networks, relationships and contacts. The owner of the company has a passion for looking to see what is happening around the world so Kevin has access to that knowledge as well. Kevin motivates his staff to learn new strategies and he constantly reviews new material, even that with which he disagrees.

On the other hand, Larry (2/8/2012) only consults the district agronomist if he has a question about a weed or a bug but says there are no local agronomists who specialise in lucerne, unlike cotton. He realises he ought to be proactive in seeking more up to date knowledge because

You use the same chemicals for years, the same this, the same that and everything is just a carbon copy of the year before, yeah. Well it works and that is why you sort of stick to it I suppose. The chemical I use, that all works good, the fertiliser is good, all runs smoothly, good yields so I suppose I really haven't got to improve on something that is working so well (Interview, 2/8/2012).

He does access information from the local agronomist from whom he buys chemicals and fertilizer. Larry finds it more satisfactory to gain knowledge by talking to experts at local information days. He appreciates the regular information days the water resource personnel provide, especially during the drought, which helped him cope with changing rules and conditions of water management.

Martha (2/8/2012) sees farming as an industry targeted for agronomist support for technical, management and planning information. "The joke in the farming community is the two day workshop." There are so many two day, one or half day workshops available plus meetings, that farmers could easily be involved in education and not have time to farm. Education is provided by the Department of Primary

¹¹ The Cotton Catchment Communities Cooperative Research Centre (Cotton CRC) is a research cooperative body set up by the Federal Government and it was funded until 2012 (Cotton catchment Communities [CRC], 2011, para. 1).

Industry and private companies. Currently government funding is available to encourage people to attend succession planning work shops run by private companies. Farming groups such as Central West Farming Systems based in Condobolin have sites near Hillston that run regular workshops. Resellers such as chemical companies run regular workshops on using chemicals or controlling pests. Banks run financial management and investment workshops, and grain sellers run grain marketing workshops. There are also workshops on getting lambs just right for the butchers - there are many workshops on all aspects of farming so farmers are used to going to workshops. Field days are well attended where farmers talk to each other and to agronomists. Sometimes they see the field trials side by side and hear researchers talk about their latest findings.

Norman and Narelle (2/8/2012) are teachers. They understand that farming is a business and observed that bank foreclosures of the early 1990s and the last drought 'weeded out' a lot of financially inefficient farmers. Now most farmers are skilled and knowledgeable. Their children are not the same as the generation who came off the farm thirty years ago, "doing a bit of fencing and a bit of shooting, and helping dad on the tractor". Young farmers are doing TAFE and other tertiary courses to improve their skills, including business studies. To be successful business men and women requires they are innovative and risk takers. Norman and Narelle predict the next generation of farmers will deal with more extremes of climate and see farmers in a constant state of adapting to economic and seasonal changes. They make the point those farmers with crop rotation run a long cycle so their's is a longer term adaptation than an economic three month cycle.

The district government agronomist was endorsed by every farmer, even Larry who did not need him as much as the other farmers. Being on the forefront of communicating new methods, the agronomist has a responsibility to local farmers to keep up to date with new ideas and the latest methods and to the environment where the changes he supports have positive impacts on sustainability.

Learning from marketing

In an effort to gain some control over marketing, Frank and Fran (1/8/2012) bought silos to store grain until the price becomes favourable. They purchased a header to get grain harvested at the premium time and cart their own grain to storage heads, using a local company to assist with grain storage and marketing. They would like to see the reintroduction of a floor price to give stability and minimise the risks inherent in their farming operation.

Glen (1/8/2012) prefers to use the services of a marketing company because he says

A lot of farmers aren't educated like that any way, they don't want to have to sit around watching the computer all day. They don't want to have to work all day and then come home and market their wheat. It is a long enough day in the summer as it is (Interview, 1/8/2012).

Maize and cotton, irrigated crops with a more certain water supply, are sold on a forward market to guarantee a price so it is important farmers are aware of what is happening in the market. Advice comes from the marketing company who email or fax or SMS everyday with the changes in the market. "So the world has changed as far as that side of thing goes. The learning goes on in the paddock with a mobile phone" (Glen, 1/8/2012).

As a manager, Kevin (2/8/2012) understands the business associated with marketing.

In Australia there is not enough population to guarantee a strong domestic market so we're basically price takers. Therefore our production of every type of grain or fibre must be at the top 5% of production quality. If we miss that we fall into what the majority of the rest of the world is producing, and that price is unacceptable to our lifestyle. Our activity and goal has to be in that world market. That influences the way we make decisions out here. Commodities can be sold on the futures market. Hence security of water supply

makes a huge difference. The biggest pressures are short term prices that are outside our control. We have got to try to manage that variability. The tools that help us manage that variability in commodities are forward selling, taking a position in Chicago on futures, taking a position in currency. If we perceive there is a place where that can help us we can take that position and that is one way to get stability (Interview, 2/8/2012).

Learning from talking to other farmers, looking over the fence and experience

Although farmers talk a lot about what they do, Frank (1/8/2012) does not think he has learnt much by doing that. He “looks over the fence” comparing what is happening on his place with other farmers in the area. Frank finds literature a valuable source of knowledge such as *The Land, Groundcover*, “anything that comes in the house”. He appreciates the science that is being employed today in soil management.

Glen (1/8/2012) is part of a close knit local community of irrigators, many of them young, who are his primary source of information. He says word of mouth between farmers where ideas are shared is important.

We are still learning now because the kids have all gone through uni and done their Ag. Science and they are virtually agronomists so they have their knowledge to pass onto us. I appreciate it really because you can't afford to be doing it wrongly (sic). If they have a better idea that has been proven, especially with cotton or something like that, you just can't ignore anyone's advice. If someone has some good advice you take it (Interview, 1/8/2012).

Jack (2/8/2012) graduated from agricultural college in 2000 and participates in a local communication network.

We were some of the first people to get the central irrigators so there was a fair bit of interest in it. They actually had a field day out here

to get everyone informed about it. Bring them up to speed. It is always a help to harness as much information as you can, isn't it? And since then a lot of people have changed over to the sprinkler irrigators (Interview, 2/8/2012).

Larry (2/8/2012) learns most from local "hearsay and what somebody else is doing and what not". The local rugby league club, which closed as an effect of the drought, and the hotel were "somewhere you can find all the information you want". Larry sees the hotel as a place to debrief and unwind, being valuable to mental health, and which is not used as much since DUI¹² laws came into effect.

Clive (8/5/2012) talked to his peers locally, shared his knowledge with them and learnt from them. He also observed what they were doing. He watched Landcare "with interest" although he did not become involved with them. He also purposefully shared knowledge in a cooperative to build channels for irrigation.

That is where I learned how to be an irrigator, by going to meetings to build the channels. We travelled around and went to different places around the state. Because we knew we were going to be irrigators in two or three years and we had the ear to the ground wherever we went. We learnt what we could and we were given bad advice as well as good advice (Interview, 8/5/2012).

Learning from drought and water

Since the drought Glen (1/8/2012) has increased cropping and downsized the number of livestock he carries. He has sunk a small bore to provide enough good quality water for domestic use and live stock. He attributes his resilience to having a strong family and the support of irrigators up and down stream who were experiencing the same problems.

¹² Driving under the influence of alcohol

Ivan (1/8/2012) is a local businessman who comes into daily contact with a broad cross section of the community, especially women. He has a community perspective and has seen “shearers and sheep, cattle and cattle people numbers decline” as a direct result of the drought. Bank sales and offers from the government meant some farmers have left the district. As a result business sales figures went down, local businesses had to reduce staff and owners were forced to work longer hours themselves.

Ivan was helped through this time by support from customers, business associates and members of a local community group. He believes a lot of survival is common sense. He performed a service to the local community during the drought by carrying accounts between \$120 000 and \$140 000 a month on the books but he had to pay for his products each week. At the time of the interview he was still carrying a few accounts from the drought and is therefore carrying some debt.

Jack’s (2/8/2012) property did not have the irrigation infrastructure during the drought that it has now, and it was that difficult experience that caused them install it. Buying feed in the drought was costly; in 2003 Jack (and his father and brothers) spent over \$500 000 on fodder alone. They have recovered from it now and “don’t like to dwell on it too much”. Jack sees them going through cycles so they are preparing for dry seasons all the time.

From the end of the 1990s to early 2000s Kevin (2/8/2012) spent a lot of time working with water sharing plans for stability and security of access to water.

The Vegetation Acts¹³ are also about security, building confidence in a stable future. The Murray-Darling Basin Plan has over layered that work and has a one size fits all approach ... after all those years of fighting for individual characteristics for our valleys (Interview, 2/8/2012).

¹³ The Native Vegetation Act 2003 manages native vegetation in NSW by preventing broad scale clearing unless it improves or maintains environmental outcomes (NSW Government Environment & Heritage, 2013, para. 1).

It has caused a deal of antagonism with rural people and Kevin thinks the approach was politically motivated.

Larry (2/8/2012) put a bore in before the drought which allowed him to keep growing lucerne and because lucerne prices rose through the drought he did quite well. He believes water supply is over-regulated now and things have changed.

It is business now. You have to be right on the ball. When the river was high there used to be off allocation irrigation¹⁴ but that is no longer allowed. Somebody done (sic) some deals with it along the track and there is no off allocation any more. And wouldn't it be sensible to use this water now. It is just flowing past down to some swamps or something now at the end there. It would be more logical to use it while there is a nice full river there wouldn't it?
(Interview, 2/8/2012)

Working in community engagement, Martha (2/8/2012) was aware of the resources available for the farming industry during the drought such as business support, interest rate cuts, grants, low interest loans and transport subsidies. The Department of Agriculture provided rural support officers that gave some personal and community support, Centrelink put on extra social workers and rural financial counsellors were provided from federal and state funding. Presently the Rural Adversity Mental Health program focuses on helping farmers cope with climate change and Centrecare and Mission Australia run various programs. The Uniting Church has a presence in the bush, the Salvation Army has four couples working in rural chaplaincy and the Presbyterians have one couple.

However even after ten years of drought some people were unaware of what assistance was available despite a high level of publicity. Martha feels

People are only going to access or hear the message when they are ready to hear it. They will always swear blind they did not know it

¹⁴ Extra water that is available for irrigation on top of allocated water.

was on but I think it is more a case of they just weren't ready to know that information (Interview, 2/8/2012).

She talked about other reasons farmers survived the drought.

Some had very little debt going into the drought so they were able to gradually increase their debt and survive ... there are some people who are adaptable and resilient and find the best ways to cope. A small but significant number of people were unable to leave the industry for a number of reasons. They were locked into a family business or they did not have the educational and personal skills to actually go through the process of selling and moving away and finding a totally different career. Sometimes their debt was so overwhelming they could not sell up until the bank sold them up. Another reason was the sense of family history that was often around a property and/or the issue of succession (Interview, 2/8/2012).

Martha saw different phenomena happening as a result of the drought. People had less mental energy so there was less creativity or innovation. Succession farming was affected by some farmers telling their children not to come home to work on the farm. In other cases the son and his wife decided they were fed up without having any money and left the farm to find work and in a few cases the elderly parents could not afford a contractor and told their children they were needed to come home and run the farm. People's lives were changed; some for the better because it gave them permission to seek a different future than what was envisioned. In some cases it has been a loss. Since the drought she has noticed farmers are working to find long term solutions to dry conditions.

4.5 Does being conservative and averse to change hinder learning?

Doug (28/5/2012) said being conservative should not be construed negatively. Being conservative is looking at the detail, improving the current system until it works well. Being non-conservative can mean looking at the bigger picture, looking to change the system instead of improving the old. Both have value.

Larry (2/8/2012) considers himself to be conservative; he did well in the drought and has not over reached himself financially. At nearly fifty he has educated his children and owns a large home on the banks of the Lachlan River. He sees his future as being more leisurely and enjoyable. Larry identifies as a producer of food but does not express a strong responsibility to feed Australia or the world.

Martha (2/8/2012) admits

There are lots of reasons why farmers are ignorant but there is no reason for that to be the case. One reason is they are conservative, being older than the Australian average which makes them less acceptable (sic) of change. Sheep and beef industries have the oldest profiles of the farmers; the average age of those farmers is in the 70s; an older, more conservative profile. When you have got three families relying on an income from the farm then you are a bit risk averse (Interview, 2/8/2012).

She expressed a concern for the farmers in that sector who are forced to leave farming when their methods become untenable and feels they need to be targeted by educational programs so they can stay in the farming sector.

These people will have difficulty fitting into other work places and are generally suited to farming but are being left behind as technology and sophisticated methodology advance. This is an area in the farming community which is neglected and paid little attention (Interview, 2/8/2012).

4.6 Conclusion

Each farmer has expressed his/her own way of learning to deal with the uncertainty of rainfall and water supply, markets and costs, with the exception of Larry, who remains an example of conservative practice. He is happy with business as usual and although he is critical of the loss of allocated water and its increased cost he has managed to work around it. His lucerne crop is watered by a bore and throughout the drought he did quite well. As a contractor he has a diverse income which has helped keep him debt free, so he sees no reason to change his practice.

Frank and Fran are increasing the size of their property, the amount of machinery, their work load and their debt to stabilise the return on their harvest. Kevin and Jack are innovative and experiment with irrigation and high capital cost efficiencies to increase their control over the variables of water and marketing. Glen is diversifying and taking advice from the younger farmers around him. He, like Jack, is hoping to grow enough feed to store in silage for the next dry time although he thinks he has experienced the worst drought he will encounter. His capital costs did not appear as high as those of Kevin and Jack, perhaps because he strives to remain debt free as a strategy for stability.

Kevin sees his work as a business manager but Bob who is currently working off his farm came to the same conclusion in an effort to stay in control of the farm business. Although Clive has retired, he relied on technology to guide his decisions as well being innovative and efficient. Kevin, Clive, Bob and Jack value knowledge and work hard to maintain stability in an uncertain work environment. Glen and Frank and Fran are also keen not to be left behind but are more risk averse. All rely on the work of the district government agronomist as a source of knowledge and agent of change.

Will working harder, buying more land and machinery, consulting the best agronomist, being an IT expert, becoming a competent futures trader or installing more irrigation equipment appreciably reduce the level of uncertainty? It may be wiser to “embrace uncertainty and unpredictability” (Holling, 2001, p. 390) and to look at the benefits of learning about sustainability. In the following chapter I

examine the responses of the interviewees in relation to learning about sustainable farming practices.

Chapter Five: Learning about sustainability.

With nine years of drought, if farmers abused their land, they wouldn't be here now. Farmers can't flog their land now, it costs you too much. They have to look after their property but it is a productive asset. Thirty or forty years ago production was increased by clearing another paddock. Now a property has to service the debt on it so methods are improving; it is really industrialised agriculture (Norman, Interview, 2/8/2012).

The purpose of this chapter is to examine the understanding and attitudes farmers have toward the concept of sustainability and how it enhances or detracts from their learning about sustainable farm practices. I will begin by telling the stories of interviewees Bob and Beryl, Clive and Cheryl, and Jack in relation to their learning about sustainability. The theme of sustainability is further developed in subsequent sections where I use testimonials from the interviewees to describe how they learned about sustainability and how they implement sustainable farm practices. I then comment on identity and local community before discussing the politics of sustainability and how it impacts upon rural attitudes. This chapter concludes with a reflection on issues affecting learning and how farmers see themselves on the continuum toward sustainable farming.

5.1 Stories

Bob and Beryl

Bob and Beryl's is a story of care and healing. After relocating to another farm, Bob and Beryl and Bob's father fell on hard times due to drought and less favourable economic conditions. They set about learning how to improve their land and to make the most of technology and new market opportunities.

Bob and his father are innovators. Through Landcare they were part of a research program into healing degraded soil through a process known as liming¹⁵. This program affected Eastern Riverina with far reaching and ongoing positive

¹⁵ See 5.2 Learning subsection Landcare in this chapter.

environmental and economic results. Bob enlisted the help of agronomists, scientists and government agencies in his quest for knowledge and skills. He also talked about taking measures to reverse erosion, lock up remnant forests and plant trees.

Both he and Beryl used the term lifestyle which indicated farming for them was more than a business. They lamented the shrinking of rural communities, not only for social opportunities but as a place of shared learning, personal and relational health, and well being.

Bob predicts some problems in the implementation of the Murray-Darling Basin Plan due to the independent operations of farmers. He also sees problems relating to farmers' attitude of their right to farm as they please, especially the old squattocracy which is still prevalent in some western areas. However, he believes most farmers are land carers and have a genuine desire to leave their land better than they found it, not only for their children but as a general principle. At the same time it is a business which means sustainable farming must also be profitable.

Bob and Beryl leased their farm six years ago for ten years. Their children are not interested in farming and they feel many farmers have sold their soul to agribusiness companies and the rural life style is being lost. The future for them remains undecided, but whatever the outcome they will retain a keen interest in farming and the environment..

Clive and Cheryl

Clive and Cheryl are retired farmers enjoying their well earned rest in the inner city; which is quite a change from living most of their lives in a small rural community. After hearing their story this city change is hardly surprising. Theirs is a story of life long learning, change and innovation. Both Cheryl and Clive admit to being brought up in ultra conservative families, particularly Clive. They now speak of being transformed by learning.

Clive was tertiary educated in agriculture and began experimenting with new farming methods early on, one experiment even getting him on the local TV station. When irrigation was beginning in his area, Clive made sure it came to his area by being part

of the committee, and helping to build irrigation channels. That is how he learnt to be an irrigator. Clive was an active member of cooperatives and learning communities and he welcomed technology to assist in his farm management. He and Cheryl also went to the USA to learn new farming techniques, taking the opportunity of a drought when they could not farm effectively. Clive connected with local agronomists, scientists and advisors and took opportunities for learning as they presented themselves.

Throughout their time on the farm, Clive and Cheryl were always looking at ways to improve their farming methods; better for the environment, better for profit and better for themselves, the triple bottom line. Although they continue to demonstrate an awareness of the environment and recognise the changes that had to be made in irrigation to conserve water, they are pragmatic and acknowledge the role chemicals have played in helping to restore soil structure.

While Clive gave time and energy to doing new things, he was as much a teacher as a learner. Cheryl and Clive have also learnt from their children, broadening their attitudes in many areas and marvelling at the change of lifestyle young men now have in regard to raising their children. During the tougher times they pulled together and are a great emotional support to each other. Cheryl remembers the stories of her elders and has used some traditional learning over the years, finding it especially helpful in knowing the hard times will pass. They continue to show strong faith and perseverance in all they do, and are inspirational to those around them.

Jack

Jack is a young fifth generation farmer who works with his brothers and father on a beautiful property out of Hillston. The day I saw it, it looked green and prosperous. Stands of trees stood out on the flat plain and pivot point irrigators watered a healthy canola crop.

Jack is proud of his family's achievements and for good reason. They survived the long drought, keeping their merino sheep and cattle alive on purchased stock feed, at great expense. They learnt a lesson and decided the best way to prepare for the next inevitable dry season was to develop their irrigation system so they could grow and

store their own feed. In this they are leaders in their field and have hosted field days to share their expertise with other farmers.

In Jack's experience he doubts the government is really interested in them.

We went to Forbes to the big meeting they had on the Murray-Darling Basin. A lady stood up and said all farmers are environmentalists. We want to be sustainable and we want to be here for the long haul. We don't want to degrade the land and we want to keep every thing in good stead but I don't think they really heard what she was saying. I don't think they take enough notice of what we actually do. I don't think they understand it (Interview, 2/8/2012).

Reflection on the stories

The above stories are good news for sustainability. Bob and his wife Beryl and Clive and his wife Cheryl have demonstrated a deep learning about sustainability. Despite their farms being run on a business model, their change to a new way of operating shows they were both willing to take risks for the benefit of their soil and to reduce their water consumption. Jack understands he must be sustainable if he is to "be here for the long haul".

To understand how farmers learn it is important to understand their motivation to learn and change to environmentally sustainable practices. Many of their decisions depend on family and community pressures and how holistically or otherwise they view agriculture, the landscape and themselves as an agent of change. Farmers need to be educated socially and culturally as well as technically to appreciate the big picture of sustainability while making it work on their individual farm.

The Murray-Darling Basin Plan has given, and hopefully will continue to give, the opportunity to discuss local management issues and research sustainability within the farming community, although Jack's experience says otherwise. Farmers in the Basin are encouraged to see sustainability as achievable even if it is a long term goal that could mean changing a whole system of production.

5.2 Ways of learning

In any aspect of human endeavour there will always be those few who are willing to risk trying a new method, and there are those who change after observing the success of the innovators and early adopters. Some will always be resistant to change under any circumstance. The most successful farmers are able to manage change, seeing it as an opportunity to learn about new methods and although they might value traditions, are not impeded by them. By changing of their own volition, these farmers are more in control of their lives which makes for a happier and more secure person than one who changes only when forced to (Napier, 2004, p. 24).

Learning from Agronomists

Agronomists from the NSW Government Department of Primary Industries (DPI) have been and continue to be instrumental in supporting farmers, particularly in organising field days which are a preferred learning environment for many farmers. With the withdrawal of government funds many government agronomists have moved either to their own private firms or large agribusiness or chemical companies. While still providing sound information some are restricted by the company for whom they work. As there are not enough advisers to personally assist every individual farmer, whose job involves integrating many systems of land management on the farm, farmers need to be proactive and not rely absolutely on agronomists for all their information.

Glen (1/8/2012) and Kevin (2/8/2012) keep in touch with DPI agronomists from Griffith Irrigation who offer a lot of guidance, while the district DPI agronomist keeps them up to date with what is happening through faxes and emails and recommends information sourced on the internet.

As a farmer and educator, Doug (28/5/2012) discussed adaptive learning for farmers as a resilience strategy. He said that ideally, educators, i.e. agronomists, should work in multi disciplinary teams which motivate, provide access to knowledge systems,

provide technical knowledge and build interpersonal relationships. They need to be visionary and allow the farmer to micro manage his/her own land. Following a history of environmentally unhelpful advice to farmers, the NSW government agencies are finally beginning to develop educational structures to assist in bio security which ideally takes a holist approach to farming in the wider environment, in terms of both short and long term impacts (Eastburn 2001, p. 10).

Learning from Landcare

Although nationally Landcare is a primary instrument of environmental improvement, Doug and Bob and Beryl (15/4/2012) were the only farmers interviewed who participated in a Landcare group. While Doug's involvement was concerned with a local group of farmers who planted trees on their properties, Bob and Beryl were engaged in a more comprehensive Landcare project¹⁶. It was partly funded by the government and brought benefits to the wider district of Eastern Riverina by testing soils for acidity, mapping the tested area and treating them with lime. This project provided major benefits to the soil and consequently increased production in the region. Bob and Beryl regularly used science to test their soils and met the challenges set by the scientists. They both accept climate change science and see it as an opportunity for the wider society to become involved in land management techniques because they perceive the effects of climate change are experienced by everyone.

Tree planting and preservation is occurring in the Hillston area mainly due to the efforts of individual farmers. For example, there are a lot of trees on Glen's property that can be converted to cash but he does not allow timber cutters in. He says

Our kids would not forgive us if we cut all the trees down. It could have been worth a lot of money, but once they are gone they are gone. You can replace them with a little tree but we are not going to see the little tree for a long time. How old would that tree be? (Interview, 1/8/2012).

¹⁶ Alma Park and Henty Landcare Group Catchment Plan, 2001

Jack (2/8/2012) does his own land care. He has planted groves of trees to provide a habitat area for native birds and wildlife. He mentioned that the CMA (Catchment Management Authority) was going to plant some trees for carbon credits but nothing happened. Frank and Fran (1/8/2012) participated in a government CO₂ offset scheme which saw the planting of 80 000 trees on the boundaries of their place over which they have no control for 150 years. They are happy that the trees provide a wind break and have received some small remuneration for participating in the scheme. Evan (31/7/2012) is emotionally attached to the trees on his property and experienced difficulty when he had permission to remove some from the centre of his paddocks to make room for new, wider machinery. He will plant replacement trees in another part of his place but for him it is not the same.

Learning from IT

Using computer skills to access information can assist farmers to source independent information while social media facilitates contact between them. The majority of farmers I interviewed used the internet but preferred personal interaction. None mentioned using social media to network. Jack specifically stated he did not use the computer, even though he was the youngest farmer interviewed and tertiary educated.

Learning from Agricultural Colleges

Clive (8/5/2012) attended an agricultural college after leaving school and continues to learn. As a farmer he conducted his own experiments and even after selling his farm Clive continued to attend field days and seminars, marvelling at the high level of scientific understanding of the younger farmers. Doug (28/5/2012) also went to an agricultural college before returning home to the farm. After a few years he pursued a career as an agronomist with a CMA to supplement farm income. He is supportive of climate change science and is conducting his own experiment with sustainable farming. Doug continues to learn from multiple sources and his foundation in tertiary education gave him the opportunity to work as an educator with access to the latest

ideas and knowledge. Jack (2/8/2012) completed his course at an agricultural college prior to returning to work on the family farm. He said he uses a lot of what he learnt there but values the knowledge passed on to him from his father and grandfather.

Learning from Conservation Farming Groups

Harry (1/8/2012) thinks farmers have “woken up to themselves”. He sees active conservation farming groups in the area where farmers put into practice what they learn. Conservation research groups, that are generally a group of farmers and agronomists, use web sites for research.

Learning from Trial and Error

Evan (31/7/2012) uses trial and error as a learning strategy. He said farmers talk to each other and discuss what they are trying because there is no hiding of information amongst dry land or cotton farmers. He sees experiential learning as important too, learning from year to year; building on prior knowledge and experience. He says having confidence is important in knowing when to call the agronomist, when to trouble shoot or when to leave well alone.

Learning from Neighbours

Jack (2/8/2012) works his farm with his father and brothers. He is actively learning from his neighbours who are a family concern and trialling new methods of organic composting among other things and sharing what they are learning. Jack sees strength in the diversity of ideas that are valued within the family system of farm management as opposed to that of a single operator. He also sends soil samples away to be scientifically tested.

Learning from the Environment

The farmers were unanimous in their agreement that many changes in farming methods have occurred over the last twenty or more years. Changes to irrigation methods were begun before the drought to aid soil conservation. Clive and Cheryl (8/5/2012) saw what had happened in USA as a result of over allocation of artesian water and they expressed concern about the detrimental effects of over allocation of water for irrigation in Australia.

Evan (31/7/2012) said that for him the changes have been driven by price and drought.

It was price signals, water became expensive and the extraction costs became more expensive so we had to make sure we recycled all the water ... We put in drainage and recirculation systems so all the water that went into the bay ended up going around again which was all good. On the dry land side of things we are far more conscious now of farming moisture ... The changing climate has not necessarily done that, what has really been the driver of that has been the increase cost of growing crops (Interview, 31/7/2012).

Regardless of the change in climate, cropping has become more expensive, a failure hurts far more than it did in the past. Fixed and variable costs are high so the imperative is to make every millimetre of water count. Evan is conscious of weed control because weeds suck moisture.

He reported there has been a huge uptake in minimum or no tillage cropping. This is where the stubble of the previous crop is left in the ground and the new seed is planted in rows between it. The soil is not ploughed as in the fallow method where the soil is ploughed up to as many as five times within an eighteen month period between plantings. There are disadvantages with no tillage in terms of management such as disease, physically getting through the stubble can be difficult, moisture and spores from the previous crop are probably detrimental to the yield in a good growing season but in the dry years, (dry years are not necessarily drought years which are more

extreme) when the need is to extract every possible millimetre of moisture and get every possible kilogram of grain, there is real benefit from having that stubble.

Evan, like many farmers in the district, is beginning to control traffic on his paddocks. The tracks in the paddock are predetermined with Global Positioning System (GPS), the machinery is set and is controlled by auto steer guidance. This is about conserving moisture because it minimises soil compaction, enabling better water penetration. Due to the width of machinery, lone trees in a paddock can be a problem and farmers must get permission from their Catchment Management Authority to remove them from their property. This is off set by planting clumps elsewhere on the farm.

Evan also sees the wisdom of not farming in a drought.

Realistically you were probably better off if you kept your machinery and fertilizer and seed in the shed but you end up in a bit of a dilemma from an environmental point of view because if you've have got bare paddocks ... because no matter how you farm, you lose your ground cover in a drought, it just blows away (Interview, 31/7/2012).

As a future plan Evan would like to see his soil in better condition. If the climate is changing and drying out he sees just maintaining profitability would be his goal, achievable through such strategies as improved wheat breeding, better use of nutrients, other practices to do with moisture conservation and softening up the soil.

Frank (1/8/2012) is also aware of the benefits of minimum or no tillage cropping but is not convinced it is the way to go and is only using it for half of his cropping paddocks. For the remaining land he uses the traditional fallow method, where he works the land with his tractor four or five times between planting. The purpose behind both methods is to reduce weeds and therefore maintain moisture. Frank has changed from twelve to eighteen month fallows in an effort to care for his soil. As he is experiencing success with both methods he sees it in his economic interests to continue this way, thus hedging his bets. While minimum tillage prevents wind and

rain erosion there are disadvantages such as mould, mice and difficulty of sowing seed. Frank thinks minimum tillage is cheaper but he gets a higher yield from worked land. He is also concerned about the effect the 2012 Federal Government carbon tax will have on the cost of their inputs such as fuel, fertilizer, freight and power.

Harry (1/8/2012) thinks farmers in general are taking more notice of stocking rates, are using conservation tillage, leaving their cover on the ground and not baring their paddocks off, so the country is generally a lot healthier than what it was. However, the motivation for these practices is cost; the increased price of fuel has made a big difference. It is cheaper to use chemicals to keep the weeds off the country than drive the tractor, ploughing it four or five times. This has been a main reason for the switch to no till farming.

Harry applauds the efforts of the cotton industry as one of the bright lights for the environment in Australia because of their farming practices. He is not a cotton farmer himself but living in a cotton producing district he has observed the changes.

I think they are marvellous, the way they have got their act together in ten years is phenomenal. They are the best soil managers I know. When they have picked their crop they have another machine that comes in and chops up all the plant that is left and the root material and puts it back in the soil. And their soil in the future is going to be much better than anyone else's soil because of their farming practices. ... Cost has a lot to do with it and an awareness of the environment I'd say (Interview, 1/8/2012).

It is generally agreed that farmers who survived the drought were sustainable and did the right thing with their land. It is acknowledged that a healthy ground cover is the secret to looking after soil. Harry is experiencing difficulty with woody weeds on his property. Although they are all native species they have become thick and when woody weeds are too thick nothing grows in between them and soil is exposed. Harry suspects "it is what man has done to the country that has made them go like this". Harry also sees woody weeds becoming a problem for farms purchased by the government and turned into national parks that are being locked up and not managed.

He is also concerned large companies are taking over farms in the area with detrimental results for the environment and the community.

Other environmental problems include salinity, which seems to have been resolved in NSW with improved irrigation practices. Control of rabbits has been a big plus for the environment, although their numbers are again increasing. Harry is proud of the efforts of the wool growers who paid a subsidy to the CSIRO who carried out research on rabbit control with celiaci virus and myxomatosis. He says mistakes are still being made with the change from merino to dorper sheep that eat out everything. He believes it “will even out, they’ll learn”.

Harry sees himself as an environmentalist. He has improved his soil since taking the property over fifty years ago from a big stock feed company who “flogged it”. He is pleased “it is totally different country now”.

My main environment thing is stocking rates. I pay for it in the future because it is the wrong thing, so I try to look after my country, balance my use with what I think it is capable of doing; [financial motivation] is part of it. That is definitely part of it but my responsibility of stewardship of the land is also part of it. There are a lot of inputs into it.

It is a hungry world and we have to feed it¹⁷ and we are getting better at it all the time. These new farming practices are phenomenal. I think we are going the right way about doing things. I think white man made a lot of mistakes when he first came here, mainly in ignorance but he has learnt from it. I had a good friend who was a wheat farmer out on this side of Hillston. When he came they were still clearing their country so they could grow wheat. He is about my age, and when he first started, the idea was you cleared every tree off the paddock and you didn’t leave any. After he did a couple of paddocks like that this green idea got to him where you

¹⁷ This comment was common for the farmers interviewed but is inaccurate. See Chapter 1

have shelter belts everywhere. So he thought; “I might try that” and the next paddock he did, he left shelter belts everywhere, and when he left to go home he said I wished I had woken up to that earlier. Now I have to go and plant shelter belts in that part that I have knocked down (Interview, 1/8/2012).

Jack (2/8/2012) does not maximise profits because his country is understocked in an effort not to degrade it. In dry periods he takes his sheep out of the paddocks and hand feeds them. This is beneficial for the sheep but also the land because they degrade the country and turn it into a dust bowl. Jack considers himself and most of his fellow farmers as environmentalists, with the exception of some share holder companies that

have pumped every last mega litre of water and they are not too worried about the sustainability of the area. The companies tend to do mono cropping [single crop, not diversified] which is harder on the land. They tend to crop it year in, year out. But the neighbouring company is getting better at looking after the land by putting a lot of compost back into the soil and looking at all the bugs in the soil, both good and the bad (Interview, 2/8/2012).

Kevin (2/8/2012) admits he has to be disciplined about environmental care of the farm on which he is a manager. Although the ethos of the company is to give the same care as would be given to a family farm to pass onto the next generation, this is not Kevin’s land and he says he could easily be driven by the bank balance or by short term gain. For Kevin, working towards security is a major goal as he endeavours to cope with the many variables of farming. The triple bottom line is his logical conclusion of caring for the land.

Improving our assets immediately brings alive conservation, sustainability, caring for the environment, caring for the structure we are working within and the ecosystems we live in. That just becomes naturally part of it and that is why coming back to that kernel of improving our assets is a good one. But if we just look at financial drivers or economic drivers alone then we are unbalanced

and that is usually not sustainable in a business model (Interview, 2/8/2012).

5.3 Identity and community

The majority of farmers identify as food producers who are responsible for feeding the world. Evan however, does not see himself this way but he is aware he is a producer of food because of the vendor declarations that have to be signed. “We are very much aware if it is going into cattle it is going into people, we have to think that way. We are not just growers of plants, we are growers of food”.

He feels quite strongly about the shrinking rural communities and the pressure this puts on those families who remain. He sees labour and skills shortage becoming a real problem, with no future for towns the size of Hillston if the predictions of climate change become a reality. The larger centres are already “sucking the life out of [small] towns”.

5.4 Politics of sustainability

Norman and Narelle, (2/8/2012) have observed the strong rural resentment toward the city ‘Greenies’ who are seen as oppositional to farmers, preservationist, anti rural development and supportive of more national parks. ‘Greenies’ are seen as being largely responsible for the city/country divide and while they are generally ignorant of rural issues, paint farmers as raping and pillaging their land. Farmers don’t want ‘Greenies’ telling them what to do, especially if it leads to unfair loss of income which is what water cuts from the Murray-Darling Basin Plan mean to them. There is a consciousness in the community about the way the term ‘irrigator’ has been demonised in polarised media discussion. While there is recognition that the river water has been over allocated by successive past governments, there is also the question of who should pay the cost? People in rural communities often feel like second class citizens where ‘Greenies’ are perceived positively and irrigators negatively. This is a cause of frustration for members of a rural community.

In 2005 Kevin (2/8/2012) used about fifty per cent of his time “maintaining the right to farm” through committee work and looking for consultation with the government. He sees the same thing happening with the Murray-Darling Basin Plan where the government is not really listening, although they claim to have given people the opportunity to consult. Kevin says what is even more demeaning is being asked to submit an application electronically, because “no one ever responds to you and you spend all that effort. You can only dream that you can convince somebody of the argument but you never get the opportunity to hear how it is interpreted. Debate, there is no debate!”

5.5 Reflection

Farmers and members of the rural communities in the Murray-Darling Basin have expressed discontent that they have been left to deal with the consequences of a plan that involves them but one into which they have had little input. They feel blamed for the environmental degradation that has occurred, which hurts them as they express a primary goal is to pass their farm on in better shape than when they inherited or purchased it.

Farmers know their land intimately, a knowledge that is derived from direct and daily contact with their farm. For them, their land is inextricably linked to their livelihood. The health of their land directly affects the health of their bank accounts which has a direct impact on the health of the local community. Their world view as far as sustainability is concerned is localised to within their sphere of influence and is more pragmatic than ideological.

Environmentalists, on the other hand, tend to have a wider world view and are more ideologically driven. Politically and socially there needs to be an improved connection between the city and the bush to relieve the antipathy that is dividing these sectors of society. Suspicion and resentment of ‘Greenies’ and environmentalists has a negative impact on the take up of methods of sustainable farming because farmers are more likely to learn from trusted sources such as the local or district agronomist.

Another problem with farmers' openness to learning is the concept of sustainability and to what degree it is realistically achievable within the context of a capitalist, agribusiness model. Using the Brundtland-definition of sustainable development, "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987), farmers need to be visionary while also meeting immediate demands within the context of present conditions. Where there is a cost-price squeeze, it is difficult to introduce and/or maintain sustainable practices which affect the ability of long-term planning by the farmer, especially on issues as sustainability. Farmers don't want to engage in practices that cause environmental damage, however there is a difference between not causing damage and employing proactive sustainable practices. By simply reducing the use of fuel, chemicals and fertiliser yet remaining within the agribusiness model with the purchase of engineered seeds and the products to assist their growth, farmers are not engaging in absolute sustainable practices, even though they may believe they are.

All the farmers interviewed with the exception of Larry, believed they were making significant changes toward sustainable farming practices, the most significant change being conservation farming (minimum or no tillage). This has revolutionised cropping, the biggest benefits being minimising the effect of soil erosion and moisture retention. It had a slow start because it involved a whole system change which included disease management and rotation of untried crops. It required a change to expensive and experimental machinery and an investment in expensive chemicals.

No tilling became more widely adopted when technology became economically advantageous and the price of chemicals dramatically decreased. Even though no till is now used extensively by cropping farmers, the majority of whom understand the importance of maintaining ground cover, the old way of working the soil still persists by some farmers if they think there is a chance of making a higher profit by using the traditional fallow system. The change to conservation farming was economically driven, as are most changes to farming practice. So while farmers are insistent they care for the land, they continue to cultivate it for their own benefit. To become more sustainable the challenge for conservation farming now is to lessen the dependence on chemicals.

Kevin's (2/8/2012) ideas about sustainability in terms of the triple bottom line concurs with Napier (2004), a sustainable farmer in the USA who also places sustainability within the framework of the triple bottom line, "where the business can continue profitably with its current methods of production, indefinitely, without degrading or consuming its resources- Natural, Social and Financial" (p. 8) which "provide[s] an easily understood and clear path to monitoring progress toward sustainability" (p. 5). The idea of progressing towards sustainability is realistic as full sustainability is only achieved over time. Some farmers whom I interviewed believed they had arrived at sustainable farming practice, while in fact they are still on the path to achieving this goal.

The physical, historical, social and emotional connection of farmers to their land and the importance of their local knowledge and how it impacts on their learning are developed in the following chapter. The theme of telling farmers' stories and testimonials is continued to maintain their voices coming through the research.

Chapter Six: Learning about the land.

A connection with the land through work creates knowledge, but it does not necessarily grant protection to the land itself (Richard White quoted in Anderson, 2010, p. 91).

This chapter uses testimony from interviewees to explore the connection farmers have to their land and the significance of their local knowledge as a point of learning. A focus is on how farmers and their local communities relate to their farms and immediate local area for the purpose of learning to be sustainable. Beginning with a brief discussion of the importance of farmers relationship to their land, I then recount the stories of Doug, Evan, Glen, Harry, and Norman and Narelle to illustrate their connection to their land that I observed while I was conducting the interviews. A description of learning from a perspective of place precedes a more detailed examination of Bob and Beryl's (15/4/2012) experience of learning through an extensive Landcare project that highlights a successful cooperative learning experience. By contrasting farmers' desire for lifestyle against a need for economic viability I discuss the conflict farmers experience between their strong sense of place while, at the same time, seeing farming as a business. This is followed by a brief analysis of the effect of isolation and conservatism as a hindrance to learning.

My final reflections conclude that all farmers have a strong connection to their land. Their knowledge and experience is intensive while environmentalists¹⁸ have a more extensive knowledge of a larger system. Most farmers interviewed identify as food producers and as such have a responsibility to produce food and fibre for world markets. To do this effectively they need to run their farms as a business while at a personal level they acknowledge their desire for a life style which is often in conflict with an agribusiness model. They see themselves as environmentalists not harming their land. According to the definition of environmentalist On page eleven of this thesis, they are environmentalists within their own context.

6.1 The importance of place

The concept of place or country is a recognised aspect of Indigenous Australians' psyches and identity. Non-Indigenous Australians also experience a sense of place

¹⁸ Here environmentalists are considered in a universal context.

which although historically younger than Indigenous Australians is for many an essential part of their identity. Increasingly ecological knowledge of the Australian Aboriginal people is becoming valued by non-Indigenous Australians, combining old knowledge with new science in an effort to heal the destruction caused since European settlement (Whitehouse, 2011, p. 64).

Accepting the reality of connection to place is important in understanding the position of farmers and their relationship with their land. Traditionally their stories told of adversity and suffering and of a need to dominate the land (Somerville, 2009, p. 211), treating it as a resource to be exploited (Whitehouse, 2011, p. 57). My observations of the farmers I interviewed led me to believe this is no longer the case and farmers today are far more in tune with their land, working with it, not against it. Farmers and people living in rural communities have the accumulated knowledge of place which is the local ecosystem. For trust to be restored and suspicion of government authorities reduced that will facilitate learning for successful sustainable land management, governments need to transfer power for decision making to farmers and rural communities. For example, part of ecosystem management is monitoring, and if the people who use the resource, such as farmers, are involved in the monitoring process it will increase the possibility that they will learn to manage more complex systems in the future (Olsson & Folke 2004, pp. 73, 83-84).

6.2 Stories

Doug

Doug is from a farming background spanning many generations. He is a farmer and an agricultural consultant with more than thirty years experience. Doug is tertiary educated and has worked in the CSIRO and the Department of Soil Conservation. He was one of the early educators working with farmers to implement the principles of minimum and no tillage¹⁹. He has been active in his local Landcare group and is a keen environmentalist who sees his farm as part of a larger system.

¹⁹ See Chapter I under Definitions

On his own farm Doug takes a radical approach to land care. At the beginning of the last drought he decided to listen to his land and “stop growing crops that did not want to grow and stop pulling out plants that wanted to be there”. Consequently throughout the long drought that began in 2002 and that devastated much of Eastern Australia, Doug had native grass cover and weeds on his property. He refused offers to agist cattle because of the damage they would do to a fragile and recovering soil structure. He observed, while his neighbours continued to sit on their tractors and plough through the dry times and then watched as their soil blew away, while his top soil was safely contained. When the drought broke with a flood, he watched the top soil of his neighbours wash away, while his did not move.

Once the rain came his native grasses quickly sprang back to life and he was quick to stock with fat lambs. Due to the grass seeds, sheep for wool were no longer viable but the lambs were raised quickly and taken off the paddocks for meat. Doug has witnessed the regeneration of trees and other plants, and the arrival of insects, birds and native animals in greater abundance; not all of them absolutely welcome, particularly by his neighbours. His experiment was not without resulting problems.

Doug had the advantage of both him and his wife working off farm. This is the point he makes in his interview. The fact he did not subject his land and himself to farming through the drought has resulted in healthier land and a healthier farmer, and probably a healthier bank account as he had no input costs; the triple bottom line.

If rural areas had more employment opportunities other farmers could also enjoy the benefits of farming when it was beneficial and resting the land when it is not. He says agriculture needs to restructure within the context of country, population and employment centres. Businesses need to be encouraged, even actively funded, to make rural life viable for farmers. It would necessitate more than just farmers being adaptive learners to achieve sustainability. For himself, his experiment has proven his and his land’s resilience.

Evan

Evan’s family has been farming in the Hillston area for over 100 years. When speaking with Evan, I heard a love of land and a keen sense of place. His farm is a

business like the other farms in the district; after all he has to make a living with a family to care for and bills to pay. But I got the feeling that the bills were not the highest priority on Evan's list. His is a story of place.

Evan is justly proud of his property. It is a beautiful farm that looks well cared for and productive. While he talked about the changes to farm management practices that have occurred since he began farming, and the way he learns new knowledge and skills, I heard another voice weaving between price driven and cost effective change with words like passion, love of trees, love of landscape, despairing and regeneration.

So while Evan is an astute, open minded farmer with an informed vision for his farm in an uncertain future, he cares deeply for his land. This is evidenced by revegetation and regeneration projects. He plants new trees while maintaining existing growth. It was difficult for him to remove trees to make way for wider machinery. His place holds memory for him, contains stories that are a part of who he is; memories and stories about chasing rabbits and mustering sheep. When the trees go, the landscape changes; landscape that is the holding place, the telling place, for such memories and stories.

Glen

Glen suggested we sit next to the river to talk because it is so beautiful. The Lachlan was running high and the chatter and call of countless birds almost drowned us out. It was a fitting place to hear a story about water.

As an irrigator who is still raw from the harsh drought it is understandable Glen talks about farming in reference to water. Glen's family have farmed and cared for their land for over 100 years in this district and his adult children are keen to join him as farmers. Glen also believes he has a responsibility to feed the nation. Throughout the drought Glen was unable to care for his land, his children were unable to come home and he was unable to produce much food. The water did not come.

For Glen to be able to farm in marginal country he needs a reliable water supply that does not come in rainfall but from the Lachlan River. When the drought came his water allocations dried up. Luckily Glen is resilient and so is his farm, but it was

tough and the pain is still felt despite the last three good years. He feels the drought took ten of the most productive years of his life; he was able to work but could produce very little.

Fear and uncertainty from another source are causing fresh pain. Glen knew the drought would end, but now he is unsure how the Murray-Darling Basin Plan will take its toll on his farm, his income and his future. Glen feels unheard, undervalued and disrespected by the governments who represent those for whom he grows the food, those whom he feeds. He does not understand their motives nor does he trust them. There is a tangle of needs: a need for a healthy river system, a need to grow food, a need for income, a need for lifestyle, a need to care for the land. These needs intertwine and twist around each other in an ever tightening knot, strangling trust and good will between those who share the same needs.

Glen shared these observations about his place with me.

It is beautiful [here] isn't it. Some mornings, there is a little weir here but it is under water now because the river is so high, the water comes out of the lake and drops over the weir and all the pelicans and all the shags are all here because there must be a lot of little carp, and hundreds of pelicans and hundreds of shags are all there going for it.

Our lake out here, it was dry for the duration of the drought and there were hardly any pelicans. Before the drought we had a big pelican community and within months of water running in, the pelicans came back. The first year of water being in the lake we had a lot of pelicans nested out there, I don't know how they knew.

And the fish all came back. Nobody could catch a fish in the river for quite a long time and within weeks of the water running, the fish were there and they were big fish so they had been there. Not just little fish, they were big fish and they had been there hiding away.

They were survivors. Everyone thought the carp had gone but they are survivors, they were there.

Harry

Harry has witnessed many changes throughout his fifty years of farming and he is feeling optimistic for the future; for both farming and the environment.

Harry feels responsible for the stewardship of his land and has made marked improvement to the quality of his soil through his farm management skills. He advocates the use of no tillage cropping²⁰ having seen the difference in the dust storms of the 1966 and the 2002 drought. He is delighted at the improvements the controversial cotton industry has made and sees them as a 'shining light' in agriculture.

Despite his optimism, Harry does not encourage any of his children to return to a life on the land. Their high salaries would not be worth trading for the life of struggle and loneliness that he has endured. His land is marginal and long dry spells are common. The last drought diminished his reserves and although the last three years have afforded him recovery he knows the good times will not last for long. But he does not want to sell his farm; everyone enjoys coming home on holidays.

Harry encapsulates the situation of farming when he says "there are lots of inputs into it". He does not see a conflict of interest between caring for the land for income and caring for the land as stewardship. They are not mutually exclusive ideals and can be integrated to be beneficial for all stakeholders. He sees the environment as changed forever from what it was before European settlement and consequently it needs to be managed; managed and made productive using the best strategies available. He sees soil improving, water management improving, problems of salinity and rabbits under control; so despite the years of struggle Harry is looking forward to a rosy farming future.

Norman and Narelle

²⁰ See Chapter 1 under Definitions

Norman and Narelle have lived in Hillston for less than ten years. Norman is a teacher and witnesses farm life through the lives of the young people in his daily care. He has known their anxiety in the long years of drought and their relief in the good years as they mirror their parents' responses.

Norman and Narelle love living in Hillston, and although country people themselves, see Hillston as a more generous and upbeat community than any other place they have lived. Despite the fact farming in this area is industrialised agriculture, Narelle is particularly insightful about the farmers and their relationship with their land and expresses the contradictory ideas of human agency and relationship to place that she observes in Hillston.

Environmentalist is a term they would never use to describe themselves. Their motivation is different. Farmers' emotional attachment to their land is related to their feelings about their families, that is what I have seen. They have a responsibility to care for their families and care for their land and I think they do have deep love for the land. They have to look after their property but it is a productive asset.

One of the reasons they feel so strongly against the Greenie is because they have a relationship with the land. Although they sacrifice things that other people have, to live here, they absolutely love being here and they are proud of enduring the hardships, the isolation, but they love it any way, it is in their blood. They know the land, they know what it can do, they know the water, they know the rain and the plants, they know all about it. In their hearts they know that they know the land better than the people who are making the decisions. I think it hurts them deeply that people think they don't know what they are doing and honestly, living here and hearing the other side of it, the farmers' side, I don't blame them. They live here and are getting a living off it. Those other people don't know and they are ignoring them and yet the farmer is likely to go broke and I think they are worried the whole land will just go

to the pack, no one will make a living off it and the land won't be any better either.

6. 3 Learning

Transformational learning

Clive (8/5/2012) was open to learning new ways of doing things. Besides being an innovative farmer Clive has also learnt from his children. He understands his shift of attitudes towards many issues as transformational.

... they [the children] have been ahead of us in attitudes to everything ... I grew up in a conservative family ... politically conservative, theologically, conservative in just about every way. It has been a huge journey, particularly for me, a huge transformation in my attitudes to all sorts of stuff

He is heavily involved in his church and filled off farm executive roles within the church while continuing to farm. He attributes much of his motivation for learning to the stimulation he gained from working with his mentor and the intelligent and highly motivated people he met while serving in church positions and travelling to meetings, usually in Sydney or Melbourne. Clive also sees the lifestyle of young farmers as transformational as they are freed from months of work now being done by contractors and huge machinery. Their transformed lifestyle involves active parenting and a richer family life, socialisation of the children and better family relationships. Clive was also open to learning from his land, which could be why he was so open to 'doing things better'.

Traditional learning

For both Frank and Glen (1/8/2012), traditional knowledge and learnt experience are a major influence on their farm management techniques. Harry (31/7/2012) said "much information was learnt as a young fella ... passed down from my father". He believes this knowledge remains relevant today as does Jack (2/8/2012), "My brother and I are actually the 5th generation in the area. Dad is a pretty good source of information."

On the other hand, Larry (2/8/2012) admits to being a “bit stuck on the one thing. You sort of get doing the one thing for years and years and I wonder if there is a better way?” Martha (2/8/2012) thinks the high incidence of family farms has a dampening rather than a creative influence on many farmers, with family pressure not to change the status quo. Often it is “this is the way we do things and if we do it this way it creates less problems in the family. That works but it can be a restrictive environment.”

Alice (12/4/2012) experienced residents in a small rural community who valued traditional knowledge exclusively. She felt this impacted on their children and restricted their openness to meet new challenges and consider new ideas about the environment and farm practices. Clive and Cheryl (8/5/2012) were criticised by some people in the local community who could not “see past the traditional way of doing things”. They think those who depend on passing down traditional knowledge as a sole knowledge source are critical of new ways of knowing.

Learning from the environment

Jack (2/8/2012) and his family are conscious of caring for their country because they have been there for five generations and “want to be there forever”. Although their property is a big business and looking after it is important to get a return for their investment, they are also there because they love the land. “It is not just the money. We enjoy the life style and we enjoy the country”.

Jack expressed his concern for the new national parks. He, like Harry, is sceptical of the ability of the government to manage their new national parks adequately.

They are buying up a lot more farms for parks now which is a different issue that has come up in these areas. They think they are looking after the country and they reckon they are going to play hell but essentially what they are doing is locking the country up. They have bought Huntalong and Willandra and a few other neighbouring places and essentially they are locking it up for feral animals. The pigs and feral goats are getting out of control and they are not

keeping a tab on them because they have got so much ground to cover and most of the places they have bought are unmanned. They have not got the money or the resources to actually put into the properties to manage them properly. It is a bit of an issue. Unless they can keep them under control they are only making it worse and worse for us.

Kevin (2/8/2012) was critical of the Murray-Darling Basin Plan and NSW Government laws on Native Vegetation. He believes “they [the government] have got an agenda to tell us rather than to listen and nobody appreciates being told how to run their lives or their business”. He argues that for change to be successful an autocratic approach is not helpful because learning is not separate from the land, but if the attributes that make up this area; the people, the land, the farm, are considered; and the visions and goals of the farmers, companies and community are aligned to the visions and goals of the government, then good things could be achieved.

Larry (2/8/2012) likes to keep his land care and income balanced. He has soil tests done and is aware of the salt problem, and will not “sacrifice [the] land because that is where your income is”. He is content with his income and would not increase his crop planting to maximise his profits. Larry sees himself as a caretaker of the land although he is:

Nowhere near a Greenie and I don't agree with any of the greenie things. I am dead against that sort of [greenie] thing, but we are here for the long term and my son has got to be here and I am not going to wreck the land. You know yourself from year after year after year and my father did not hurt the land but I am not about to do any damage; but in saying that I'd be pretty quick to push a tree out too and plant one somewhere else if it came to that. They have us pegged back on tree pushing out now, that is a no no.

I suppose there has to be laws and things like that but they have gone too far one way, they have just got too much power. It is unbelievable the different rules and regulations that are coming

through. Why don't people in our community make some of the rules, they know what is going on. It is no good having someone from the city who has no idea about the bush or what happens making rules.

Larry feels the rural situation is misunderstood by governments and country people are over regulated from Sydney and Canberra. He acknowledges climate change science but as "the planet has been warming up and cooling down for millions of years I don't think you are going to stop it by whacking a tax on us".

The most telling thing about Larry was that after the interview he took me for a walk along the river with such obvious joy and pride for the beauty of his place. He loves the birds and trees and river and he took pleasure in showing it to me.

Martha, (2/8/2012) has observed a significant level of tree planting and conservation tillage in the Basin over the last 30 years. She claims change comes more slowly in areas of low rainfall because it takes longer to recover from a poor decision than in higher rainfall areas. Financial pressures can also stop people being as innovative as they may like to be. She said that most people do not deliberately damage their land, particularly if they had been on the land for more than one generation; "sustainability is just a part of what they do". She feels "part of their love for the land is watching it produce ... they would not like to lock up their land and not use it. So that is bound up in work ethic and wanting the land to be productive".

6.4 A Landcare project

Bob and Beryl (15/4/2012) were innovators in a local Landcare project that monitored acidity in the soil in their area and is an example of how participation in an action helped those involved to learn about sustainability and how learning about place by a broad based community group can cause positive change for the ecosystem of a wide area. Recommendations could not be enforced, but through education and example

farmers were encouraged and supported to implement the actions required. This plan was also seen as a valuable farm management resource (Landcare, 2001, p, i). The vision statement, (2001, p iii) was “to implement our community plan to improve the soil, water and air quality which will ensure a long term ecology and a sound and profitable future”.

The plan grew out of a need, identified by Catchment Management Authority committees, for local Landcare groups to address natural management issues on a catchment level. Over time the plan grew as a range of natural resource management issues were identified. As data was collected community awareness was raised and farmers were encouraged to look beyond their fences. Although a paid coordinator, technical assistance and two university students were involved in the process, “most important of all were the contributions made by many community members and ... the plan reflects the many ideas and comments expressed at workshops, meetings and other forums” (Landcare, 2001, pp. 3-4).

The plan was designed to be a flexible guide to take advantage of future opportunities. Its value was in the whole catchment being mapped by aerial photography where issues of community concern were discovered. Participants came to understand how their management practices affected others within the community. By working together “we often find that we produce an outcome that exceeds the sum of the contributions of the individual participants” (Landcare, 2001, pp. 1-2).

Although there was some financial support for the project, the farmers essentially financed the liming of their own country. Reduced acid soils led to improved pasture and cropping and therefore increased farm profit, which off set their costs. Because this catchment plan had been developed by the community through a wide ranging consultation process and was targeted at understanding the local issues and priorities, the recommendations were more likely to be accepted. The plan also recommended responsibility for eco management to be shared between local government, local industry and agribusiness, State government and non-government agencies, and Catchment Management Boards (Landcare, 2001, p. 32).

6.5 Conflict of place and farming as a business

Although Evan (31/7/2012) spoke in terms of change being cost and price driven, a closer study of the language he used points to a caring and compassionate man with a genuine sense of place. He talks about a *passion* for dry land farming, and being ‘ground truthed’.

We have just completed a property vegetation plan and we have got permission to clear 256 isolated paddock trees but I have to revegetate. That is perfect for me because *I'd rather have big clumps of trees* [italics mine] instead of trees in the middle of the paddock that are quite detrimental to the *long term goal of ground cover* and obviously economic sustainability and environmental sustainability.

We have quite a lot of vegetation on the farm. I am in the middle of clearing them [the paddock trees] now. *It is hard, believe me.* Every tree, like these pine trees I'm knocking out, *I have grown up with them*, you know each one and you have mustered sheep from around each one. You know I don't find it very easy at all to knock them out. I know they are just pine trees and I know they will just regenerate anywhere but the whole ... the landscape changes forever just with these 30 or 40 trees in this paddock gone. The thing that keeps me going is seeing all the rye grass and fleabane, two problem weeds, are nowhere else except around these trees so that's what keeps me going. I have come to a clump that I was allowed to knock out and I just couldn't do it yesterday. I am going to leave them; there are about 6 to 8 in a clump and I think surely I can go around a clump but I will see. I'll give them a chance and see what the weed problem is around them.

When asked if he had a sense of being a part of the landscape, he answered, “More than I'd like. My wife came from the Blue Mountains, loves the mountains. I am just thinking of going somewhere where she would be more at home, somewhere there are

mountains, but it will be very hard to leave.” Evan’s father also had a strong sense of place and Evan believes that has influenced him. He also believes most farmers have the same passion for their land as he does.

You hear the farm leaders talk about farmers being the ones with the most interest environmentally in their land and generally speaking that is true but the economic signals, even if there is an ethos, the economics have forced that as well; particularly in terms of irrigation. Irrigators have gone to great expense to adopt technology to make sure they only apply what the crop needs. The issue of salinity is far less likely to emerge because of these practices. There are very few blokes who just want to exploit their land ... We have 120 acres that we have set aside through Greening Australia some years ago for revegetation. It is pretty well vegetated now but there are areas that can regrow and I would like to see that happen; I might have to look at actually planting trees. Ongoing management is necessary, like rabbit control; they’re a bad outcome for the environment.

Frank and Fran (1/8/2012) both purport to have a love for their land and with farming being in their blood they take pride in their country. They are positive about being environmentalists when it comes to looking after their land because they know well cared for land produces the highest returns. It was one reason Frank sold his sheep, he felt they were not good for the land.

Glen’s (1/8/2012) perspective on care for the environment is ‘tangled up’ with care of a business that creates employment in the food industry. “So a lot of people get a slice out of our pie.” The assumption being that the farmers’ care of their land results in employment and food for a lot of people.

Doug (28/5/2012) feels farming is struggling to be profitable and needs to be restructured in the context of the whole structure of the country including the towns, the population, their proximity to the major centres and access to work. Those

properties too far from work centres may have to become bigger and self sufficient. To develop the country, he said

Money should be put into businesses that can value add, such as a cheese factory or tourism, but not agriculture. Supermarket chains are not helping the agricultural sector by controlling demand through pricing. Water has been over allocated and in the longer term will be unsustainable. Australian farmers are producing too much food and fibre and are not getting paid enough for their product. Consequently they are putting unnecessary pressure on themselves and the land. There is a myth they produce food and fibre for the world; there is enough food for those who can afford it and for those who can't, will there ever be enough? The only thing in the world that is becoming really scarce is open space and nature.

6.6 Isolation and being conservative as a hindrance to learning.

Martha (2/8/2012) claims there are lots of reasons why farmers are ignorant but there is no need for that to be the case. One reason she says is they are conservative, being older than the Australian average working age. Sheep and beef industries have the oldest profiles of the farmers; the average age being in the 70s²¹.

Frank and Fran (1/8/2012) don't consider themselves isolated and see themselves as quite conservative. Frank likes to wait and see how new methods work out before he adopts them. He has kept up with technology and thinks it is wise to keep machinery worth hundreds of thousands of dollars for three to four years.

Norman and Narelle (2/8/2012) see the people in Hillston as generally conservative in politics, religion and morals. They are not necessarily anti change but their values are more conservative than in a city for both good and bad, for example, values like

²¹ This was Martha's statistic, however data from ABS shows the average age of farmers is increasing. <http://www.abs.gov.au/AUSSTATS/abs@.nsf/Lookup/4102.0Main+Features10Dec+2012#end2>

working on behalf of the community are high. Norman and Narelle, rightly or wrongly, perceive educational outcomes and economic indicators in rural areas are poor compared to the rest of Australia. They believe government policies have encouraged discrimination rather than encourage equality. That all adds to feeling forgotten, not being relevant. The more that the Australian population centralises in a few areas or on the coastal fringe, the less likely anyone is going to pay any attention to the bush, until the time comes when growing food is important. Now, if Australia's wheat crop fails no one in Australia starves. When growing food becomes important, farming will come into its own again; it certainly isn't now.

When I asked Narelle if she would call farmers environmentalists, her response indicated that the term 'environmentalist' is seen as radical within this rural community.

Yes and no. An environmentalist would not clear those trees to make a paddock but a farmer would clear the trees and then plant wind breaks and shade belts. They might be making the environment a bit artificial but they are not miners and they are creating areas for bio diversity because there is a concern for native life. Environmentalist is a term they would never use because their motivation is different.

Doug (28/5/2012) considers farmers as being part of a broader integrated system that is affected by the way the individual farmer operates. This was also what Bob and Beryl learned from their community based Landcare project.

It is at the intersection of the concepts of isolation and independence where farmers don't always think of themselves as isolated but independent; and they like to work that way. The more traditional farmers do not see their farming system as part of a larger, integrated system. This is breaking down somewhat with the younger, more tertiary educated farmers. Even some government bodies struggle with the concept of integrated systems. The physical reality is most farmers live some distance from their neighbours, and unless they are involved in the local community,

may not get the opportunity to speak to many people. The sense of isolation can be problematic if the farmer does not think what happens on his/her farm has any affect on any other part of the ecosystem (Doug 28/5/2012).

6.7 Reflections

Without exception, every farmer interviewed expressed a strong sense of connection to and a love for his/her land. It was ‘business first’ in the words used to describe their farm operations but what I observed and listened to underlying the business talk was care and concern for land, trees and birds. For example, Jack (2/8/2012) commented, “It is not just the money. We enjoy the life style and we enjoy the country”. I witnessed a pride from the farmers as I was shown the natural beauty of farms, river fronts encompassing river gums and wild life.

Farmers’ identities are complex. Integrated with the love they have for their family and farm and a rural lifestyle is that of a food producer with a responsibility to produce food and fibre for world markets. There are differing opinions as to how many people they feed, but rightly or wrongly they believe they are responsible for providing a significant amount of food to large populations. The responsibility to produce food and fibre is bound up with a responsibility for making a profit and for caring for their family and land. To be effective producers they maintain they need to run their farms as a business on an agribusiness model while at the same time not degrading their productive asset, which is their land.

Motivation for learning sustainable land management is first and foremost economically driven. However Bob and Beryl’s positive experience of their Landcare project taught them the benefits of working together as a community. It also demonstrated the positive responses from landholders that can be achieved when plans are locally driven. The recommendations from Landcare to share responsibility for eco management would mean that governments would have to transfer some of their power for decision making to farmers and rural communities. This would promote learning by providing opportunities and motivation to manage more complex

systems. Kevin (2/8/2012) also recognises that optimum learning for sustainable practices will occur when the farmers, companies and community can work cooperatively with local, state and federal government agencies, working toward a common goal and vision for the future.

Doug's (4/5/2012) idea that farmers would profit by working off farm during times when farming was detrimental to their land, such as during a drought, has merit. Providing worthwhile off farm work would be financially beneficial to farmers because their land would be rested and they would not have to face the dilemma of not caring for their land as much as they would like to while at the same time incurring losses due to high input costs for poor returns, a cause of personal stress. To enable this model to make rural life viable for farmers, businesses need to be encouraged and supported to operate in rural areas.

For farmers to be able to participate in this model, they would have to let go of their belief that they are responsible for feeding the world. This practice would place the needs of their land before the perceived needs of a 'hungry world'. This may be a difficult mindset to alter. Martha (2/8/2012) believes that "part of their love for the land is watching it produce ... they would not like to lock up their land and not use it." In other words, for farmers to radically change, some form of transformation needs to take place to shift mindsets and generations of farm practice.

In the next and final chapter I will return to the research question, how farmers learn to change to sustainable farm practices, by reflecting on the research findings of learning about uncertainty, sustainability and land and will attempt to draw my conclusions and summarise the answers I have found.

Chapter Seven: Maintaining the Farmer's Voice and Finding Ways Toward a Sustainable Future.

The question I set out to answer in this research was: *How farmers, especially irrigators, learn to change to sustainable farming methods in an effort to cope with climate change.* The primary focus was on learning from a transformative perspective and a secondary focus was on sustainability from an environmental perspective.

In this final chapter I will discuss the data and consequent findings. Section 7.1 discusses the perspectives of the interviewees and the effect it had on the data. Section 7.2 looks at how farmers learn to change, examines their motivation to change and describes their attitudes toward sustainability. Section 7.3 is concerned with the contradictions in which farmers work and live. Strengths and weaknesses of the study are examined in section 7.4 and section 7.5 is a critical reflection on what I could have

done better. I reflect on future research in section 7.6 and draw conclusions in section 7.7. A summary of my findings is in section 7.8 and I make a final comment in section 7.9.

Environmentally, water is the primary issue in the Murray-Darling Basin, not just for farmers, but for all those who live in rural communities. The prediction of an altered rainfall pattern with less rainfall in the future as a result of climate change (NSW Government, 2010) will only exacerbate this concern. As I spoke with interviewees and listened to discussions at meetings in the months prior to commencing my research I was told that uncertainty of water supply was a major factor in their lives. In light of the stress that is caused by living with uncertainty, it is understandable that farmers want to take control of their environment rather than begin processes of radical change which has the potential to create more uncertainty.

While recognising the many changes and improvements made by farmers in an effort to be more sustainable, most farmers in Australia operate within the context of the capitalist industrial farming model. They see themselves as food producers, meeting the needs of the larger population. Thus producing food and engaging in the market economy is the purpose of their work and the focus of their energy. Only two of the farmers I interviewed expressed an outrage over the state of soils in Australia, the decline of the river system in the Murray-Darling Basin, and a concern about climate change. Although they genuinely expressed a love and connection to their land, for the remainder it was economics first.

7.1 Interpreting the Data: Perspectives of the interviewees

As discussed in Chapter 3, the principles of Colaizzi's Seven-step Framework²² (Deal, 2010, pp 852-863) were used as a guide for looking more deeply at the interviews. The most common themes identified were: learning, environment, uncertainty, place, sustainability, isolation, community and conservatism.

The themes were further classified into three main concepts: uncertainty, sustainability and place. An aim of this study was to hear 'the farmer's voice',

²² Annette Freak, UNE, 2012, personal communication

therefore I have endeavoured to maintain the authenticity of each interviewee, which also is an indicator for credibility (O’Leary, 2004, p. 56) and it is only in this chapter that I am drawing conclusions and making judgments.

Before carrying out any interviews I had acquainted myself with the work of Alvesson (2011) who employs a reflexive approach for rigor of analysis by gaining an insight into the ‘truth’ and usefulness of the information obtained. Reflexivity in this case means being aware of my position, of what I want to hear and what I am hearing, “for conscious and consistent efforts to view the subject matter from different angles, ... avoiding the ... privileging of a favoured one, including a focus on the details of the text” (Alvesson, 2011, p.106). Pragmatically there comes a time to reach a decision and begin to write.

The influence of the social setting was evident in the data as most farmers were interviewed at their farm and their role as farmers was a major component of the research question. Because this sample of farmers was interviewed on location, the findings from this research may not be transferable to the broader society but confined to farmers in the Murray-Darling Basin, or even more locally to the Hillston area (O’Leary, 2004, p. 56). However, from discussions and reports in the literature and media, they do not represent an extreme position in the Murray-Darling Basin water debate and as such are likely to be representative of a wider cohort of farmers.

The general distrust and negative comments made about governments and the Murray-Darling Basin Authority, environmentalists and “Greenies” blocked any impartial discussion in this area. This attitude potentially limited those farmers’ open mindedness about sustainable practice.

Eleven of the thirteen farmers interviewed identified as major food producers and it was important to them to be seen as such. This position was challenged by two farmers, Kevin and Doug, who have a different world view. Identifying as a world food producer directly impacts on the issue of sustainability and economics. Farmers who are irrigators and suffering from lowered self esteem as a result of negative attitudes toward their water use, especially in the production of rice and cotton, could be susceptible to image construction that may affect the data.

Notwithstanding the purpose of the interview and my expectations clearly set out from the beginning, all the interviewees reinforced each other’s claim that they are caring for their country. It was important to them that I heard how much they cared.

With so much public debate on ecology and environmental issues becoming politicised, acceptable vocabulary has developed which may cloud the truth. Apart from altering ‘climate change’ to ‘climate variability’ and using the term ‘environmentalist’ when it would have been wiser not to, language did not pose any undue problems. All the interviewees were articulate and any misunderstandings on my part were clarified in the course of the interview. I believe their responses were genuine and truthful in the area of how they learnt new skills.

7.2 Findings

How farmers learn to change their farming practices

Using data gained in the interview I divided the interviewees into three categories of implementing change: innovators, early adopters and incremental adopters. Of the thirteen farmers interviewed, seven were innovators, two were early adopters and four were incremental adopters. Six used both irrigation and dry land practices, two were sole irrigators and five were sole dry land farmers. So while this cohort did not exactly fit the original thesis heading of “farmers who are irrigators” it did include a wider cross section of farming practice. As I spoke to the dry land farmers I discovered their learning had been just as active as that of the irrigators.

	Innovators	Early Adopters	Incremental Adopters
Combination Irrigation and dry land farming	Bob and Beryl Jack Clive and Cheryl	Glen	
Irrigation only	Kevin		Larry
Dry land only	Doug	Evan	Frank and Fran Harry

Of the thirteen farmers only Kevin was not on a family farm with a history spanning at least three generations and with traditional knowledge passed on from their father. In each case the interviewee valued his/her traditional knowledge and expressed respect toward his/her father. Clive, Doug, Jack and Kevin were tertiary educated and attended an agricultural college after completing high school. It is interesting to note they are all in the category of innovators.

In answer to the question, “How did you know to make these changes?” the unanimous answer in Hillston was “the district agronomist”. The district Department of Primary Industry (DPI) agronomist is a popular and knowledgeable figure who has the respect of all the farmers I interviewed. He organizes field days and is networked to the farming community through the internet. The field days are popular and were spoken about enthusiastically. Private agronomists were also acknowledged as a valuable source of help and information, although the agenda of private enterprise was readily recognised. This finding confirms the work of Kilpatrick and Johns (quoted in Eastwood, 2008, p. 62) who found that the most effective training was “interactive, relevant, delivered to groups who feel a sense of commonality and presented by credible facilitators in short sessions at convenient times and locations”.

Ten of the thirteen the farmers I interviewed said they learnt by talking to other farmers, comparing experiences and trial and error in their own practices. For Glen (1/8/2012) his peers, a trusted community sharing the same environment and water issues, were especially relevant to his learning and decision making. Talking with other farmers is not necessarily the same as engaging in discourse which facilitates transformational learning. It can be a sharing of information which adds to knowledge without changing a value or attitude, or it can reinforce conservative attitudes and practices, being business as usual,

All but one of the interviewees used the internet, few admitted they enjoyed using a computer and most claimed low competence. However every farmer owns a computer and those who are not highly skilled depended on another family member (often their

wife) to find the information they needed if the search was complex or time consuming.

Of medium importance to their learning of new skills were publications despite *The Land* being widely read. A different result may have occurred had I asked this question directly. Seventy per cent said they learnt from looking over the fence and from the land itself. Soil testing was a common strategy for all farmers which is a pragmatic way of learning from the land. Every farmer interviewed demonstrated a connection to his/her land and each one would be aware of any changes that might occur. Seven farmers also identified learning from past mistakes. This question was not put directly to all interviewees but all responses indicate the farmers are life long learners, constantly learning from experience and changes to their working environment.

Lesser importance was placed on knowledge gained from Landcare by the Hillston farmers because it was not active in Hillston. However, for Bob and Beryl who farmed in another district in the Basin, it was a major source of learning. Those with educated adult children were appreciative of their knowledge and learned from them. Jack is the educated son and Harry has a large well educated family and has advised his children not to return to the farm for several reasons. For the other farmers interviewed it was not applicable.

The farmers identified their learning opportunities within the domain of access to new knowledge and skills. The changes they are making are largely confined to the agribusiness model that requires expensive equipment, technology and /or chemicals. Although their changes have afforded some environmental benefits, none of the interviewees expressed a complete change of ideas and attitudes toward sustainability. So while there has been no immediate transformational learning, there is evidence of ongoing incremental learning to change to more sustainable farming practices albeit within the context of an agribusiness model.

Motivation to change farming practices

The findings indicate that climate change is not a big motivation for change to sustainable methods.

Of the drivers causing change, the unanimous motivation was economic because all identified their farm as a business. The variable rainfall was a high motivator for ninety per cent and seventy per cent identified farm succession. This was described by Kevin (2.8.2012) as the “triple bottom line”; namely economic well being, caring for the land and improving your asset for the next generation, or people, place, profit. He maintained in farming the three were inseparable. Judging by the responses received it is reasonable to suggest all the farmers understood this although they did not say it so succinctly. Pannell’s research (2003, p. 23) found that economics was foremost in farm management and he advocates using “the motivation of self-interest to act in the best interest of the environment”.

The increased cost of water and the government cut to water allocation was stated by half the farmers as an incentive to change. Accepting the predictions of a drier climate and lower water allocations is difficult because it adds to the input costs and the already high level of uncertainty. The rising cost of fuel compared to a reduction in the price of chemicals has assisted change to minimum tillage cropping. This was introduced long before the drought but its benefits in conserving moisture were seen during the drought and have convinced more farmers to adopt it.

Motivation is also affected by identity. For the farmers who identified strongly as food producers for Australia, if not the world, there was no thought of diversification of land use such as energy production. In fact their identity as food producers was so strong such an alternative thought would be unthinkable. The belief they are producing food for the world motivated these farmers to keep planting throughout the drought when it would have been more economically and environmentally sustainable to leave their machinery in the shed. Although Australian farmers do not feed the world, the motivation to keep farming in adversity is maintained by believing they do. This misconception hinders their ability to risk significant changes toward sustainable management systems.

This misconception is perpetuated by the marketers of the agri-business system. They need to preserve this myth to sell their chemicals and heavy machinery and to maintain their market share. When travelling through country areas I heard and read advertisements telling farmers they are vital for the country as food producers, and therefore needed to purchase a particular product. The voice of the organic and permaculture movement is quieter, perhaps because it does not generate the cash flow needed to advertise on such a wide scope.

Motivation to change is also not strong within the general conservative nature of the farming fraternity, with change often being implemented slowly. When machinery costs hundreds of thousand of dollars, a decision to change a method that calls for the purchase of new machinery is not taken lightly. When there are several members of the family working the farm and making decisions, it is often safer for relationships if each participant keeps to his/her designated role. Five farmers identified as being conservative but this question was not directed to everyone. Two of the interviewees involved in the pilot study and not farming in the Hillston district identified as non conservative. Clive and Cheryl (8/5/2012) talked about the education they had received at the hands of their educated adult children and were amazed how their views had become more liberal and accepting of change.

A big change farmers have had to cope with is marketing. With the demise of the single desk, the farmers are left to market their own wheat. They have to be aware of the market for all their produce and many keep an eye on the futures market when they are dealing in commodities. They can take the risk of forward selling but the risk is amplified if the water supply is uncertain. For those farmers who market their own grain it takes much of their time and energy, which could be spent on reflecting and acting toward increased sustainable practices.

Motivation for change is more likely in a period of creativity (Horton & Freire, 1990, p. 204) and Australia is in such a period due to climate change and its implications for developing new industries and sustainable farming methods. A time of significant change is seen as a “progressive revolutionary process” (Horton & Freire, 1990, pp. 225-6). Sydney Morning Herald journalist, Elizabeth Farrelly (SMH, 25/4/2013, p 18-19) describes a property that has undergone dramatic changes and is now farmed

using sustainable practices. She says “there’s a ... revolution here, since it implies unknitting the corporate stranglehold to feed the world ... [the farmer she spoke to said] ‘We need more women on the land. It’s a nurturing thing, not a killing thing,’ There’s your revolution”.

Farmers’ attitudes towards sustainability

The attitude of the farmers towards the environment was unanimously positive, both directly and indirectly. Each interviewee stated that if he/she does not look after the land it would soon become non productive. There is a strong sense of responsibility to leave the land, regardless of succession or selling it, in better condition than when it was taken on. I wanted to hear that the farmers cared for the land regardless of productivity but essentially the farm is seen through a business lens.

The attitude toward ‘Greenies’ and city scientists is not positive. I chose not to directly talk about this because of the hostility and I did not want to put up any barriers. Norman and Narelle (2.8.2012) explained that in the bush, the term ‘greenie’ basically stands for a preservationist, while in the city most people would understand ‘greenie’ to mean an environmentalist. There is also a perception the term ‘irrigator’ is a dirty word in the city, caused by ‘Greenies’, who want to see the irrigators’ source of livelihood returned to the river. There is a lot of miscommunication between the two groups and this is an area that warrants work in the future, possibly in the form of participatory action research and community engagement.

The interviewees said that government committees were not interested to hear from them. Those who attended meetings with government agencies said the agenda has been about farmers hearing what the government wanted. The farmers’ general mistrust of government agencies is not helpful to the take up of sustainable farming practices. There is a divide here too that also needs work, from both sides. Participatory action research or community engagement groups, including an adult educator, could find a way through the messy middle, with the aim of developing mutual understanding and respect between the differing parties, creating opportunities for learning.

The farmers interviewed felt helpless about water security which was their biggest hope and their biggest fear. Generally, with water security, it can be business as usual, but without it, not only will farmers be adversely affected but the whole community will suffer, resulting in a loss of population. A reduced population will impact on availability of services, causing even more hardship for those remaining. The sense of isolation was expressed more in relation to the community than living on the farm. Farmers love their land and feel comfortable working on their own. However they are aware the community has the potential to be cut off from essential services which could have an isolating affect.

Although six of the farmers recognised climate change, the majority were sceptical and looked at climate in terms of variation in the weather pattern. Unpredictable rainfall is so common in a semi-arid environment it is dealt with constantly. It is nearly always dry and droughts are not uncommon. What is uncommon are the three good seasons in a row experienced following the drought in 2010-12.

Another sphere of influence in delivering the environmental message is language. I encountered this with the terms 'climate change' and 'environmentalist'. Irrigators perceive the term 'irrigator' has negative connotations in urban areas and 'greenie' is a much maligned term in the bush. Language that reinforces stereotyping inhibits the ability of individuals to make sense of conflicting information. This can result in complex environmental issues becoming simplified and disconnected from the social and economic issues that that will result from changed practices (Muhlhauser and Peace, 2006, p. 465; Johnston and Carter, 2011, p. 1). The term 'climate change' put some perspective interviewees off because it had connotations with 'city 'Greenies''.

Likewise one question I asked was "do you see yourself as an environmentalist?" While the answer unanimously was 'yes' it was with a hesitant thought at the beginning before becoming a definite 'yes'. It is as if this was not how the farmers saw themselves but realised that in caring for their country they were indeed environmentalists. This is also not a term they seem comfortable with because of its association with 'greenie'. Asking "Do you see yourself as a caretaker of your land?" would have been more meaningful.

7.3 Living inside a contradiction

Within the context of conducting the interview on the farm (or 'place') was evidence of contradiction and tension caused by a love of land that is inconsistent with the business model of farming. Most of the interviewees are living inside this contradiction.

The contradiction was evident for example, when Larry (2/8/2012) said he was "dead against the Greenie and all that sort of thing" yet took me for a walk along the river to show me how beautiful it was and talked about spring putting a "spring in his step". Evan (31/7/2012) talked about his connection to the land and his wife's connection to the mountains. Glen (1/8/2012) asked could the interview be conducted on the banks of the river because he loved to sit there and listen to the birds. However, for every farmer, cost determined their farm management system. It was economics first; the value of their land is determined by what it can produce. Part of the difficulty experienced during the drought was that they could not care for the land as much as they would have liked while they attempted to maintain some level of production.

External drivers, those which are outside the farmer's control such as cost/price ratio and drought, determine many decisions the farmer makes in regard to farm management practices in a capitalist, market driven, agribusiness economy. As Kevin said,

In Australia there is not enough population to guarantee a strong domestic market so we're basically price takers. Therefore our production of every type of grain or fibre must be at the top 5% of production quality. If we miss that we fall into what the majority of the rest of the world is producing, and that price is unacceptable to our life style. Our activity and goal has to be in that world market (Interview, 2/8/2012).

Internal drivers, those attributes within the farmer's control, also affect farm management practice. However internal attitudes are open to manipulation by external forces. For the farmers and inhabitants of Hillston and adjoining areas it is the daily

dose of a well known climate change sceptic ‘shock jock’ Alan Jones on the local radio as well as advertising by multinational agribusiness companies who try to influence the world view and motivation of the individual farmer to change. A neurobiological discovery that the brain turns off when a positive future is not likely and when there is lack of knowledge and fear (Johnston and Carter, 2011, p. 2) means those under stress are vulnerable to manipulation and unhelpful influences take traction. The lack of knowledge is exacerbated by the reluctance of the government to release information and a failure of a whole government approach to water management.

The farmers I interviewed in the Hillston district have always struggled with an irregular water supply until they irrigated either from river water or the underground aquifer. They did not accept changes in water availability were due to climate change and tended to blame the government and ‘Greenies’ for taking their water and using it for environmental flows. My finding is confirmed by research from Golding et al (2009, p. 555) who also found “the hardest learning had been about learning to accept that the changes in water availability may be due to climate change”.

Determinants of learning and change are therefore more than personal; choices are made inside social and economic structures and government policies. These are beyond the choices of the individual, who often think they have the right to make their own decisions but are in fact on a tread mill. Farmers in the Murray-Darling Basin are finding themselves caught between the demands of agri-industrialists, their love of land and rural lifestyle and a river system in need of repair. A changing climate and lower water allocations through the Murray-Darling Basin Plan are threatening traditional farming structures that in the past have relied on over allocated river water for irrigation. They are in the middle, the ‘middle class’.

7.4 Strengths and Weaknesses

The strengths of studying several cases like this are; (a) the comparative nature of the study and (b) the results can be more confidently generalised as more cases are studied. The weakness is with the more cases studied by one researcher with limited

resources, the shallower the analysis will become. The issue of finding the balance between breadth and depth (Johnson, B., 2004, pp. 377-8) was addressed by using the Colaizzi Seven-Step Framework.

The distance involved in the study was a disadvantage because it prevented me from establishing a deeper relationship with the interviewees prior to the interviews. I intended returning to Hillston to conduct follow up interviews to add data to any omissions. However when I was conducting the interviews, despite a warm welcome, I knew the farmers were giving precious time and a second interview would not be welcomed.

Validity could be an issue because there was only one method of data collection and one researcher (Hall, 2008, p.78). Using Colaizzi's Seven-step Framework of data collection for open and axial coding and cross-case analysis helped offset these limitations. Another step to validate was to conduct a pilot study, especially as this is my first research project (Hall, 2008, p. 79). The pilot study involved interviewing three farmers and a science teacher from the Riverina prior to going to Hillston to undertake the remaining ten interviews. This exercise gave me valuable experience in the interview technique, operation of the voice recorder and transcription of interviews. I gained confidence and an insight into what to expect at the interview. I was able to modify the questions and discussion points as well as acceptable language and terminology.

Although there were only two and a half days of interviewing, due to the long distance of Hillston from Sydney, I was away from Monday to Friday. By the final couple of interviews I was getting tired and felt like I had heard it before; however on transcribing the interviews I realised how diverse the findings were.

Despite the intensity it was a wonderful and up lifting experience. The work the part time chaplain put into the organisation and the hospitality shown by the full time rural chaplain was inspiring. The honesty of the farmers was appreciated and many of their comments were validated by each other, notwithstanding the variety of farms. There was generosity of spirit and good humour displayed and I felt sincerely welcome. I

came away from Hillston thinking positively but also with a sense of responsibility to do the right thing by the people who trusted me with their stories.

The teachings of Freire and Horton (Horton & Freire, 1990) and Mezirow (in Percy, 2005, p. 127) stress that the responsibility of the learners' future lies with the farmers themselves. How easy it is to become hooked into their story and not see a way out. Self discipline, self reflection and reflexive practice of the researcher are called upon here.

7.5 Reflection on what could I have done differently to improve the response and results?

The results would have been more consistent if I had asked each interviewee the same questions. Being aware that these were semi structured interviews I let the interviewees talk on as much as they wanted. Some were more talkative than others so it was with the more reticent ones that I asked more questions. As a result when I was examining responses and looking for patterns, there were some gaps in the grid on tertiary education, being conservative and feeling isolated because I had failed to ask the appropriate question. If I were to repeat the study I would also focus on asking about opportunities to engage in discourse as this is a vital step in the transformational learning process.

The disadvantage of doing the interviews one after the other was the lack of reflection between interviews and hence making improvements for the next one. For all the time farmers have given to various studies and research they have not seen many favourable results. This put pressure on me to make their time count. Admittedly some of the surveys are market orientated but farmers are studied often.

The interviews where the wife was present resulted in more information and she gave her husband credit for things he was not going to admit to. It would have been useful to have had more wives present, but those who didn't were at work and couldn't. Those who could were keen to do so.

7.6 Future research

Climate change is predicted to have a far reaching effect on farming in southern Australia. The effects of the last drought and the Murray-Darling Basin Plan are being felt by farmers and rural communities, particularly those dependent on irrigation, as the need to live with less water becomes a reality. Not only will farmers need to learn to use more sustainable farming practices, they may need to learn new skills to move off the farm into new areas of employment.

Pannell (2003, p. 23) found, as I did, that for farmers, their farm was a business and any change to practices was economically driven. He suggests that to be effective, it is better to use the motivation of self interest to integrate sustainability with agriculture. Self interest can include absolute environmental concerns as well as issues such as risk, labour, farm succession, age, land value and financial security (Patrick et al., 2009, p. 36; Pannell, 2003, p. 28). Goldney and Kerle (2013) advocate farmers are paid, not a one off payment, but perpetual payments that will replace other subsidies, for land care outcomes that can be quantified. They see all landholders as “the key players in addressing nature conservation and land degradation issues” (p.3) because landholders manage about eighty per cent of the land in Australia.

In light of the above issues, future research on change toward sustainable farm practice from the perspective of economic motivation and stewardship payments could benefit more farmers and members of rural communities, as they grapple with the difficulties of restructuring their lives.

7.7 Conclusions

Uncertainty

In Chapter Four I began the analysis of living with uncertainty and the effect it is having on the lives of farmers and community members living in the Basin. I reported how each interviewee has learnt to change certain farming methods to cope with an uncertain future. An aim of this chapter was to highlight the stress of both the natural environment and the people who work and live there. I did not want to be

judgmental of the participants and their farming practices but let them tell their story. The stories they told were about the resilience of their farm more than their personal resilience. They took a pragmatic approach and I did not get an insight, except from observation of their behaviour, of how they are dealing with personal stress. Ivan (1/8/2012) was the most open about his emotions. Although he is a community member his experience of learning to live with uncertainty is no less valid as his business and well being is directly affected by the well being of the farming community.

Sustainability

Chapter Five dealt with the issue of sustainability. I began with a detailed discussion of what constitutes 'sustainability' and the opportunities the Murray-Darling Basin Plan may give to farmers as government focus will be on them and their communities as they adjust to changed conditions. In the second part of the chapter I let the interviewees tell their story about their environmentally friendly or otherwise methods of production. I understand the farmers, with the exception of Doug (28/5/2012) who is using more radical sustainable methods, are engaging in conservation rather than sustainable practices. There is no evidence to suggest they can maintain their current methods of farming indefinitely with no detrimental effect to the soil and water ways. However what they are doing is more eco friendly than past practices and they need to be applauded and encouraged to continue in this direction. Incremental changes of practice that are positive for the environment have begun.

Place

Chapter Six was dedicated to learning about the 'land' because what I heard and observed was a genuine connection to place. It is not as strong as Indigenous connection but it is an important factor in the psyche of the farmer. In a business model it may make no commercial sense to pursue a life on the land with low income and high costs, heartbreaking droughts and water uncertainty causing stress and despair. In spite of this, an emotional, psychological, physical and historical connection to a property which has been in the family for generations with the hope to

continue the succession to future generations is often stronger than farming as a business. A farmer's desire to care for his/her country, not necessarily in a strict scientific and environmentally sustainable way, is also strong because of the desire to pass the land on in better shape than when he/she took it over.

Learning

Hence the focus of Chapters Four, Five and Six is on learning within the context of uncertainty, sustainability and place. Farmers are becoming increasingly vulnerable as the climate becomes drier and some farmers continue to resist change. Over time it will become necessary for them to adopt more sustainable farming practices and with no organised adult learning programs in place, learning must be through their existing learning environment.

New learning environments such as online and conversations with new potential markets are avenues that are not yet readily taken because research findings on the learning environment of the farmers at Hillston as well as those interviewed in the pilot study, confirm Golding et. al (2009, p. 545) that farmers learn from a variety of sources in a socially connected learning environment. Their learning community is multi-faceted and primarily informal, including traditional and experiential knowledge, interaction with peers, literature and engagement with media.

Importance of the district agronomist

For the interviewees in this small study, the local government agronomist was the most respected change agent. This confirms findings of Vanclay and Lawrence (1995, p. 152), and suggests they are the essential participants in any participatory action research or education process. Extension agents are the bridge between the farmers and the government, the city 'Greenies' and scientists. If farmers are resisting positive change, it is vital for agents to listen and work with them to help effect these changes. For agronomists to become transformative educators a paradigm shift would have to occur at all levels of delivery and this is only possible with training in the methods of transformative and popular education.

This places responsibility on agronomists, both public and private, to become as aware as they can about the issues facing the Basin, thus becoming co-learners with farmers and Basin community members. Training in transformational adult education practice would also be helpful to deal with the many messy problems this situation presents. The 2008 Productivity Commission's (Golding et al. 2009, p. 557) separation of agricultural extension and education and training programs is not helpful as agricultural extension officers are on the front line of farmer education. Of specific importance, and an issue discussed by the interviewees, is the reduction of funding for extension officers.

Community Engagement

There is an urgent need for agencies to connect to community groups and provide opportunities for discussion from all concerned, which would include farmers, scientists, agronomists, both public and private, and government officers. Environmental adult educators have a place with such organisations. "Education for ecological democracy must begin with growth and empowerment of community-based associations" (Hill, 2003, p. 31), where shared knowledge, critical reflection and discourse connected to place and community, helps participants to learn and understand what is needed for a healthy lifestyle and a healthy earth.

The School of Social and Policy Studies at Flinders University has developed a model, *Thriving Communities* that could provide such opportunities (Grafton et al 2010, p. 23). It respects the deep knowledge born from experiences by Basin communities in dealing with drought and reduced water extractions from the rivers, and their capacity for change and adjustment. *Thriving Communities* involves bringing people together for a structured dialogue; hearing the frustration and anger, to listen and learn from one another and develop a better plan for the future (p. 25).

As current Federal and State Government departments don't have the capacity to lead this process, Grafton et al. (2008, p. 25) advise that a "specifically appointed multi-disciplinary National Task Force of expert practitioners in local economic and social

development, working over a minimum of two years with a small team of evaluators” should do the job. However there are other agencies that have begun this process, for example the 2013 Uniting Church NSW and ACT Synod unanimously passed a proposal for facilitating dialogue to benefit both people and the environment (Appendix 5).

Of major importance to transformational learning is the acceptance that a problem of a future with less water exists. There is a need to educate and care for the well being of whole communities as well as farmers, as they move from a long natural drought to the uncertainty caused by the ‘enforced drought’²³ of the Murray-Darling Basin Plan. Farmers must first recognise the need to change the system that is grinding them into submission and then want to do something positive about it (Newman, 2007). Their knowledge will grow as they participate in change and they will be changed by their new knowledge which in turn will enable them to make further changes to their system (Horton & Freire, 1990, pp. 129-130).

It is when farmers become more fully conscious of the factors affecting their landscapes, lifestyles and livelihoods that they are in a better position to solve their problems. Not all farmers will solve their problems the same way because of their different personal, social and cultural experiences, all of which are valued. Change to sustainable farming systems relies not only on farmers but “the network of people who operate around them in a community of practice” (Eastwood 2008, p. 232). Nevertheless, it is helpful to have a variety of good farm models and innovative farmers in the community.

7.8 Summary of findings

- This is a messy problem with no clear solution.
- The initial assumption about farming descriptors is unnecessary because dry land farmers are learning as much about water and sustainable methods as the irrigators.

²³ This term was used at the community meetings I attended in the Riverina prior to conducting the interviews

- Farmers are living in a contradiction, full of tension and conflict between farming as a business and their love of their land.
- Farmers in the Murray-Darling Basin are finding themselves caught between the demands of agri-industrialists, their love of land and rural lifestyle and a river system in need of repair.
- The changes many farmers are making are largely confined to the agri-business model. Technology is seen as the means to sustainability and many alternative markets and discourses are not recognised or encouraged.
- As a group, farmers in the Murray-Darling Basin feel marginalised and blamed for environmental issues facing the country.
- The misconception that Australian farmers are responsible for feeding the world hinders their ability to risk significant changes toward sustainable manage systems.
- Farmers and Basin communities are living with uncertainty and change, learning to live with less water which may not be viable.
- Within this thesis the issues of climate change, sustainability and water, including the Murray-Darling Basin Plan have often become conflated.
- Farmers learn from a variety of sources, primarily within a social environment. The most popular and widely used is the district agronomist.
- Farmers and members of rural communities have to be agents of change and take control, not be victims of capitalist agribusiness and international markets.
- There is a need for assistance to provide opportunities for structured dialogue within communities assist the process of change toward a sustainable future.
- Farmers expressed a strong desire for a positive outcome on the triple bottom line: People, Place and Profit.
- There is a need for an assessment of smaller geographic areas in the Murray-Darling Basin because the same river has a diverse range of natural environments.
- For many, the hardest learning is learning to accept the changes in water availability may be due to climate change.
- This is just the beginning; there is much work to be done on learning to be dryer.

7.9 Final Comment

I reiterate that while I am sympathetic to the voices of my interviewees, I do not necessarily endorse their position. I accept the climate change science and am concerned about the health of the Murray-Darling Basin river system. From that perspective I am keen to witness landholders and those living in the Basin having the welfare of the natural environment foremost in their minds.

When I set out on this research I wanted to discover that a majority of farmers were engaged in transformational learning toward sustainable farming practices. What I did discover was that the farmers I interviewed were caught somewhere along the continuum between farming as purely business, the agribusiness model, and a deep and genuine love for their country; a place I term the messy middle. It is a place of contradiction and conflict as traditional family farmers, living and working in a drought prone country and dependent on the export market and foreign prices are sometimes forced to make decisions that are not in the best interests of their land.

The main message I was told was farming is a business and the land is cared for to support that enterprise. The message I heard was about a love of place that supported at least one family and was steeped in tradition. I also heard anger toward water reduction from the Murray-Darling Basin Plan and the stress of living with the uncertainty of costs, prices and water supply. Farmers expressed frustration at not being heard and a distrust of government officials and city environmentalists.

I also witnessed farmers working hard to overcome their difficulties. They are engaged in various levels of education within the context of their own community. Bob and Beryl, Clive and Cheryl, Jack, Kevin and Doug as innovators are co learners and educators. Glen and Evan as early adopters are not far behind them. Although Frank and Fran and Harry are more cautious about change, they too are making inroads toward more sustainable farming methods. Larry is the exception because his farm is small and successful with no immediate need to change. Despite his dislike for authority he demonstrated a strong sense of place and pride in his country.

Transformational learning is also a continuum along which all the interviewees are at some point. Bob and Beryl and Doug support the science of climate change and have significantly altered their attitude toward a more sustainable life style. Clive and Cheryl, now retired, were early innovators and pioneered much of what is common today such as no till cropping, while Jack and Kevin are making significant changes to adjust to farming with less water and building up their soil. As they experience success with one change, such as an irrigation method, they use this knowledge to meet the next challenge. Glen and Evan are both keen to learn new ways of doing things and their attitudes are changing too. Glen has had to sell stock to preserve his land and Evan is dealing creatively with no till cropping and the necessary removal of trees. Frank and Fran are gradually transforming their mind set as they try many new ideas to help them cope with harvest time and marketing their grain.

Just as transformational learning is in process, so is working towards sustainability. While even the innovative farmers could be described as more conservationist than sustainable, there is a definite movement toward the sustainable end of the spectrum. No till cropping is one way farmers are working toward sustainability, however there remains the issue of heavy use of chemicals that are a considerable part of this process. Irrigators are conserving water by using more sophisticated equipment and technology. Levelling paddocks with laser technology has eradicated salination from irrigation properties. Trees are being planted and traffic on paddocks is being controlled to protect the soil. While these measures do not create an absolute sustainable farming method they are a vast improvement on past practices.

Farmers are learning to cope with climate change, or as they see it, a variable climate. The Hillston farmers interviewed all claimed they learned the most from the district agronomist, nevertheless, they are also learning from many different sources within their social context. Kevin and Jack are agents of change and education themselves. All the interviewees were appreciative of being given the chance to have their stories told and to have their voices come through the interviews. I have heard their conflict and applaud their efforts to maintain a lifestyle that is not for the faint hearted. If the future of farming is to remain viable, these people will need the continuing support of agents for education, especially at the government level.

Isolation and conservative attitudes toward new ideas are being overcome by advancing technology. Farmers are 'switched on' and willing to participate in change as long as they feel they are being heard and their needs are being taken into account. The conflicted process of implementing the Murray-Darling Basin Plan bears testimony to that. Farmers are co-learners with the rest of society as we navigate our way towards learning to live with less water and a more variable climate. Although farmers are on the front line with a changing climate directly affecting their income and life style, as consumers of food, we are in this together.

As Percy claims (2004, p.127), farmers may be assisted to learn by the participatory actions of educators and researchers, who could assist rural communities "to analyse and reflect on their livelihoods in a way that could be said to be empowering or transforming". It is also important those of us who live east of the Great Divide listen and learn from farmers who are being challenged to adopt increasingly sustainable farming practices in response to an increasingly drier climate.

When I began this study my mindset was one of deep ecology, and after doing some critical reflection at the end stages of the process, realised my attitude to sustainability was preservationist, which is to leave nature to care for itself. It was unsurprising then that I experienced a sense of dismay that the farmers I interviewed were not as passionate about sustainability as I had hoped. In order to remain true to my commitment to tell the farmers' stories and let their voices come through the research, I tried to suspend my own reality and not be judgemental as I wrote this thesis. In the course of writing this however, I have undergone my own transformational learning in that I have come to realise that land management is as valid as land preservation, more so in many places, as a path to a sustainable future. The idea of caring for the land within a paradigm of self interest was difficult for me to accept, believing the land should be cared for exclusively for the land's sake.

Now I am engaging in the deep knowledge that for tens of thousands of years Indigenous people managed Australia for their own well being, their self interest. At the heart of most human actions is self interest which is necessary for survival. If humanity and the earth are connected and integrated, the actions of one should conserve the well being of the other. The very act of making a conscious decision to

preserve a section of land is in itself an act of land management. I now accept land management as a legitimate means toward sustainability and am coming to grips with the concept that self interest can motivate creative and positive actions toward a sustainable future.

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Appendix 1

Information Sheet for Participants

Research Project

How farmers who are irrigators learn to implement water efficiency and other sustainable practices as a response to climate change.

My name is Helen Miller-Brown and I invite you to participate in my research on the above topic. I am conducting this research project for my Master Education with Honours Degree at the University of New England. My supervisor is Dr. Bob Boughton of University of New England. He can be contacted by email at bob.boughton@une.edu.au or by phone on 02 67732913. I can be contacted by email on bhbrown@hotmail.net.au and by phone on 0423858945.

Aim of Study

The aim of this study is to discover how farmers, especially irrigators, learn to cope with climate change. Coming out of a long drought, many farmers in the Murray-Darling Basin have had to change some of their farming methods in order to conserve water. This study will research what motivated them to choose their new methods and how they learnt the new skills and technology required. It will also enquire if the farmers feel their personal knowledge is valued by government intervention agents and how they see their role in the future of the Murray-Darling Basin.

Time Requirements

An interview lasting approximately 60-90 minutes that will be audio taped or electronically captured, at a time and place that is convenient to you.

Interviews

Open-ended questions will let you express your views and practices related to your farming methods, how you learnt about these new methods, any support you received during the process and on going support you continue to receive. You will also be given an opportunity to talk about the relevance of community and government organisations that are helpful or not in the need to adapt to climate change and more recently, the Murray-Darling Basin Plan.

These interviews will be voice recorded or electronically captured. Following the interview, a transcript will be given to you if you wish to see one. Any information or personal details gathered in the course of the study will remain confidential. No individual will be identified by name in any publications of results. All names will be replaced by pseudonyms; this will ensure you are not identifiable.

Participation is completely voluntary. If you decide to participate, you can withdraw at any time with no reasons to be given.

It is unlikely that this research will raise any personal issues but if it does you may wish to contact your local Community Health Centre (Coleambally: (02) 6954 4297; Finley: (03) 5883 3627; Griffith: (02) 6966 9900; Hillston: (02) 6967 2201).

The voice recordings will be kept in a locked filing cabinet in the researcher's office. The transcriptions and other data will be kept in the same manner for five (5) years following thesis submission and then destroyed. Only the researchers will have access to the information.

Research Process

It is anticipated that this research will be completed by the end of 2013. The results may also be presented at conferences or written up in journals without any identifying information.

This project has been approved by the Human Research Ethics Committee of the University of New England (Approval No. HE12 – 070).

Should you have any complaints concerning the manner in which this research is conducted, please contact the Research Ethics Officer at the following address:

Research Services

University of New England

Armidale, NSW 2351

Telephone: (02) 6773 3449 Facsimile (02) 6773 3543

Email: ethics@une.edu.au

Thank you for considering this request and I look forward to further contact with you.

Regards



Helen Miller-Brown

School of Education

University of New England
Armidale NSW 2351
Australia

Phone 61 2 6773 4221

Fax 61 2 6773 2445

education@une.edu.au

www.une.edu.au

PLEASE REPLY TO:
Helen Miller-Brown
99 Eastwood Ave
Epping 2131
NSW
hmillerb@une.edu.au
ph. 0423858945

Dear _____

In the light of challenges to farming such as the recent drought and floods, many farmers are adapting methods and farm use. The local community is also being impacted by these challenges.

In this process many farmers are learning new skills and techniques. The research I am doing seeks to investigate how these adaptations are occurring. It would assist me greatly if you would be willing to participate in an interview at a time and place that is convenient to you. The interview will take approximately an hour.

Enclosed are the information sheet, consent form and points which will be addressed in the interview. It is a requirement of University of New England Ethics Committee that the consent form is signed before the interview.

I will be in your area from _____.

If you are willing to participate you can either indicate the time and place for the interview on the consent form and return it to the above address beforehand, give me your telephone number and I will contact you prior to the time or you can contact me on 0423 858 945.

I am enclosing several copies of this information. If you know of any other farmers who would like to participate in this research I would be grateful if you could pass this information onto them.

Thank you for your help.

Yours faithfully
Helen



School of Education
University of New England
Armidale NSW 2351
Australia
Phone 61 2 6773 4221
Fax 61 2 6773 2445
education@une.edu.au
www.une.edu.au

Consent Form

Research Project Title: *How farmers who are irrigators learn to implement water efficiency and other sustainable practices as a response to climate change.*

Researcher: Helen Miller-Brown

Please circle your answer YES/NO

I have read and understood the information sheet about this research project. I have been given an opportunity to respond to the information and have my questions answered. YES/NO

I understand that the information I provide will be anonymous and I will not be identified in any analyses or reports resulting from the data collection. YES/NO

I understand that I may withdraw myself or any information I have given, without giving a reason, for up to one month from the date of my participation. YES/NO

I agree to the interview being audiotaped YES/NO

I agree to my words being quoted anonymously in the Research report YES/NO

I would like to see the transcript of my interview before it is used YES/NO

I agree to take part in this research. YES/NO

Signed

Print Name:

Appendix 2

FARMERS and IRRIGATORS

- water efficiencies
- other changes to farming methods
- the motivations for making these changes
- areas of support and encouragement
- the farmer as environmentalist, custodian of the land
- the importance of the local community
- effect of another drought
- effect of the Murray-Darling Basin Plan

- sense of security and implications for future generations
- a sense of continuing on from previous generations on the farm
- future changes planned

WOMEN (in addition to the above points)

- Role on the farm, practical and supportive
- Areas of support and encouragement, either the same or different to male partner

SCIENCE TEACHERS

- Conflicts of interest between personal beliefs and what is taught
- Conflict of interest between personal beliefs and what the children from farms hear from parents
- Areas of support for themselves and other staff members who are caught in conflict situations and or general stress from living in a community under stress.

Appendix 3

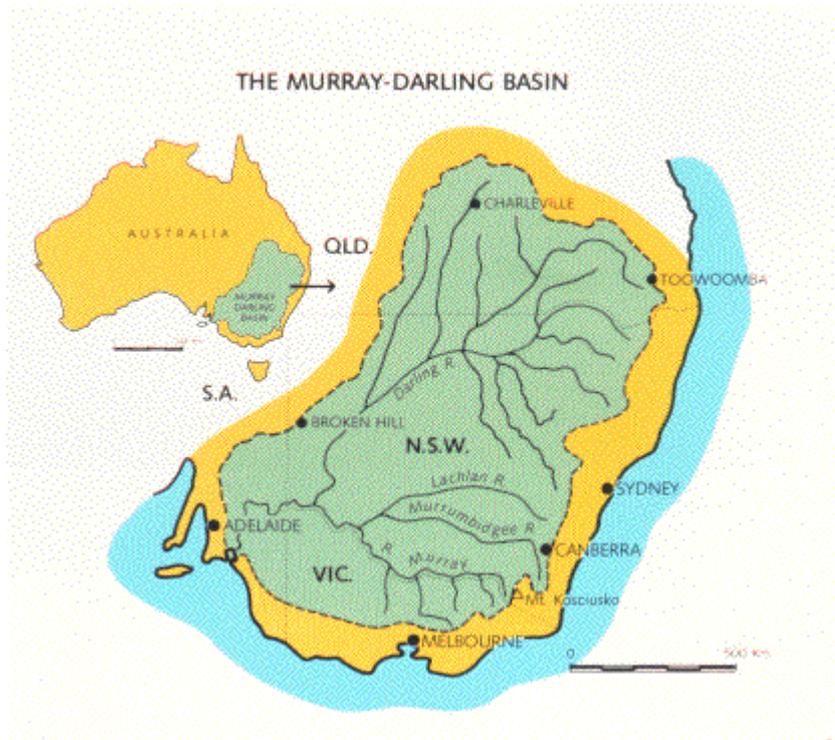
Learning How						
Govt. agronomist						
Private agronomist						
Landcare						
bank manager						
educated adult children						
father						
publications						
The Land						
field days						
other farmers						
over the fence						
internet						
trial and error						
the land itself						
Drivers of change						
climate						
economic						
peer pressure						
government						
a life long learner						
ability (subjective)						
Tertiary educated						
member of social group						
Attitude						
status quo						
growing and developing						
direct positive attitude to environment						
indirect						
direct negative attitude to environment						
indirect						
family farm						
single operator						
company						
dryland						
irrigator						
cropping						
livestock						
identifies as isolated						
not isolated						
expresses high fear for future						
medium						
low						
hopes for future high						
medium						
low						
identifies conservative						
not conservative						
positive attitude to 'greenie'						

negative attitude						
Non-committal attitude						

Appendix 4

[Website for this image](#)

artserve.anu.edu.au



Appendix 5



- About us
- Explore the Basin
- Proposed Basin Plan
- Programs
- Water management
- Have your say

[Home](#) » [Proposed Basin Plan](#) » [Plain English summary of the proposed Basin Plan](#)

Chapter 6—Water that can be taken

[Chapter 6](#) of the proposed Basin Plan responds to items 6, 7 and 8 in subsection 22(1) of the [Water Act 2007](#)  (Cwlth), by setting limits on how much water can be taken from the Murray–Darling Basin, and describing how compliance with these limits will be checked. It also responds to Part 2, Division 4 of the Water Act, by identifying the Commonwealth’s share of the reductions in diversion limits, and changes in reliability of water allocations.

Chapter 6 is related to [Chapter 5](#) of the proposed Basin Plan on the objectives of the Basin Plan. It is also related to Chapter 9, parts [3](#), [4](#) and [5](#), on water resource plans; [Chapter 12](#) on monitoring and evaluation of the Basin Plan; and schedules [2](#), [3](#) and [4](#), which set out the baseline diversion limits (BDLs) and long-term average sustainable diversion limits (SDLs). Other parts of the proposed Basin Plan may also be relevant.

Explanatory note

[Chapter 6](#) of the proposed Basin Plan, in conjunction with schedules [2](#), [3](#) and [4](#), presents the **long-term average sustainable diversion limits (SDLs)**, which are upper limits on the volume of water that can be taken on a sustainable basis from the Basin’s **water resources**. These limits are central to the plan to secure the long-term health of the Murray–Darling Basin.

This explanatory note mainly discusses the rationale for the SDL numbers proposed in this chapter. You may also wish to refer back to the explanatory note ‘What’s behind the proposed Basin Plan’s recommendations’ on page vii of this document, which discusses many issues related to the content of Chapter 6.

Briefly, the earlier note discusses the fact that SDLs will be achieved via a combination of buybacks and infrastructure investment — the Australian Government has made a commitment to ‘bridge the gap’ between current levels

Search this site:

Search

Proposed Basin Plan

[The Proposed Basin Plan – a revised draft](#)

[Proposed Basin Plan consultation report](#)

[The Socio-economic implications of the proposed](#)

and proposed levels of water diversions, without affecting entitlement or allocation reliability. The SDLs will not be implemented until 2019, by which time it is expected that reductions in diversions will have been achieved through buybacks and infrastructure investment.

The Murray–Darling Basin Authority (MDBA) is proposing a review of the Basin Plan in 2015, at which time the SDLs also will be reviewed. As the SDLs in the proposed Basin Plan are indeed proposals, they may be increased or decreased between now and 2019 on the basis of new knowledge about environmental needs, the efficacy of infrastructure projects, improved system management or other relevant information.

The [Water Act 2007](#)  (Cwlth) requires SDLs to reflect an **environmentally sustainable level of take**. The SDLs set out in the proposed Basin Plan are based on scientific evidence of sustainability; that is, on how much water we need to leave in the river and groundwater systems in order to support the environment and to ensure that we will continue to be able to use the river system productively into the future.

In fact, returning water to the environment is not just about the amount of water the river system needs, but also about the seasonal flow patterns and in-channel flow variability or 'flow regimes'. By damming rivers, and storing water for use when we need it, we have not only reduced the amount of water available to the environment, but we have also changed the frequency, timing and duration of wetland and floodplain watering.

Understanding these natural flow regimes helps us to work out how much water the environment needs.

In setting SDLs, MDBA has taken into account the need for:

- **water-dependent ecosystems** to be protected and restored, so rivers and groundwater systems remain healthy in a changing climate
- efficient and productive industries and resilient communities
- greater certainty of access to the Basin's water resources
- time for Basin science to advance further and for communities to adjust to new arrangements.

The environmentally sustainable level of take for groundwater is focused on ensuring that groundwater-dependent ecosystems, river and stream base flows, water quality and the ability to extract water over the long term are protected.

In determining the proposed SDLs, MDBA first needed to understand the water needs of the natural environment. This is a complex task and there is no established science or method that currently provides a succinct or definitive answer. There are tens of thousands of 'environmental assets' — rivers, wetlands, floodplains and aquifers — in the Basin, and to study the water requirements and natural flow regimes of all these would take many years. Therefore, MDBA looked at a subset of representative environmental sites and functions throughout the Basin. The environmental science underpinning this assessment is presented in Appendix A.

In conjunction with MDBA's environmental research, socioeconomic studies were undertaken or commissioned by MDBA to ascertain the likely effects of a range of SDLs on Basin communities and economies. MDBA's socioeconomic research is outlined in Appendix B. The results were used to ensure that the SDLs proposed would not have unduly harsh community impacts, and so that in places where impacts might be felt more strongly, strategies can be put in place to support these communities through the transition. The seven-year transition to SDLs and the 2015 review are examples of these strategies.

[Basin Plan](#)

[Delivering a healthy working basin](#)

[The draft Basin Plan](#)

[- catchment by catchment](#)

[Basin Plan Knowledge and Information Directory](#)

[Science and the draft Basin Plan](#)

[Mythbusting](#)

[Supporting documents](#)

Plain English Summary

[Table of contents](#)

[Chapter 1](#)

[Chapter 2](#)

From this strong scientific basis and building on feedback received, judgements were made about how much water the Basin and its catchments need to be healthy in the long-term, while continuing to support communities and economies. This is the foundation of the SDLs set out in the proposed Basin Plan.

[Chapter 3](#)

During the seven-year transition period, MDBA will undertake further detailed assessment of the health and water needs of the Basin's key environmental assets. The results of this research will be considered in reviews of the Basin Plan, along with other new information about socioeconomic impacts, improved operating rules and the benefits of new infrastructure, before the SDLs come into effect.

[Chapter 4](#)

[Chapter 5](#)

[Chapter 6](#)

After 2019, SDLs are expected to have been achieved, and the limits they represent will be enforced.

[Chapter 7](#)

Part 1 – Preliminary

[Chapter 8](#)

Chapter 6 of the proposed Basin Plan deals with:

[Chapter 9](#)

- long-term average sustainable diversion limits (SDLs) ([Part 2](#))
- the temporary diversion provision ([Part 3](#))
- the method for determining compliance with diversion limits ([Part 4](#))
- allocation of risks in relation to reductions in diversion limits and other risks ([Part 5](#)).

[Chapter 10](#)

[Chapter 11](#)

[Chapter 12](#)

Part 2 – Long-term average sustainable diversion limits

[Schedule 1](#)

The Water Act requires the Basin Plan to include long-term average sustainable diversion limits (SDLs). This part of the proposed Basin Plan sets out these SDLs.

[Schedule 2](#)

Division 1 – SDL resource units

[Schedule 3](#)

Division 1 of the proposed Basin Plan, along with schedules 2 and 4 to the proposed Basin Plan, divides the Murray–Darling Basin into surface-water and groundwater **SDL resource units**. Maps of the SDL resource units will be published on the Murray–Darling Basin Authority's website.

[Schedule 4](#)

[Schedule 5](#)

There may be one or more SDL resource units in a water resource plan area. SDL resource units are mapped in figures 6.1, 6.2 and 6.3 at the end of this chapter.

[Schedule 6](#)

[Schedule 7](#)

Division 2 – Long-term average sustainable diversion limits

[Schedule 8](#)

Long-term average sustainable diversion limits

[Schedule 9](#)

SDLs limit the amount of water that may be taken from an SDL resource unit. Water resource plans must include rules that give effect to these SDLs, but they do not need to do so until 2019, and they can also set a lower limit. See Chapter 9 for more information on this.

[Schedule 10](#)

SDLs for **surface water** are given in [Schedule 2](#), while SDLs for **groundwater** are given in Schedule 4.

[Appendix A](#)

The SDL for the whole of the Murray–Darling Basin is all of the SDLs added

[Appendix B](#)

together.

SDL resource unit shared reductions for surface water

The proposed Basin Plan specifies shared surface-water reduction amounts for the northern Basin and the southern Basin. *Shared reductions are for the needs of the Barwon and Darling rivers in the north, and the River Murray in the south.*

In the northern Basin, the shared reduction amount total is 143 gigalitres per year (GL/y).

The northern Basin is the following SDL resource units:

- Queensland Border Rivers
- Barwon–Darling Watercourse
- NSW Border Rivers
- Moonie
- Namoi
- Macquarie–Castlereagh
- Condamine–Balonne
- Intersecting Streams.

In the southern Basin, the shared reduction amount total is 971 GL/y.

The southern Basin is the following SDL resource units:

- Murrumbidgee
- New South Wales Murray
- Lower Darling
- Victorian Murray
- Kiewa
- Ovens
- Goulburn
- Broken
- Campaspe
- Loddon
- South Australian Murray
- Eastern Mount Lofty Ranges.

The exact breakdown of the various contributions to shared water reductions will be determined by the quantities and locations from which **environmental water** is sourced.

When a total shared reduction amount is achieved, the Murray–Darling Basin Authority (MDBA) will publish this on its website along with a breakdown of the amount of water contributed to the shared reduction amount by each SDL resource unit.

The MDBA will convert water access entitlements to a common unit for the purpose of calculating when the shared reduction amount is achieved.

Possible future adjustments to surface-water SDLs

Changes arising from any of the following matters may result in a need to change an SDL. These matters are:

- works or measures

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- river management and river operational practices
- methods of delivering water
- new knowledge
- proposals which advance the objectives and outcomes of the Basin Plan
- any other matter.

The MDBA must keep a register recording those matters that are likely to alter an SDL and the reasons for deciding this. The register must be published on MDBA's website at mdba.gov.au

Review of SDLs in 2015

The MDBA must review SDLs in 2015 and prepare a written report. The review will help MDBA determine whether it should propose changes to SDLs or the apportionment of the shared reduction amount between states or SDL resource units. The review should take into account all relevant information (including the registers of possible future adjustments) and be undertaken in consultation with the community.

Any amendments that MDBA considers necessary, including as a result of this review, must go through a formal process set out in the Water Act, which includes consultation and tabling in Parliament by the Commonwealth Water Minister.

Part 3 – Temporary diversion provision

The **temporary diversion provision** for each SDL resource unit is zero.

Part 4 – Method for determining compliance with long-term annual diversion limits

Division 1 – Registers of take

For each SDL resource unit, MDBA must establish a 'register of take', covering each **water accounting period** following 30 June 2019, to assist with determining compliance with diversion limits.

Registers will include columns showing the cumulative difference over the years between water that is permitted to be taken for **consumptive use**, and water that is actually used in each water accounting period.

Registers of take may also record any other matters MDBA considers relevant to determining compliance.

These registers must be published on MDBA's website.

Division 2 – Determining compliance

Compliance will be determined for each SDL resource unit in each water accounting period following 30 June 2019.

The following method must be used.

1. Work out how much water is permitted to be taken in the SDL resource

unit and how much has actually been taken. [Chapter 9](#) requires water resource plans to ensure that the amounts are determined, and to set out how they will be determined.

2. Record the difference between the permitted take and the actual take on the register of take:
 1. If actual take is greater than permitted take, the difference must be recorded as a debit.
 2. If actual take is less than permitted take, the difference must be recorded as a credit.
 3. If actual take and permitted take are equal, a zero must be recorded in both debit and credit columns.
 4. Finally, the cumulative balance of the difference between permitted take and actual take must be recorded.
3. If there is a cumulative debit (adjusted to take into account any buying and selling of environmental water) equal to or greater than 20% of the SDL, and the Basin state does not have a reasonable excuse for this, there is non-compliance with the SDL for that resource unit.

For the purpose of compliance, the Victorian Murray, Kiewa and Ovens SDL resource units may be treated as a single unit; similarly, the Goulburn, Broken, Campaspe and Loddon SDL resource units may be treated as a single unit.

If a Basin state wishes to claim it has a reasonable excuse for any non-compliance, it must provide a report to MDBA explaining this, along with the steps it will take to bring the register balance back into compliance.

The MDBA may undertake compliance audits; it may publish these, including the steps it believes should be taken to bring the register for that unit below the 20% threshold. The findings of these audits may lead to further action to ensure compliance.

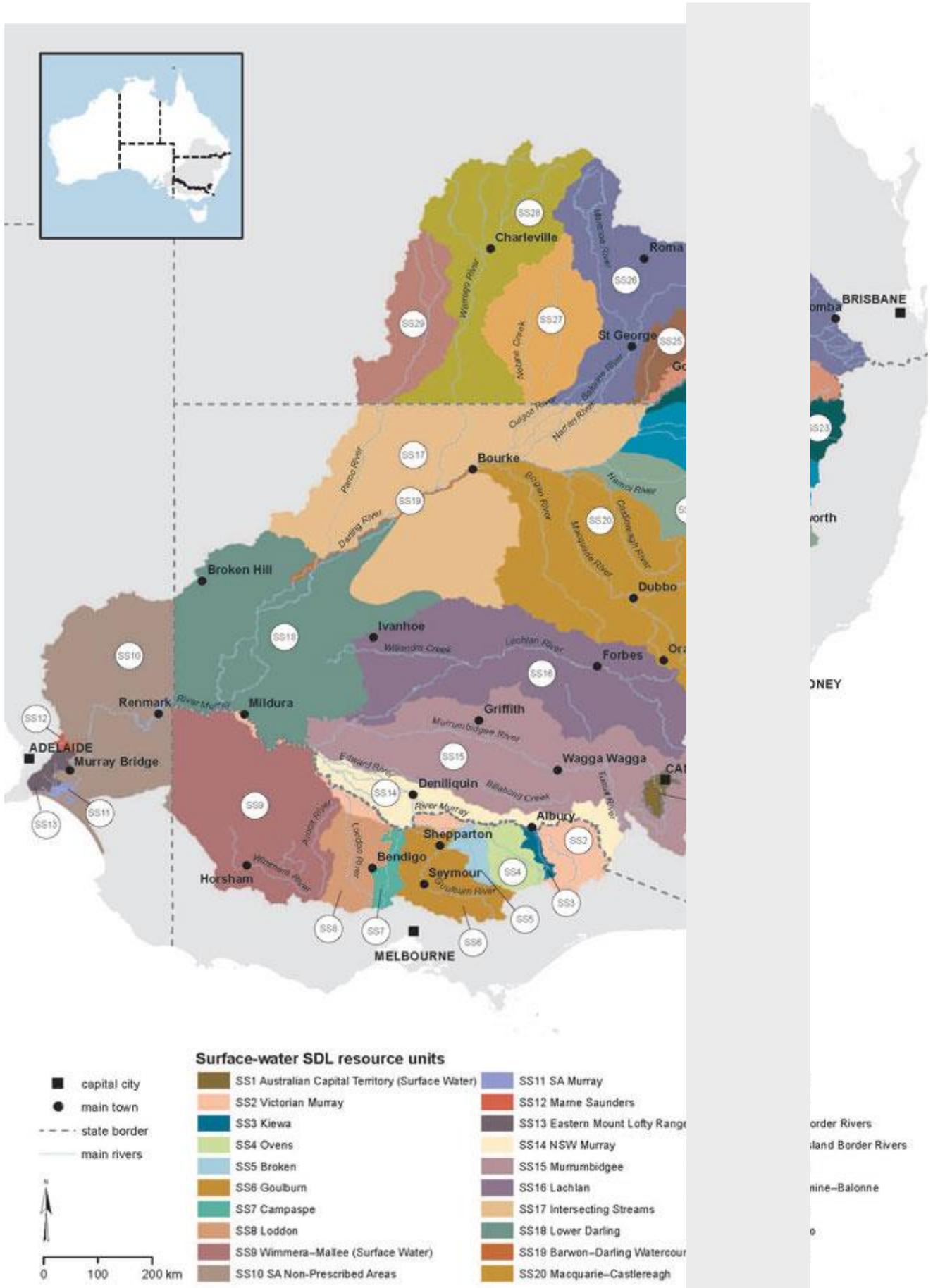


Figure 6.1 Surface-water SDL resource units in the Murray-Darling Basin

Appendix 6

69. THE MODERATOR'S MURRAY-DARLING BASIN CONSULTATION

(Rev Dr Jason John &
Mr Paul Creek)

Proposal

That the Synod

- (i) Note *that* the current crisis in the Murray-Darling Basin is an extremely complex issue that impacts directly not only on the health of the Basin and the lives of people who live there but on all Australians.
- (ii) *Affirm that all Australians must share in the cost of addressing the issue.*
- (iii) *Affirm the efforts that scientists have made to warn Australians about the poor state of the Basin's waterways and to develop insights into living sustainably in the Basin.*
- (iv) *Affirm the efforts farmers, especially irrigators, have made and are making to implement more sustainable farming practices.*
- (v) Calls on the Moderator to ensure the church has a growing role in this debate in the areas of (a) pastoral care for the people and (b) a prophetic voice for the land and its peoples.
- (vi) *Request the President to encourage the Synods of NSW, ACT, Queensland, South Australia and Victoria and Tasmania to explore ways of working together for the common good of the Murray-Darling Basin and its people.*

RATIONALE

The current crisis in the Murray-Darling Basin affords us the opportunity to work together through a consensual process so that Basin communities can move toward a sustainable future, resulting in more resilient communities and a healthier basin river system.

It is important to understand that Basin communities are diverse and complex, and tensions exist between those of differing world views. Furthermore, research has shown that many communities are vulnerable and fragile following the last drought and subsequent floods. Many residents have lost trust in governments and the Murray-Darling Basin Authority which exacerbates their sense of fear and insecurity.

There is also the sense that farmers and those living in basin communities are not respected; their knowledge, skill and experience are not recognised and have not been heard by the various government authorities involved in water policy and management.

The Rural Chaplains and other members of the church are currently working with and alongside those communities most affected. There is a need to harness further support for this mission in a time of complexity and uncertainty.

There is also a lot of distress in the Murray-Darling Basin and beyond about the damage that is being done by current policies to our wonderful rivers and the associated ecosystems. We need to work harder to restore the rivers to good health.