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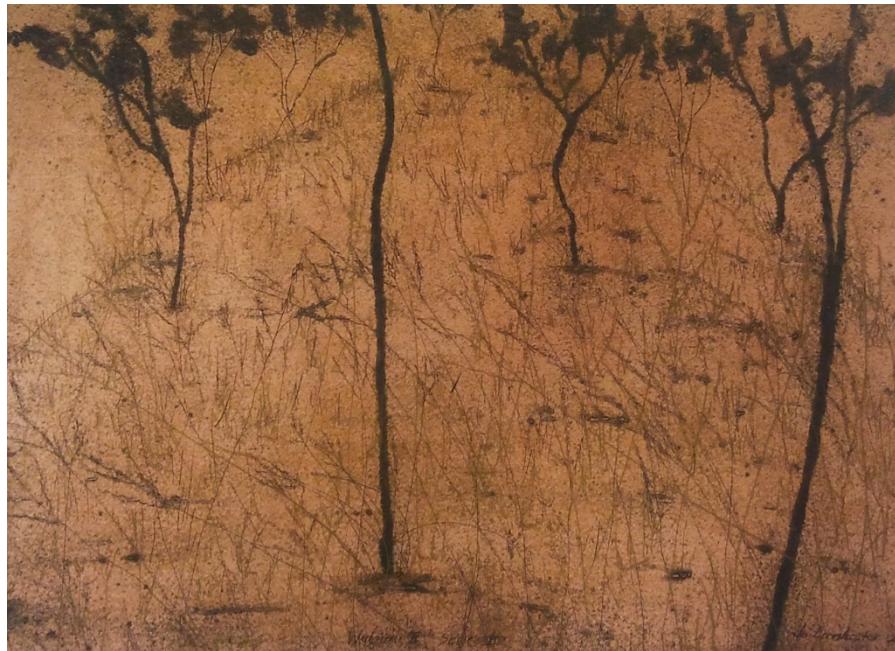
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Sustainability on the Australian rangelands: Learning, roles in life and sense of place

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Jo Lankester, 2002, Collagraph: Wulguru II, Series II

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for the degree of Doctor of Philosophy
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Declaration on ethics

The research presented and reported in this thesis was conducted within the guidelines for research ethics outlined in the *National Statement on Ethics Conduct in Research Involving Humans* (1999), the *Joint NHMRC/AVCC Statement and Guidelines on Research Practice* (1997), the *James Cook University Policy on Experimentation Ethics. Standard Practices and Guidelines* (2001), and the *James Cook University Statement and Guidelines on Research Practice* (2001). The proposed research methodology received clearance from the James Cook University Experimentation Ethics Review Committee (approval number H2815).

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Abstract

With the uncertainty surrounding the capacity of natural resources to maintain ecosystem services into the future, achieving sustainability is a high priority for land managers and policy makers. This thesis asserts that developing a ‘more sustainable’ approach to natural resource management requires the adoption of social and ecologically enhancing practices through shifts in the way people learn, see themselves and the world around them. Despite the attention that learning and social-psychological dimensions have been given, there is still limited understanding of farmers’ learning and self-identity processes that involve changes in perspectives and practices for sustainability. There is even less understanding of these aspects and processes in the context of achieving sustainability within rangelands. The main aim of this thesis is to increase understanding of aspects and processes of learning and self-identity, as self-identity relates to roles and place, in the context of achieving sustainability within rangelands and extensive grazing systems.

The thesis focuses on a case study of beef producers who operate extensive cattle grazing operations in the northeastern rangelands of Queensland, Australia, where multiple and complex social-ecological problems have arisen due to the erosion of ecosystem services. I use the case study to explore learning, self-perceived roles in life and sense of place in this setting and to identify (1) learning processes and outcomes that foster changes in perspectives and practices that enhance sustainability, and (2) the influence of self-perceived roles in life and sense of place on achieving sustainability. Interpretative mixed methods are used to provide in-depth and broad-scale understanding of the social-psychological dimensions of the thesis: a qualitative study (28 face-to-face interviews) with one set of producers followed by a quantitative study (91 telephone surveys) with a different set of producers. Qualitative data are used to develop variables for the quantitative survey and to provide interpretative understanding of the quantitative findings. Content and statistical analyses of data from the qualitative and quantitative phases of the study, respectively, provide conclusions for the thesis as a whole. Social-cultural perspectives from different disciplines frame the analysis of beef producers’ narratives and discussion of the findings.

The results of the case study show that aspects that can foster sustainability are organised and sustained collective learning, adversity, active experimentation, alternative discourses and an emotional connection to the land and family property. On the other hand, attachment to the lifestyle and occupation of cattle grazing, including

'outside' labouring roles, do not appear to be strong indicators of sustainability. Some aspects of the beef industry and culture may not always need changing for sustainability. For example, 'learning by doing' and, in some cases, producers' emotional connection to the family property appear to help foster sustainability. However, other aspects such as low engagement in collective learning and alternative discourses, and attachment to the occupation and lifestyle of cattle grazing may require critical reflection and change. The entrepreneurial discourse associated with personal and cultural change in the northeastern rangelands may also require critical reflection on the extent of ecological sustainable behaviour fostered by this change.

I, therefore, conclude that continual, collective and experimental learning that encourages critical reflection of habits of practice and builds the social and cultural capital of alternative discourses is important for achieving sustainability. This thesis contributes novel interdisciplinary contributions to the fields of geography, environmental psychology, adult learning and sustainability and new insights for concepts of 'place identity', 'place attachment', and 'learning for sustainability', 'adoption of innovations', 'transformative learning', 'farmer identity' and 'gender roles'. Implications of the results of this thesis for policy include realising that a learning-based approach is required and that because producers' sense of self and place is multifaceted there is likely to be a diversity of responses to planned interventions. Further research is required to understand what the 'change' or 'transformation' in learning and self-identity processes that foster sustainability constitutes. Research could include further identifying cognitive, emotional and relational changes that lead to shifts in learning, practice, self-identity and culture that fosters sustainability, and understanding the role of adversity in the learning and change process.

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Chapter 1

Social-psychological dimensions of sustainability: Northeastern Australian case study

1.1 Introduction

Escalating social-ecological problems in agricultural and pastoral systems are shifting the goals of food production from simply maximising productivity to include a wider and more complex array of social and environmental objectives (Pretty et al. 2010).

Achieving sustainability is a high priority of strategies to address social-ecological problems. This thesis asserts that personal and cultural shifts in the way land managers learn and perceive themselves, others and the world around them are required to enhance sustainability. While the literature shows that changes for sustainability are influenced by learning processes and aspects of self-identity (and vice-versa), there is still limited understanding of aspects and process of self-identity and learning, especially in the context of transformative thinking, alternative practices and extensive grazing systems. This thesis attempts to increase this understanding through a mixed method study focused on the extensive beef grazing industry of northeastern Australia that shows ‘less traditional’ discourses and practices, sustained collective learning, experimentation and particular aspects of place and self-identity are important for the transition to ‘more sustainable’ practices.

In this chapter I introduce a perspective of sustainability that is based on the need to adopt socially and ecologically enhancing practices that involve shifts in perspectives that increase interest in learning and change. I introduce some key social-psychological factors and processes that contribute towards change for sustainability and then identify the need to better understand how aspects and processes of learning and self-identity influence sustainability in the context of extensive grazing systems. I describe the social, ecological and political context of the northeastern Australian beef industry, which is the case study for this thesis. Lastly, I present the objectives of the thesis and provide an outline of the chapters.

1.2 Background

Rural agricultural production practices that stem from an industrialised and market-driven approach to agriculture have proven to be unsustainable (van der Ploeg 2010). A range of social-ecological problems exist in agricultural and pastoral landscapes that relate to the degradation of ecosystem services (Millennium Ecosystem Assessment 2005). These problems have been exacerbated by changes in climate and culture (Lang 2010). As a consequence of these drivers, land managers are faced with an increasing rate of institutional and environmental change and uncertainty (Darnhofer et al. 2010b). Climate change, in particular, is predicted to dramatically alter the accessibility and quality of natural resources thereby substantially increasing land managers' vulnerability and need to adapt to change (Marshall 2010). Society has the challenge of needing to develop strategies that reduce the negative ecological impacts of land-use across multiple services and scales while maintaining social and economic benefits (Foley et al. 2005). The concept of 'sustainability' is an integral part of strategies to address social-ecological problems associated with food production.

1.2.1 Defining sustainability

The concept of sustainability originated from recommendations for development in the Brundtland report (WCED 1987). In general, sustainability is about ensuring that depleted natural resources and ecosystems are replenished and regenerated in a way that ensures the wellbeing of current and future generations. Sustainability is widely understood to include three main dimensions: social responsibility, ecological viability and economic viability (Black 2005; Ramen 2006). 'Sustainability' is a highly ambiguous and contested concept that has been interpreted in a multitude of ways depending on the different values and interests of people. The lack of agreement on a definition of sustainability has occurred because people assign different priorities to social, economic and environmental assets and outcomes (Cocklin & Dibden 2005). Different discourses shape different perspectives of sustainability (Fleming & Vanclay 2010). Contrasting and multiple definitions of sustainability suggest that use of the concept must also be accompanied by an understanding of how the concept is interpreted and a detailed understanding of what the concept means for the particular setting or context (Loeber et al. 2009).

Sustainability in this thesis is interpreted as a process that involves a change in the way people perceive and manage natural resources towards replenishment and

maintenance of the resource. In this sense, the nature and goals of sustainable food production are positioned as an alternative to productivist and/or industrial modes of production (Fish et al. 2006). Sustainable food production is a change in technoscientific practices, a *social movement* (i.e. a way of life, a source of identity and solidarity and a new sense of purpose and independence) and a policy goal (i.e. changes in industry, research, environmental health and other policies that apply to agriculture) (Buttel & Shulman 1997). It involves a systems level reconstruction of practices to enhance biological activity, rather than technological changes within existing systems (Fairweather & Campbell 2003). For example, Tabara and Pahl-Wostl (2007) emphasise the cultural change that is required for achieving sustainability:

Sustainable development simply cannot resolve a problem that is culturally rooted in the way that science and policy view and interpret the relationships between natural and social systems and the role of knowledge production. Sustainability demands, above all, a cultural transition in the form of an emerging sustainability culture that views humans as an inextricable part of the making of their own social-ecological system.

The transition to sustainability is a lengthy and difficult process that involves fundamental changes in goals, attitudes, values and institutions (Pretty 1995; Röling & Jiggins 1998). Achieving sustainability, in the way it has been interpreted for this thesis, involves the adoption of practices to address social-ecological problems, but more importantly requires deep and underlying changes in the approach to land-use for food production.

'Soft system thinking' is a necessary part of achieving 'more sustainable' land-use practices. Soft system thinking views a socio-ecological system as a whole with many parts that interact and that interacts with other systems. This type of thinking is necessary for addressing complex natural resource management issues that cannot be understood through examining parts in isolation from each other or the whole as an aggregation of parts (Röling & Wagemakers 1998). A soft systems approach recognises that goals or end points are often ambiguous, conflicting and constantly shifting (Wilson and Morren 1990 in Pretty et al. 2010, p.111). Alternative approaches to knowledge generation, inquiry and decision making is also characteristic of soft systems and holistic thinking (Thompson 1995). A notable feature of soft systems thinking, in the context of agricultural sustainability, is the intention to adapt to changing conditions through a process of learning about changes and adapting to those changes

(Ramen 2006; Darnhofer et al. 2010a). This is in contrast to ‘hard systems thinking’ that is predictive and uses well-defined goals and boundaries to solve problems.

1.2.2 Learning and sustainability

Learning that is continuous, collaborative, participatory, experimental and transforms perspectives is essential for sustainability that fosters cultural change (Finger & Verlaan 1995; Maarleveld & Dangbégnon 1999; Ballard 2005; Maiteny 2000). This learning process is characterised as social, practical and reflective. Collaborative and participatory learning experiences that develop trust, encourage dialogue and prompt individuals to critically reflect on their own and each other’s assumptions of the world is an important part of learning that enhances sustainability (Marschke & Sinclair 2009; Sims & Sinclair 2008; Tilbury 2009). Dialogue that highlights areas of conflict and continues through to negotiate a shared understanding of an issue and how to address it is an important part of the learning process (Webler et al. 1995; Eshuis & Stuiver 2005). Experimental and adaptive learning (i.e. a continuous cycle of action and reflection) is another recognised aspect of learning that fosters sustainability (Somers 1998). Achieving sustainable food production requires learning that involves critical dialogue through participation and experimentation.

The theoretical and empirical understanding of learning processes and outcomes that foster sustainability is not yet strong enough to design policies and institutions to effectively enhance sustainability (Stagl 2007; Henry 2009). Specifically, there is limited understanding of the aspects and outcomes of learning that require change and the conditions and processes that provide evidence of a change or transformation in learning for sustainability (Rodella 2011; Sinclair et al. 2008; Muro & Jeffrey 2008), how and why individuals learn (Henry 2009) and the inter-linkage of learning processes at different scales (Stagl 2007; Krasny et al. 2009). Henry (2009) concludes that a better understanding of how and why individuals learn and the parameters that influence this process is required to design the types of institutions that promote learning for sustainability.

1.2.3 Farmer self-identity and sustainability

A range of interrelated factors influences the process of learning and changing to ‘more sustainable’ land-use practices. Changing practices will depend on land managers’ goals and values that are influenced by a range of personal, social, cultural, physical and economic factors (Pannell et al. 2006). Different farms will have different

opportunities for enhanced sustainability, depending on levels of social, cultural, economic and moral capital (Wilson 2008). Depending on the situation and context, some variables will be more salient than others in influencing change towards sustainability. Where food production is the main source of income for producers, financial capacity and perceived financial benefits play an important role in whether or not a land manager will adopt ‘best practices’ (Vanclay & Lawrence 1995; Bewsell et al. 2007; Lankester et al. 2009). Social values are often as influential, if not more so in some cases, as economic factors when it comes to learning and changing land-use practices (Richards et al. 2005; Vanclay 2004). Changing practices depends on the extent to which the change matches self-identity and what an individual knows and values and provides symbolic and cultural capital (Burton & Wilson 2006; Tsouvalis et al. 2000; Burton 2004b).

Land managers’ self-identity, or how they perceive the self in relation to others and the wider world, is often closely entwined with their relationship to occupation and place and the culture that shapes these relationships (Hummon 1992; Becker & Carper 1956). The individual’s ‘context’ influences the development of his or her identity (Hay 2010). For example, land managers with long and ancestral connections to their property develop strong attachments and emotional ties such that the place becomes part of their self-identity (Gosling & Williams 2010; Chawla 1992; Dominy 2001; Silvasti 2003). The occupation of farming or livestock production, the self-worth and recognition, routine and social-connectedness associated with the occupation, is also entwined with land managers’ self-identity (Riley 2011; Källström & Ljung 2005).

Previous research shows that land managers’ self-identity associated with their relationship to their place and occupation can influence their propensity for sustainable natural resource management in different ways. For example, a strong attachment to the family farm and occupation, qualities of the rural life and reliance on the land for livelihood have been associated with resistance to participation in conservation activities and adapting to change (Jacobs & Buijs 2011; Cross et al.; Marshall et al. 2012). In contrast, land managers with an emotional connection to nature have shown a propensity for pro-environmental activities (Cross et al. 2011; Gosling & Williams 2010). While studies have investigated attitudinal responses to ‘more sustainable’ practices and change, researchers have been slow to acknowledge exactly how important culture and aspects of culture such as identity and symbolic meaning can be for achieving sustainability (Burton 2004a; Adger et al. 2011). More specifically, there has been little investigation into the relationship between aspects of self-identity such

as roles and sense of place (or relationship to place) and achieving sustainability in the context of extensive grazing systems and rangelands.

Changes in self-identity for sustainability is both constructed by individuals and shaped by broader social structures; the process is dialectical. For example, groups of people engaged in a process of collective learning in a shared domain of human endeavour is influenced by and may change the social structure (Pahl-Wostl et al. 2007). The social interaction involved with changing practices can influence and shape farmers' identity. While the literature that has examined how farmers' self-identity shapes and is shaped by change processes for sustainability is scant, there is even less literature of these phenomenon and their interactions in the context of extensive grazing systems and rangelands. Previous research of participatory approaches in rangeland management recommend that the design of appropriate and effective participatory processes account for differences in social and cultural contexts and develop specific participatory approaches for particular groups of land managers (Kelly 2001).

This thesis applies the concepts of learning and self-identity, as self-identity relates to roles and sense of place, in the context of achieving sustainability in extensive grazing systems and rangelands. The thesis aims to provide insights into farmer identity and learning more broadly in the context of natural resource management and more specifically in the context of extensive family operated cattle grazing enterprises, the beef industry and rangeland management. Aspects and processes of learning and self-identity are likely to interact with sustainability differently in different contexts. These concepts are important to explore in extensive grazing and rangeland systems, as there has been little exploration of these concepts in this context and far less exploration into how they influence achieving sustainability. Through a case study of the beef industry in northeastern Australia, this thesis attempts to increase understanding, from a socio-cultural perspective, of learning, self-perceived roles in life and sense of place, and examines how these aspects may influence sustainability.

1.3 Case study: The beef industry in northeastern Australia

The beef industry in the tropical savanna rangelands of northeastern Queensland, Australia is the chosen case study for this thesis (Figure 1). The tropical savannas are characterised by eucalypt-dominated woodland on typically nutrient poor soils, with the vegetation becoming increasingly sparse and smaller in size in areas where the rainfall

declines (Yates et al. 2008). The climate in this region is characterised by pronounced wet and dry seasons, with most rain falling between November and April (Marshall et al. 2011a). Beef grazing is the main land-use; land is predominately leased for cattle grazing from the state government and operations are mostly family-run businesses.

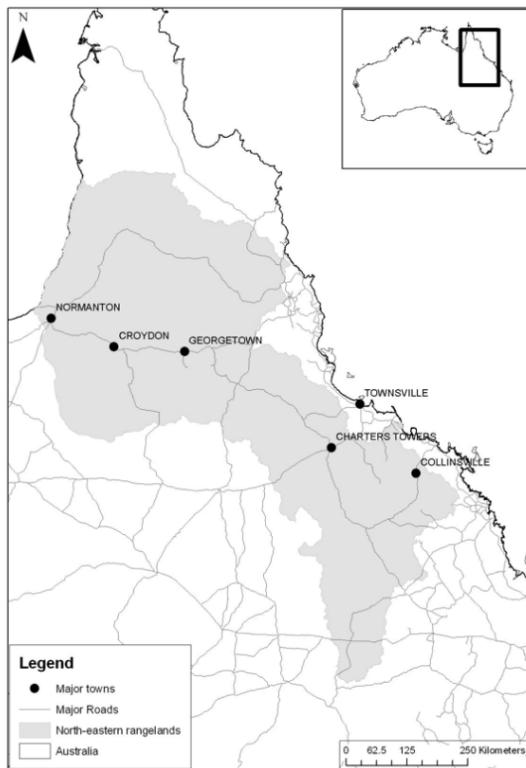


Figure 1: The northeastern rangelands of Queensland, Australia

The beef industry in the rangelands of northeastern Australia provides an ideal opportunity for a case study to examine the social-psychological dimensions of natural resource management. The adoption of sustainable land-use practices in the rangelands has become critical due to the erosion of ecosystem services, climate variability and other factors such as fluctuating market prices (Stafford Smith et al. 2007). Since the introduction of livestock there has been a loss of biodiversity through altered fire regimes, the spread of pests and exotic plants, soil loss, changes in water availability and/or quality, vegetation clearance and compounded combinations of these factors (Woinarski & Fisher 2003). For example, the spread of the pasture grass, Indian Couch (*Bothriochloa pertusa*), combined with the reduction of native blue grass (*B. ewartiana*), from cattle grazing has contributed to native fauna species declines in tropical savanna woodlands (Kutt & Fischer 2011). Additionally, increased sediment and nutrient loads in run-off from beef grazing lands in catchments adjacent to the

Great Barrier Reef are major sources of diffuse water pollutants entering the reef (Brodie & Mitchell 2005; Haynes et al. 2007). Environmental degradation in the rangelands has also contributed to declines in productivity. Degradation problems are considered so severe in some rangeland areas that if grazing is not phased out as a primary land-use, these areas are predicted to experience serious ecological and social decline (Stafford Smith et al. 2000; Gordon & Nelson 2007).

Escalating environmental degradation in the rangelands has increased societal pressure on beef producers¹ to operate sustainably. The new leasehold renewal agreements (The State of Queensland 2007) and regulation to protect the Great Barrier Reef from upstream water pollutants (State of Queensland 2010) are examples of increasing regulatory pressures on producers to change to ‘more sustainable’ practices. In addition to these ‘forced’ changes, producers are also expected to engage in voluntary conservation programs such as payment for environmental stewardship (Commonwealth of Australia 2007).

The major management issue in the rangelands is estimating the correct stock numbers to maintain desirable perennial pastures given variability and changes in climate, commodity prices and costs of production, government policy, financial pressures and technological capability (Stafford Smith et al. 2007). Current recommended practices to enhance sustainability in the northern Australian rangelands include enhancing the condition of native pasture, controlling the spread of exotic animal and plant species, sound financial management, appropriate use of fire, managing for a variable climate and conserving biodiversity (NLWRA 2005; MacLeod & McIvor 2006).

Adoption of recommended practices depends on how beef producers perceive the practices facilitating cattle production. Beef producers in northeastern Australia rely on cattle production for a livelihood and are a part of an industry characterised by production values (Holmes 2006). The beef industry has developed and intensified according to a strict productivist model that has emphasised economic efficiency above the creation of more complex and variable agricultural systems that have heterogeneity in values, goals and uses at all scales (Hinrichs & Welsh 2003; Holmes 2006). Northeastern Australian beef producing families exist within a contradictory policy

¹ I have used ‘beef producer’ to describe land managers with extensive cattle grazing operations. In doing so I recognise that there are many other titles that beef producers may more strongly identify with such as ‘cattle grazier’, ‘livestock farmer’ or ‘land manager’.

environment; they are expected to become ‘more environmentally sustainable’ managers on the one hand and maximise profitability, in the face of declining terms of trade, on the other. Producers are incurring constantly increasing regulatory pressures, cost-price squeezes and worrying debt levels as a result of agricultural and natural resource policies (Hamblin 2009). Producers also have the added pressure of managing the risk associated with drought since the government changed from dealing with drought through public policy to expecting producers’ able to predict and control the risk associated with drought through formal business planning techniques (Higgins 2001). The adoption of recommended management practices in the northern Australian beef industry will be limited by the extent that practices support production and business goals and values.

The future landscape of northeastern Australia is envisaged to become less dominated by beef production and more ‘multifunctional’. It is predicted that pastoralist will remain the core activity in the rangelands, but with a whole new set of linkages to post-production economy, information and social networks and to a more diverse group of land-users (McAllister et al. 2006). Foran (2007) believes that rangelands in coming decades will be dominated by issues surrounding the tension between European and Aboriginal trends; the increased economic dominance of mining, tourism and defence; the ‘sponge effect’ of successful towns and particular enterprises; carbon trading; energy generation; water catchments, weeds and diseases; and agricultural incursions. Climate change is a major factor influencing the future direction of the beef industry with the introduction of new schemes such as the Carbon Farming Initiative (Commonwealth of Australia 2012). Continual bio-physical and socio-economic fluctuations and change will require flexible enterprises that manage for risk and uncertainty (Stokes et al. 2006). These predicted changes for the Australian rangelands require new ways of thinking and behaving.

1.4 Purpose and objectives of thesis

In this thesis I explore important social-psychological drivers of land managers’ decision-making in the context of achieving sustainability. The overall aim is to increase understanding of learning and self-identity aspects and processes that foster sustainability in extensive beef grazing systems such that policy makers are more able to accelerate the rate of change to ‘more sustainable’ behaviour. The focus is on individuals on family run cattle grazing operations. The objectives of this thesis are to

identify (1) learning processes and outcomes that foster changes in perspectives and practices that enhance sustainability, and (2) the influence of two main dimensions that relate to self-identity—roles and sense of place—on achieving sustainable natural resource management. These objectives are operationalised into the following sets of research questions that relate to each of the three results chapters:

- What are the sources, processes and outcomes of beef producers' learning for changing practices to improve the condition of the land? What are characteristics of beef producers' learning that foster change for sustainability? (Chapter 3)
- What are beef producers' self-perceived roles in life? What are the most important roles for beef producers? How do these self-perceived roles influence sustainability? (Chapter 4)
- What is the nature of and meanings behind beef producers' relationship to their family property, occupation and way of life? What does it mean to be a beef producer? How does this 'sense of place' influence sustainability? (Chapter 5)

1.5 Thesis outline

This chapter (Chapter 1) sets the scene for the thesis. The chapter summarises the social-ecological problems facing agricultural and pastoral landscapes, provides an interpretation of sustainability based on learning and change, highlights social-psychological dimensions of natural resource management, identifies limitations in knowledge to do with learning and self-identity in the context of sustainability and explains how this thesis aims to improve this understanding. It also describes the case study region of the northeastern rangelands, including the region's social-ecological problems, cultural-political background and its predicted future. The next chapter (Chapter 2) provides an overview of the mixed method research approach and design, details of the qualitative and quantitative methods and other considerations such as ethics and validity. Chapters 3–5 present the main results of the thesis and explain the social-psychological perspectives or theoretical frameworks that I used to analyse the data. In Chapter 3 I develop a conceptual framework of learning for sustainability that integrates adult learning theories that I operationalise in the beef industry of northeastern Australia. In Chapters 4 and 5 I provide insights into beef producers' self-

perceived roles in life and sense of place and how these aspects influence sustainability. These chapters are in a format to allow for their modification for publication in peer reviewed journals (see Appendix A for the full list of publications produced during my candidature). Chapter 6 discusses the implication of the thesis outcomes for management and policy design. Chapter 7 provides a general conclusion for the thesis in relation to the objectives and discusses theoretical contributions, limitations of the approach and ideas for future research.

Chapter 2

Investigating complex issues using mixed methods

2.1 Introduction

Different methodological approaches exist within the social sciences. A qualitative approach explores social or human aspects and processes using strategies of inquiry such as case studies, grounded theory, ethnography or narrative to generate an in-depth ‘story’ of the phenomena. This approach focuses on understanding and interpreting action or phenomena through the meanings they have for people. A qualitative approach to social research is usually selected when the research is exploratory in nature, the diversity of variables surrounding a phenomenon is unknown, or when a theory base for the study is lacking (Creswell 1994). In contrast, a quantitative approach uses more standardised measures and strategies of inquiry such as surveys and experiments with pre-determined categories. A quantitative approach to the research is most commonly used when the objective of the research is to identify factors that influence an outcome, the utility of an intervention, or to understand the recommended predictors of outcomes (Creswell 2003).

A mixed methods approach was judged to be most appropriate for addressing the research questions for this thesis, which is focused on understanding social-psychological dimensions of sustainability. ‘Mixed methods’ has been defined differently by different research disciplines and paradigms. In a review of the different definitions of mixed methods Johnson et al. (2007, p.129) defines mixed methods research as:

...an intellectual and practical synthesis based on qualitative and quantitative research; it is the third methodological or research paradigm (along with qualitative and quantitative research). It recognizes the importance of traditional quantitative and qualitative research but also offers a powerful third paradigm choice that often will provide the most informative, complete, balanced and useful research results (p. 129).

Mixed methods were needed in this thesis to: (1) provide (qualitatively) an in-depth account of the meanings and processes behind beef producers' learning, self-perceived roles and relationship to place; (2) identify a range of variables (qualitatively) for the quantitative survey; and (3) identify (quantitatively) the relationship between different variables, broad-scale patterns and the importance of different variables. Combining qualitative and quantitative methods allows the researcher to draw conclusions that would not be possible using either method alone (Teddlie & Tashakkori 2010).

This chapter explains the mixed methods approach that I used for this thesis. The chapter is divided into two sections. Section 2.2 provides the reader with background on the epistemological perspective and mixed method research approach. Section 2.3 provides details of the qualitative and quantitative methods, including consideration of ethical, validity and reliability issues.

2.2 Background issues relevant to the development of methods

2.2.1 Epistemological position

'Epistemology' refers to the assumptions informing the research; the ideas one holds about what can be known and what it means to know something (Biesta 2010). Within a mixed method approach there are a range of epistemologies and perspectives. I used a critical realist paradigm to guide the approach to answering the research questions. Realism provides a philosophical stance that is compatible with both qualitative and quantitative research (Maxwell & Mittapalli 2010). Critical realism asserts that there is a world independent of human beings. Reality consists of material objects, ideas and discourses (e.g. material, ideational, artefactual and social types of realities) that affect behaviour and makes a difference (Alvesson & Sköldberg 2010).

Critical realism retains a realist ontology (i.e. researcher takes seriously the existence of phenomenon as independent in some way from their experiences with them) while accepting a form of epistemological relativism, which assumes that the world is the way it is, but there can be more than one scientifically correct way of understanding reality (Maxwell & Mittapalli 2010). In other words, we do not have any objective or certain

knowledge of the world; there can be alternative and valid understandings of the one phenomenon.

A critical realist perspective assumes that the perspectives participants (and the researchers) have of phenomena such as roles, relationship to place, learning and practices, depends on what they mean in reality for the participants. These perspectives are not simply constructions of the observer, but part of the world that we are trying to understand. A critical realist perspective also assumes that participants' perspectives of the different phenomena causally interact with one another and are influenced both by the circumstances in which they exist and the cultural resources that provide individuals with ways of making sense of their situations (Sayer 1992 in Maxwell & Mittapalli 2010). The emphasis is on generating knowledge about the meaning of participants' perspectives rather than the cause of their perspectives.

2.2.2 Case study methodology

I chose a case study methodology to gain an in-depth understanding of the complex issues of self-identity and learning and their relationship to sustainability in an extensive rangeland environment. Case studies gain insight into the complexity of a single case or a complex functioning unit taking into account the context of the situation and setting (Johansson 2003). A case study methodology seemed appropriate for this thesis because the study included "how" and "why" questions and sought to understand contextual conditions and issues relevant to the situation and variables investigated (Yin 2003). A case study approach is also compatible with the use of mixed methods to highlight the multitude of variables of a case from different angles. A case study enables the researcher to gather data from a variety of sources and to converge data to illuminate the case (Baxter & Jack 2008).

2.2.3 Mixed method research approach

The research objectives for this thesis were reached using an inductive mixed methods approach. The use of quantitative methods to explore concepts such as 'sense of place' have been criticised for failing to capture the richness and elusive dimensions of such concepts (e.g. Stedman 2003a). However, mixed methods use a combination of qualitative and quantitative research approaches for the broad purposes of breadth and depth of understanding and corroboration (Johnson et al. 2007). It involves the

integration of the two approaches to answer complex research questions. Equal status may be given to both approaches in the research design or the research can be more qualitative or more quantitative. The approach taken for this research was two-phase sequential: a qualitative phase followed a quantitative phase (Figure 2). The research design was *exploratory*: an initial qualitative phase explores a phenomenon and then builds to a second quantitative phase (Cresswell & Plano Clark 2007). In the first phase of the study, qualitative data were collected through face-to-face interviews. The qualitative data were used to develop variables for the quantitative survey and to help interpret the results of the survey. In the second phase of the study, quantitative data were collected through a telephone survey with a set of different participants to the qualitative study. The survey was used to answer aspects of research questions for each chapter. Analyses of the results from both phases of the study were used to draw conclusions for each chapter and the thesis as a whole.

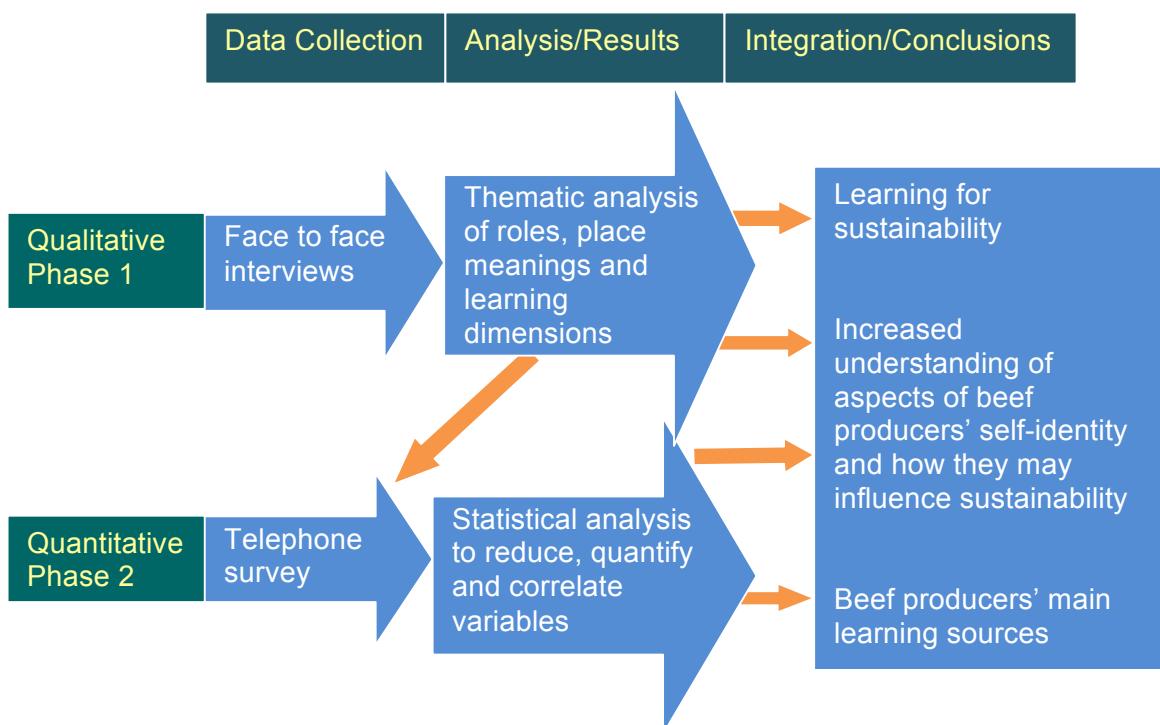


Figure 2: The two-phase sequential mixed methods approach used in this thesis

2.3 Details of methods

2.3.1 Qualitative phase

Sampling

I used a non-probabilistic purposive sampling approach to select producers for the qualitative study. This technique involves purposively selecting a diverse range of cases to understand variation of a particular phenomenon; to generate a broad diversity of relationships and/or gather a depth of information or a unique perspective relative to the phenomenon of interest (Patton 2002; Collins 2010). Purposive sampling seemed most appropriate for the qualitative study, as a deep and varied perspective of the phenomena examined in this thesis was lacking. Producers were selected from lists of beef producers provided by two extension officers: one who worked in the north and the other in the south of the study area. Producers were purposefully selected from the lists to ensure a range of land management styles (e.g. cell grazing, continuous grazing of paddocks without rest); farming strategies (e.g. diversified land-use, off-farm business); geographic locations (e.g. different climate variability, soil types and degrees of remoteness); demographics (e.g. different age and gender); and extension experiences. There were 50 producers on each list. Producers were randomly selected from these lists, contacted and asked if they would like to participate in a face-to-face interview. All producers who were contacted and available during the interview period agreed to an interview.

The final sample of participants for the qualitative study included 28 producers—10 females and 18 males—from 22² properties who ranged from 28 to 65 years of age. Producers from 18 properties managed large, remote (one to two hour drive from a township) properties with cattle grazing as their main livelihood. Producers from the four other properties had smaller sized properties and managed an off-farm business in conjunction with cattle grazing. Producers' properties had soil types that ranged from more fertile basalt and black soils to less fertile, shallower soils. Seven producers were actively using a cell grazing system³ and the other 21 producers were either

² I interviewed several producers from the one property in some cases.

³ The practice of cell grazing involves reducing large-sized paddocks into smaller ones through an increase in fences and water infrastructure. Cattle are rotated around the smaller paddocks so that each paddock is intensely grazed and obtains a period of rest from grazing.

continuously grazing cattle⁴ or just spelling (or resting) some paddocks from grazing, especially during the wet season. About half of the producers were actively participating in extension and natural resource management group activities and the other half interacted with extension staff and forums intermittently.

Qualitative interviews

I collected qualitative data through face-to-face semi-structured interviews between December 2007 and April 2008. The interviews were conversational in style. According to Fontana and Frey (2000), semi-structured interviewing attempts to understand the perspectives and experiences of participants without imposing any *a priori* categorisation that may limit the scope of inquiry. Interviews are jointly constructed by the interviewer and interviewee, whereby both the researcher and participant strive to arrive together at meanings that both can understand (Mishler 1986).

The interviews were all undertaken on properties over three periods between December 2007 and April 2008. Most interviews lasted approximately two hours. I used an interview guide with a list of questions in the interviews. The guide was based on the research questions for the thesis. The purpose of an interview guide is to ensure that the basic lines of inquiry are pursued with each participant and that the limited time for an interview is used effectively (Patton 2002). I refined the interview guide over the interviewing period to include some questions and omit others. For example, I removed questions such as 'Are there different stages you go through when making a decision to change management?' and 'What situations have helped you in making the decision to change management?' as the interviews progressed because it became obvious that the decision-making process does not neatly follow stages and/or answers were too vague, respectively. Other questions were added over time to improve the interview guide. For example, in order to more effectively draw out producers' learning experiences, I added a question that specifically asked 'What are your main learning sources?' The final questions used in the interview guide are listed in Appendix B.

The interview questions were open-ended to encourage interviewees to define the focus of the interview rather than myself. I avoided leading questions, to which the interviewee could easily answer with 'Yes' or 'No'. Questions were sequenced so that 'icebreakers', or less personal questions, were at the beginning of the interview and

⁴ Continual grazing refers to a management system where livestock graze a paddock continuously over time with no, or only infrequent, spells from grazing.

more personal questions positioned towards the end. I placed ‘softer’ descriptive type questions at the beginning of the interview to help develop trust and rapport so that when I asked more personal questions the interviewee would feel more comfortable to answer them. As the interviews progressed and I had an increased familiarity with the topics and interview process the interviews became less structured. The sequence of questions, however, stayed much the same and the interview guide became more of a checklist to ensure that all topics were covered. Interviews ceased after I identified a range of different themes and when many themes had been repeated at least several times and a point of saturation had been reached (Strauss & Corbin 1994). All interviews were taped and later transcribed.

Data analysis and interpretation

I used an inductive content analysis process, an NVivo 8 software (QSR International Pty Ltd. 2008), to analyse and interpret the qualitative data for this thesis. The content analysis involved (1) analysing transcripts to form concepts or themes, (2) coding the transcripts according to the identified themes, (3) grouping the themes into categories, and (4) identifying connections between categories (Neuman 2000). The coding process deconstructed the interview transcript and generated themes within categories that related to the research questions, literature and new insights. The coding process in qualitative data analysis forces the researcher to make judgments about the meanings of contiguous blocks of text (Ryan & Bernard 2000). For this study, the coding process involved reading through the transcripts several times to get a feel for possible themes, hand coding the transcripts to identify themes and then using NVivo to select or code pieces from the transcripts. In NVivo the coded pieces were sorted into categories or ‘tree nodes’ and ‘sub nodes’ within the tree nodes and also linked to other nodes, where relevant. I used the theoretical frameworks and research questions for the thesis and new insights to identify themes in the data. Finally, I selected quotes from the interview transcripts to illustrate themes.

Reliability and validity

In qualitative research concerns relating to reliability and validity are often framed in terms of ensuring the ‘trustworthiness’ of a study through four main criteria: credibility, transferability, dependability and conformability (Guba 1981). These criteria can be met in a number of ways (Shenton 2004). Strategies for meeting some criteria can also meet other criteria.

'Credibility' is one of the main tenets of establishing an internally valid qualitative study. The credibility of qualitative inquiry depends on the use of rigorous methods, the credibility of the researcher and a philosophical belief in the value of qualitative inquiry (Patton 2002). I ensured the credibility of the qualitative study in this thesis through:

- the use of well established research methods;
- developing a familiarity with the north Australian beef industry before data collection;
- triangulation with the use of a quantitative study to compare findings;
- purposive sampling to attain a wide range of respondents;
- the willing participation of interviewees;
- establishing independent status and rapport with interviewees;
- iterative questioning (i.e. rephrasing and probing with questions when needed);
- frequent sessions with supervisors and mentors to critically reflect on the research;
- peer scrutiny of the research through submissions to journals;
- the researcher having prior experience with qualitative research;
- member checking through receiving feedback from the industry via a brochure sent to producers, which reported research results, and presentation of the research results at a forum of extension officers who work with beef producers; and
- providing 'thick description', or enough context surrounding the study, so that the reader can easily judge the truth of the findings.

The 'transferability' of a qualitative study establishes its external validity. It is concerned with the extent to which the findings of one study can be applied to other settings (Shenton 2004). I ensured that the qualitative study was transferable by providing background of the study area and a description of the social and cultural context of the beef industry. I also provided detailed descriptions of the interviewees (e.g. demographics and farming strategies) and interviews (e.g. duration, number, location).

The 'dependability' of the qualitative study relates to the research design and addresses the question of reliability. For the qualitative study, I addressed the issue of dependability through providing comprehensive details of the process I followed in

designing and collecting the qualitative and quantitative data and in integrating the two methods.

'Conformability' is the qualitative researchers' comparable concern to objectivity. The aim of conformability is to ensure that, as far as possible, the study's findings are the result of the experience and ideas of the informants, rather than the characteristics and preferences of the researcher (Shenton 2004). I ensured confirmability of the qualitative study through three main steps. Firstly, I combined qualitative and quantitative data to highlight complementary aspects of the same phenomenon to attain methods triangulation (Patton 2002). The qualitative study provided an in-depth account of patterns and the quantitative study identified the extent of the patterns for the wider population. Secondly, I included reflections and recognition of the limitations of the study in the thesis and how these may have influenced the study. Thirdly, I provided an in-depth account of the research design and process, including the diagram in Figure 2 that shows the different parts of the quantitative and qualitative research processes and how these parts were integrated.

2.3.2 Quantitative phase

Sampling

I randomly chose telephone survey participants from a sample size that was, in turn, selected from a sampling frame of family operated cattle grazing enterprises in the northeastern rangelands. The sampling frame was provided by extension officers from government and non-government organisations in the Burdekin and Northern Gulf regions. Random sampling aimed to minimise sampling error and provide a representative sample. Sampling error results from heterogeneity on the survey measures among members of the population and reflects the number of respondents surveyed (Dillman 1991). Of the 613 family operated enterprises included in the region, 188 (30.6 per cent of) producers were calculated (using a 5% margin of error, 90% confidence level and assuming a 50% response distribution) as the sample size. The sample size of 188 were randomly selected (using a random numbers table) from the population of 613 and sent letters informing them of the research and inviting them to participate in a confidential survey. Following the letter, 143 producers from the family enterprises were contacted by telephone and asked if they would be willing to participate in the survey. The other 45 either had a disconnected phone number or

were unable to be contacted after several telephone calls. A financial incentive (the chance to win a \$500 shopping voucher by participating in the survey) was also provided to help increase the response rate. Of the 143 producers contacted by phone, 52 were not interested and 91 producers accepted to partake in the research, giving a response rate of 75.2 per cent. Thus, the final sample represents approximately one sixth of the region's family operated cattle grazing population.

Socio-demographic information of survey participants

Most of the 91 telephone survey participants were male (68 per cent), aged between 30 and 60 (75 per cent), had completed school to Grade 10 (47 per cent), managed a business that earned between \$150 000 and \$500 000 (before tax) each year (59 per cent) and did not have off-farm businesses (75 per cent) or investments (60 per cent). The property that participants lived and worked on tended to be leased from the government (81 per cent), to be an average of 51 500 hectares and to have been in the family for two to three generations. The majority (91 per cent) of participants intended to hand the property on to the next generation. All participants considered they owned the property, even if they leased the property from the government.

Telephone survey

I used a telephone survey instrument based on a non-experimental correlational research design for the quantitative phase of the study. Structured telephone surveys were collected between July 2008 and February 2009. The survey included questions about: producers' backgrounds, socio-demographics, decision-making, property management, sustainability, relationship to place and roles in life (see Appendix C). The survey started with non-confronting 'general' questions about the person, their family and property to ease the participant into the survey and ensure that they felt comfortable. More personal questions (e.g. about income levels) were placed towards the end of the survey.

Eight producers and three extension officers assisted to pilot the survey to ensure that the survey was worded clearly and that the questions were non-ambiguous. The participants who piloted the survey were asked to provide feedback on how they interpreted the questions and inform of any questions they thought were hard to understand. Following the pilot test some questions were omitted from the survey because participants had trouble understanding the question and needed more

information and/or the questions were ambiguous or interpreted differently. For example, I reworded the statement: 'I have the same friends now that I have always had' because some participants said that they did not know whether or not this meant they had not changed their friendships at all or had kept the same friends they had always had while also forming new friendships. Participants also had difficulty answering the question that asked to what extent they agreed with the statement: 'I have become more focused on pasture condition rather than cattle condition over time'. Many said that while they had become more focused on pasture condition they were still very focused on cattle condition (i.e. not a matter of either/or). Participants also said their extent of agreement for the statement: 'I would take a significant amount of my time to go to a workshop that I may learn something from' would depend on the workshop. They said they felt they needed more information about the workshop before they could give an answer to this question.

The telephone survey included a combination of fixed-alternative (choice between two or more answers) and nominal-dichotomous (yes or no) questions, respectively. Likert scales were used to combine multiple items into an index to measure the strength of participants' opinion on various themes. Some researchers use an odd number of measurement scales, which includes a mid-point of neutrality, to give participants a range of choices so that they do not feel forced into an answer that does not reflect their true position (Mitchell & Jolley 2007). However, removal of the mid-point is also considered to provide a more conceptually coherent and sensible measurement scale (Fowler, 1995). I chose to use a four-point scale, and did not provide a neutral or 'undecided' option, so as to increase the interpretability of responses since a 'mid-point' can be interpreted in many different ways (e.g. unsure, undecided, neutral or unwilling to divulge) (Marshall 2010). Instead, I asked respondents to leave a question blank if they were unable to answer it for any reason.

Participants were asked to rate (on a four-point Likert-type scale of 'not at all', 'slightly', 'moderately' and 'very' important) how important different goals and learning sources were to their management decisions and how important a set of different roles were to their everyday life. The statements describing learning sources and roles listed in the survey were identified from the qualitative interviews. Participants were also asked to rate (on a four-point Likert scale of 'strongly disagree', 'disagree', 'agree' and 'strongly agree') to what extent they agreed with different statements to do with their property management, sustainability, place and occupation.

Data analysis techniques

I analysed the quantitative data using SPSS version 16.0. Combinations of descriptive, factor, reliability and correlation analysis techniques were used (see Chapters 3–6 for full details). Briefly, descriptive statistics described the characteristics of the sample and identified the most and least important learning sources, most important roles and the extent of agreement of different statements. A principal components analysis (PCA) reduced the 14 roles into ‘role types’ and the four place attachment items into one ‘place attachment’ factor score. The PCA is a statistical factor analysis approach that aims to simplify a matrix of correlations so that they can be explained in terms of a few underlying factors (Kline 1994). Reliability analysis developed a scale of variables to measure place attachment that had internal reliability.

I used non-parametric techniques to explore the relationship between variables. Non-parametric techniques were used because of the categorical measurement scales. Correlation analysis explored the relationship between gender and the different roles, between the (PCA determined) role types, place attachment factor score and belief statements aligned with sustainability and between the place attachment factor score and socio-demographic variables. Pearson r correlation coefficients measured the relationship between variables. The Pearson r coefficient ranges from -1 to +1 and summarises the relationship described in a scatter plot with a single number: a positive relationship gives a positive coefficient, no relationship gives a coefficient close to zero and a negative relationship gives a negative coefficient (Mitchell & Jolley 2007). Responses to negatively framed statements were reversed prior to analysing the data.

Reliability and validity

Reliability in quantitative surveys refers to the internal consistency of results over time using the same measures, and *validity* refers to the extent that the variables accurately represents the concepts being measured (Carmines and Zeller 1979). Internal consistency of measures shows that a variable is constructed through the measurement process and that validity is expected through the inference from indicator(s) to concept (Punch 2005). I used three main measures to ensure that the quantitative survey was reliable and valid: (1) a reliability analysis to ensure internal reliability of the scale (or set of statements) that were used to measure place attachment, (2) use of literature, qualitative data and pilot testing to ensure reliability and validity of the survey items, and (3) ‘face validity’ to check the degree to which

survey items were clearly and unambiguously tapping the constructs they intended to assess.

2.4 Ethical considerations

Interviewees and survey participants were informed that ethics approval to undertake the study had been obtained from James Cook University (ethics approval number H2815). Ethical concerns were addressed through ensuring the identity of the participants was kept confidential and that participants were assured of their anonymity. Interviewees were asked to sign an informed consent form prior to the interview that assured the information they provided would not be linked to their identity and that their name and contact details would be kept confidential throughout and after the study. For example, interviewee's quotes were given an anonymous reference number with 'm' or 'f' (for male or female) to identify the person. The informed consent form sought the interviewees agreement to participate in the interview and, as well as assure confidentiality, briefly summarised what the interview was about, stated the interview's purpose, included a request that the interview be taped and informed the interviewees of the estimated duration of the interview. For the quantitative survey, participants were informed in a letter and in the survey that (1) their involvement is voluntary and they are not obliged to answer every question, (2) any information they provide will only be viewed by the researcher, and (3) the results will be aggregated so that it is not possible to identify them or their situation to the information they provide.

In designing the study, I also considered the possible consequences for the participants as a result of being involved in the study. For example, I thought that it would be important for participants to see benefits for her or himself through participating in the study. One foreseen benefit (that was communicated in the letters sent to producers' prior to participating in the study) was that the study provides an opportunity to 'have their say' or voice their opinions on matters to do with their natural resource management. Provision and allocation of a financial incentive (a \$500 shopping voucher) also aimed to increase benefits for producers by participating in the survey. A brochure was also sent to producers that provided a summary of the research results. There were no envisaged negative consequences for the participants as a result of their participation in this research.

2.5 Chapter conclusion

An inductive mixed method approach was chosen for this thesis, due to the research questions requiring both narrative and numerical data. Research questions were addressed through the lens of a critical realist paradigm. A qualitative study (28 face-to-face interviews with open-ended questions) with one set of purposively selected beef producers was followed by a quantitative study (91 structured telephone surveys) with a different set of randomly selected beef producers (response rate of 75.2 per cent). Qualitative data were analysed using a content analysis process that identified themes in the data, while the quantitative data were analysed using a combination of descriptive, factor, reliability and correlation analysis methods. Measures used to ensure the reliability and validity of the study included thorough and detailed descriptions of the research design and study area, triangulation of methods, statistical analysis of survey items and a pilot test of the telephone survey. Finally, to ensure ethical research, ethics approval was sought and participants were assured that their identity would be kept confidential. The following three chapters provide the findings of the thesis in relation to the objectives to do with (1) learning that fosters sustainability; and (2) the influence of self-identity, as it relates to roles and relationship to place, on achieving sustainable natural resource management. Depending on the research questions for each chapter, data is derived from quantitative more than qualitative in some chapters and vice-versa for other chapters. The methods for addressing each topic are dealt with in more detail in the relevant chapters. The next chapter presents a framework of learning for sustainability and the qualitative and quantitative results that pertain to beef producers' learning to improve the condition of the land.

Chapter 3⁵

Conceptual and operational understanding of learning for sustainability in the context of improving land condition

3.1 Introduction

Social and individual learning processes associated with the management of natural resources have been extensively studied in Australia and internationally (Röling & Wagemakers 1998; Cerf et al. 2000; Wals 2009). Despite the extensive attention that learning processes have been given in relation to natural resource management, there is still limited understanding of learning processes that create changes in perspectives that foster sustainability. Specifically, there is little work conducted on the identification of aspects of learning that require change and evidence that shows there has been a change (Rodella 2011), how and why individuals learn (Henry 2009), the inter-linkage of learning processes at different scales (Stagl 2007; Krasny et al. 2009) and the outcomes of learning processes that are transformative (Muro & Jeffrey 2008; Sims & Sinclair 2008). An increased understanding of learning processes that enhance sustainability will help to develop institutions and programs that can foster this learning.

This chapter endeavours to address two research questions: (1) What are the sources, processes and outcomes of beef producers' learning for changing practices to improve the condition of the land⁶? (2) What are characteristics of producers' learning that foster change for sustainability? Through answering these questions my thesis aims to contribute to the theoretical and empirical understanding of learning processes that foster sustainable natural resource management more generally and in the context of extensive grazing systems. More specifically, I develop a conceptual framework that

⁵ A modified version of this chapter has been published: Lankester, A.J. 2013. Conceptual and operational understanding of learning for sustainability: A case study of the beef industry in northeastern Australia. *Journal of Environmental Management*, 119, 182-193.

⁶ I decided to frame this question as 'improve the condition of the land' to avoid confusion with the term 'sustainable'.

embodies adult learning theories that captures the how, why and what of individual learning in social learning and the interactions between these dimensions.

Transformative learning theory (Mezirow 1991) is used to identify shifts in thinking, values and behaviour that are conducive to sustainability. I use this framework to analyse northeastern Australian beef producers' descriptions of their learning processes in relation to improving land condition.

3.2 Theoretical framework

'Learning' in this chapter is viewed as a continual and integrated psychological and social process of knowledge creation rather than a fixed process focused on outcomes. The conceptual framework (Figure 3) developed to analyse beef producers' learning processes is focused on intentional learning, or the clarification and/or reinterpretation of the meaning of an experience. The framework embodies transformative and experiential learning theories and is structured by the perspective of learning developed by Maarleveld and Dangbégnon (1999) that questions: 'who learns?', 'what is learned?', 'why is it learned?', and 'how is it learned?' The framework builds on previous integrated psychological and sociological frameworks of learning for sustainability and takes an individual-centric perspective (e.g. Brummel et al. 2010; Henry 2009; Rodella 2011; Sinclair et al. 2008; Tabara & Pahl-Wostl 2007). The individual learning processes are represented in the inner circle and squares and the outer circle represents the social dimensions to individual learning (Figure 3). There may be an overlap in the dimensions and processes. For example, some descriptions of 'how' something is learned could also be viewed as descriptions of 'what' is learned. The following sections explain the different parts of the framework in the context of achieving sustainability.

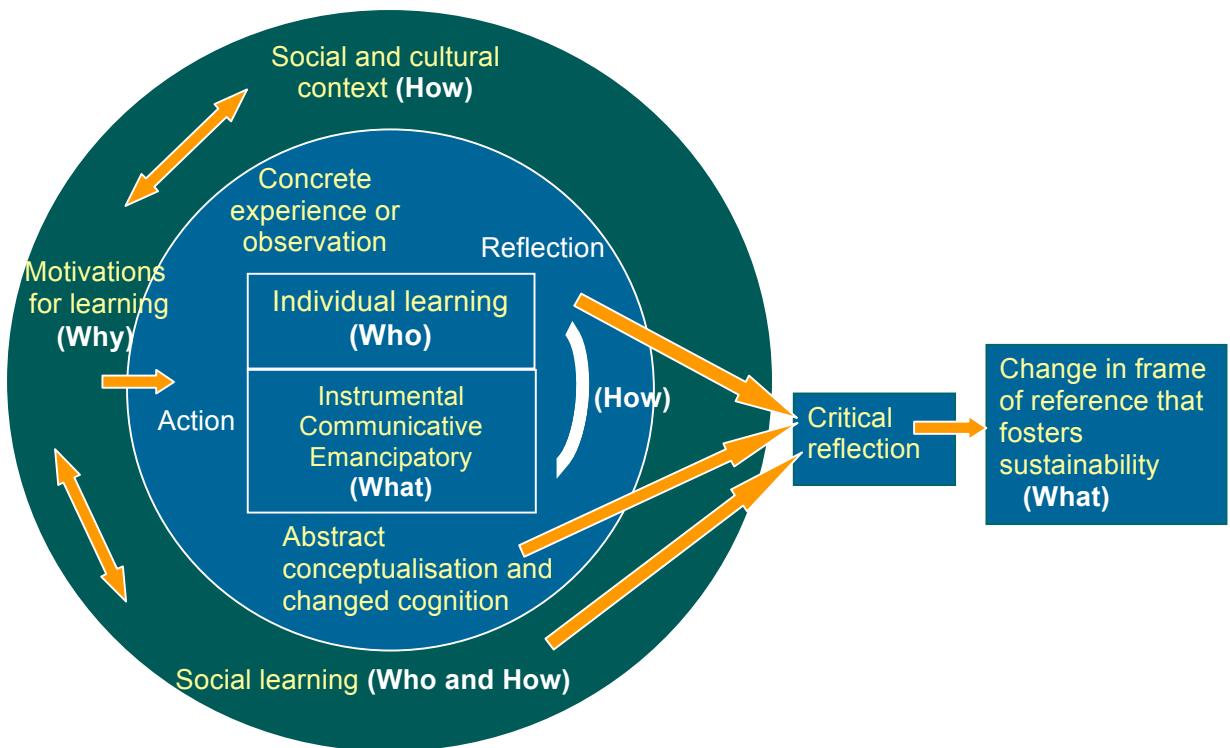


Figure 3: Conceptualisation of learning for sustainability

Individual learning (inner circle) in social learning (outer circle) in the context of learning for sustainability: adapted from the experiential learning cycle developed by Kolb (1984) and Leeuwiss (2004) and the transformative learning framework developed by Tarnoczi (2011).

3.2.1 Who learns?

Individuals are the primary learner (Maarleveld & Dangbénon 1999). However, individuals can develop shared understandings of a problem as a group or collective that can facilitate collective action to change a situation or institutions. In this case, there is the creation of shared meaning and social values among cultural groups that is characteristic of 'social learning' (Stagl 2007; Pahl-Wostl et al. 2007). Social learning can involve different perspectives of a situation that move to shared perspectives, which are then used to address a problem (Röling 2002). A collective transition in perspectives can lead to changes in the wider social context such as in government and institutions that are beyond, and include, the individual (Armitage et al. 2008; Reed et al. 2010; Pahl-Worst 2009).

3.2.2 Why is it learned?

Certain conditions and situations foster learning and trigger the concrete experience stage of the experiential learning cycle (see Figure 3). Individuals are often not inclined to start learning until they experience a problem or tension between their aspirations and perception of reality. The more immense, urgent and/or directly experienced the problem, the greater the incentive to learn (Leeuwis 2004). The most significant learning tends to happen through an emotionally charged situation such as a life crisis where individuals require new meanings and perspectives to interpret an experience (Mezirow 1995). Learning is also initiated through social interactions and dynamics, especially active experiences that allow individuals to experiment and reflect on actions in new or unexpected ways (Maarleveld & Dangbégnon 1999).

3.2.3 How is it learned?

Individuals learn through direct experience and observing and/or modelling others' experiences (Maarleveld & Dangbégnon 1999). Experiential learning theory (Kolb 1984) emphasises 'learning by doing' and describes the process of knowledge creation and re-creation through the transformation of experience. Learning, according to this theory, is a continuous interaction and iteration cycle between reflection and action (Leeuwis 2004). Two mutually exclusive modes of understanding an experience are included in the theory: concrete experience and abstract conceptualisation, and reflective observation and active experimentation. Put simply, an individual has a concrete experience and/or observation and then she or he goes through a cognitive process of reflection. This reflection process generates a change in understanding or knowledge and abstract concepts that are then used to guide the creation of different action and experience. Individuals also have different learning styles. For example, some individuals may favour reflective observation whereas others may favour active experimentation (Kolb et al. 2001).

Experiential learning theory has been widely used to study and explain individual learning in the context of natural resource management and sustainability (e.g. Dougill et al. 2006; Fazey et al. 2005; Keen & Mahanty 2006; Palis 2006; Leeuwis 2004). 'Adaptive management' is an example where experiential learning is applied as a method to enhance learning of natural resource management programs and projects during different stages. For example, Dougill et al. (2006) developed a flexible approach to deal with conflicting problems and complexities of land management by

including a number of feedback loops in the process where the output from the activities was reflected back to the stakeholders for refinement. In another example, the experiential learning process generated and negotiated among a farmer group through the life cycle of a rice crop was essential for the adoption of Integrated Pest Management technology (Palis 2006).

Experiential learning theory is, however, not without criticism. One of the main concerns has been the lack of acknowledgment given to the construction of individual learning through complex and varied social, cultural and physical processes, in which the individual actively participates (Vince 1998; Seaman 2008; Kayes 2002; Loeber et al. 2009). The learning process happens during, as well as after, dialogues with others in all kinds of social interactions and settings that are imbued with cultural codes and conducts. The other main criticism has to do with learning defined in a cycle or sequential steps, which is seen to inadequately explain the holistic and random nature of learning (Seaman 2008). Experiential learning theory is a good conceptual starting point for understanding the cognitive change that happens with learning through experience, but should not be seen as prescriptive. The learning process is complex and in reality may not include all of the above-mentioned elements and could possibly include other elements.

The conceptualisation of learning in this chapter attempts to respond to the above-mentioned concerns: the parts of experiential learning theory are depicted as elements of individual learning, rather than in a set sequence, and individual learning is depicted as happening within a social, cultural and physical context and through social learning (see Figure 3). Individuals learn either informally through existing social networks and settings or the learning can be more formal and happen collectively through organised social aggregates. ‘Social learning’ is the concept used to describe more intense or strategic social learning processes that are considered important for addressing shared natural resource problems and enhancing sustainability (Keen et al. 2005; Wals 2009). Although social learning is a contested and confused concept, it is widely considered to involve structured negotiations and open dialogue on a resource problem in participatory settings with different stakeholders who may have diverse and conflicting perspectives (Ison et al. 2007; Keen et al. 2005; Mostert et al. 2007; Pahl-Wostl et al. 2007). Individual learning is also situated in a specific social and cultural context and will be influenced by the norms and values of the surrounding culture and the associated power relations.

3.2.4 What is learned?

Transformative learning theory (Mezirow 1991) describes different domains of learning and reflection processes involved in intentional learning or problem solving. ‘Instrumental learning’ refers to learning that takes place when individuals engage in task-orientated problem solving. It involves obtaining new skills and technical information (or empirical knowledge) in order to do something better and is based on observable things or events. ‘Communicative learning’ involves understanding what others mean (in regard to their intentions, values, feelings and beliefs) and being understood by others. Instrumental learning often depends on communicative learning and the two types of learning frequently occur simultaneously. ‘Emancipatory learning’ involves critical self reflection and is often transformative (Mezirow 1991). Mezirow (1991) also identifies different levels of reflection. There may be reflection on the content, process or premises of an experience in any of the different types of frames of reference (epistemic, socio-linguistic and psychological) in any of the three learning domains (instrumental, communicative and emancipatory) (Percy 2005).

Transformative learning happens when there is a change in our frames of reference (or meaning perspectives) in instrumental, communicative and/or emancipatory domains of learning (Mezirow 1991). A frame of reference includes a habitual set of expectations, beliefs or assumptions based on past experiences that structure our points of view and how we respond to and interpret new experiences. There are three different and interacting types of frames of reference that relate to (1) knowledge and the process of knowing (epistemic), (2) socialisation and language norms (socio-linguistic), and (3) self perceptions (psychological) (Percy 2005). Particular knowledge, beliefs, value judgments and feelings (or meaning schemes), which become articulated in an interpretation of an experience, are included in a frame of reference. For example, a land manager’s frame of reference in instrumental learning may include an understanding and knowledge of management practices and in communicative learning it may include an ability to communicate and build trust and rapport with others.

A transformation in a frame of reference occurs with higher levels of critical reflection that involve self reflection and in-depth questioning of assumptions or premises of an experience. Through this learning process an individual develops an alternative and more meaningful set of expectations to interpret an experience and has a changed self concept. The individual becomes more inclusive, discriminating, open, emotionally capable of change and reflective so that they may generate beliefs and opinions that

will prove truer or justify action (Mezirow & Associates 2000). Perspective changes can also create changes in an individual's behaviour that have a different impact on their surrounding physical, emotional, or social environment than previously, which can translate into broader social change (Kerton & Sinclair 2010). This critical reflection process of transformative learning interacts with the reflection and changed cognition stages of the experiential learning cycle (see Figure 3).

Transformative learning theory has, like experiential theory, gathered criticisms. The criticisms mainly stem from the lack of acknowledgment and integration of social and cultural influences on an individual's critical reflection process (Taylor 1998). The theory has been criticised for overemphasising individuals' critical reflective learning as an autonomous process based on rational discourse (Percy 2005). As highlighted above, learning happens through social interactions, relationships and practices. Critically reflecting on well-established beliefs and values is likely to be a challenging and emotional process that requires dialogue and the trust and support of others (Taylor 1998). There have been attempts by researchers to integrate the social dimensions of learning with transformative learning theory. For example, Nairn et al. (2012) uses Bourdieu's (1977) concept of 'habitus', or social processes and expectations, to provide a social and cultural context for making sense of an individual's processes and problems associated with critical thinking and reflection. The conceptual framework in this chapter acknowledges the social and cultural context of individual learning (e.g. the outer circle in Figure 3).

In agriculture, changes in farming practices that have consequences for the vision and strategy of the farmer are considered transformative (Proost & Röling 2000). Characteristics of transformative learning in the context of farming, food, natural resource management and sustainability include a transformative experience, participation, diverse information sources, collaboration, experimentation and changes in thinking, values and behaviour (Sims & Sinclair 2008; Tarnoczi 2011; Marschke & Sinclair 2009; Kerton & Sinclair 2010). For example, active participation by fishers and farmers in group learning created opportunities for skill development and fostered critical reflection on their own and others' values and knowledge leading to a change in their understanding of natural resource management and 'more sustainable' practices (Sims & Sinclair 2008; Marschke & Sinclair 2009). A study of transformative learning in relation to buying organic food found that a 'realisation process' (or transformative experience) prompted learning that led individuals to become more broad-minded, open to change and to develop the intention to improve the self and environment

(Kerton & Sinclair 2010). Transformative learning has also been shown to be enhanced by a range of information sources and communication of information in an experiential and observable way (Tarnoczi 2011). This chapter aims to contribute new knowledge of the why, how and what of learning that creates changes in self, thinking and practice that favours sustainability through a case study of the beef industry in northeastern Australia.

3.3 Methods

I used qualitative and quantitative methods to examine the research questions for this chapter (see Chapter 2 for details of the methods). Qualitative methods were mainly used to answer the research questions for this chapter in accordance with an interpretative ‘qualitative dominant’ mixed methods approach (Johnson et al. 2007).

The qualitative interviews with 28 beef producers included the following questions:

- What, if any, major change(s) have you undertaken in recent years to improve the condition of the land?
- Why did you make these changes?
- What process do you go through when deciding to change management practices?
- How do you learn about practice changes and their implementation?
- What are your main learning sources?

I analysed the interview data using NVivo 8 software and qualitative content analysis. I reduced the data by drawing out the relevant parts and then categorising the data into themes based on the literature, research questions and new insights. Interview responses were coded into reasons for learning ('why were beef producers motivated to learn?'), the sources and processes of learning ('how did beef producers learn?') and the different categories of learning ('what did beef producers learn?'). The 'who learns?' were the individual beef producers, details of whom are described in Chapter 2. Each interview transcript was analysed for the extent that narratives showed evidence of changes in self and perspectives according to the theoretical framework. This evidence was separated out into categories or themes of 'learning for sustainability'. Linkages were also identified between the different learning processes, reasons for learning and learning outcomes. Finally, quotes were selected from the data to illustrate themes. The qualitative phase of the study was expected to provide

rich interpretations of what, why and how beef producers learned. Fourteen different learning sources were generated from the data collected in the qualitative interviews.

I used the quantitative telephone survey with 91 participants to identify the extent and variability of learning sources ('how is it learned?') that exists among beef producers in northeastern Australia. Survey participants were asked how important (using a Likert scale) fourteen different learning sources were in influencing their management decisions (see question 2 of Section B of the survey in Appendix C). I used descriptive statistics to analyse the average responses by survey participants for each different learning source.

3.4 Results

3.4.1 Why were beef producers motivated to learn?

Most (18 out of 28) interviewees said that the first step in the learning process to change practices was a realisation that there is a problem with existing management practices. Interviewees said they had become motivated to learn new practices through realising that their existing practices were inadequate to survive regulatory changes in the industry (e.g. the new leasehold renewal regulation⁷, compulsory ear tagging and record keeping of cattle and changes to financial institutions). Interviewees also said that through their adoption of practices required by new regulations they had engaged in 'new' learning.

Some (7 out of 28) interviewees said that their experience with financial and personal hardship associated with drought, overstocking, succession and/or lack of business planning had been a valuable learning experience and strong motivation for engaging in 'new' learning experiences such as courses and workshops:

'The nineties drought was one of the best things that happened to me and it was terrible, but it was a terrific learning. I suppose things like that cause you to think more about what you're doing' (P-6m).

⁷ The newly introduced grazing leasehold renewal agreements require producers to show, through a property management plan, monitoring and record keeping, that they are maintaining their leased property at a certain level of land condition (The State of Queensland, 2007).

Some (3 out of 28) interviewees said that increased information availability and the opportunity (through financial incentives) to attend courses and workshops had helped foster a marked increase in their learning and practice change. One interviewee described how her participation in workshops had created '*jolts of inspiration*' (P-2f). Often interviewees said that it was a series of events that motivated them to engage in 'new' learning. For example, one interviewee said that his learning was motivated by a combination of land degradation and financial hardship (that he experienced from drought) and his participation in an intensive course on new grazing and land management practices.

3.4.2 How did beef producers learn?

All 28 interviewees were orientated towards learning through direct and active experiences rather than abstract learning. Interviewees said that as well as learning about practices through others and in the media they must have '*hands on experience*' (P-8f). Interviewees said that they had learned a lot through their own experiences and observing changes in their cattle and property, especially in regards to how a recommended practice may work in their own situation. Several interviewees said that their best learning had stemmed from their failures and witnessing the failures of others. Many interviewees reported trialling bits of a recommended practice (especially ones that are financially risky) on a small scale first, to see possible benefits and costs, before implementing the practice completely. For example, several participants destocked cattle from a small paddock first to see how spelling (or rest from grazing) affected pastures and production before implementing cell grazing across the whole property.

Interviewees learned through different social interactions, extension experiences, media and their own practice. Extension experiences included workshops; courses; and project groups⁸ facilitated by government, industry, private consultants or natural resource management groups. The workshops and courses focused on financial management, livestock husbandry, and property planning and/or natural resource management issues. It was common for interviewees to report that they sifted through a large amount of different and conflicting information to find what was most relevant to

⁸ A 'project group' is a collaborative learning process where producers learn from each other in regard to a specific issue and/or practice.

their situation. Some interviewees said they always used the same select sources for new information, whereas others drew on a variety of sources. Interviewees said that as well as reading (in the print media) about other producers' experiences with recommended practices they also needed to observe and understand how these practices worked (or did not work) through communicating with their peers. The following interviewee discussed how he needed to hear an idea several times among his social networks before he would think about exploring the idea further:

'You've got to build that bit of confidence. You hear it a second time and they're talking the same sort of thing, so maybe this is the thing to try. If things are good they will keep coming up. If it keeps coming up you can grow its strength' (P-11m).

Most telephone survey participants considered their own management experiences, observations of others' practices, and shared experiences with peers and family members to be the most important learning sources influencing their management decisions (Figure 4). The next section examines producers' learning outcomes as part of the above-mentioned learning experiences.

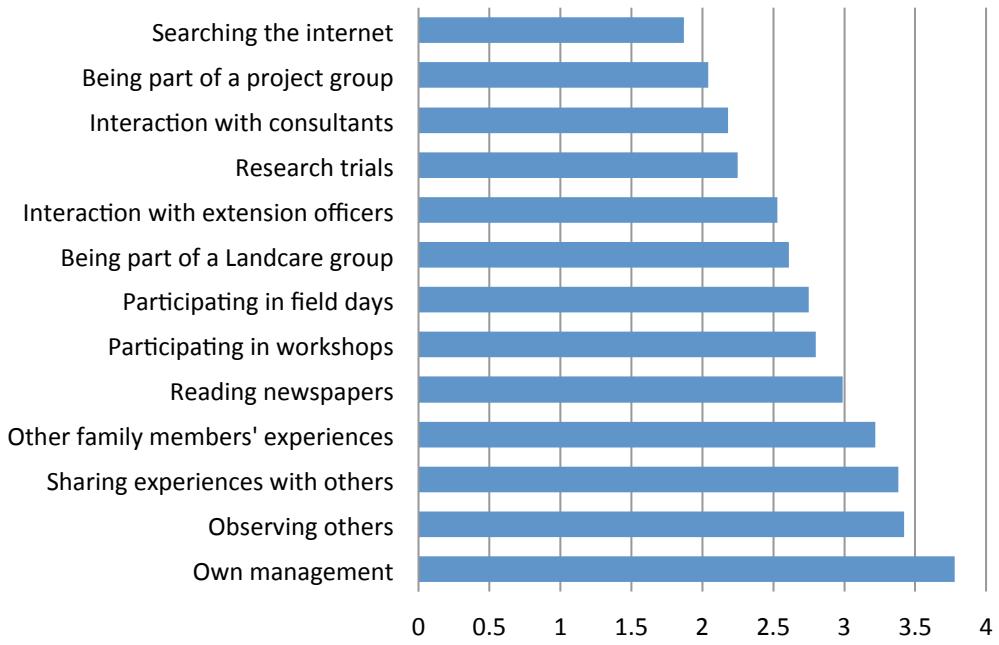


Figure 4: Importance of different learning sources for beef producers

Mean average responses (scale: 1 = not at all, 2 = somewhat, 3 = moderately and 4 = very important) for 14 different learning sources by beef producer telephone survey participants in northeastern Australia (n=91).

3.4.3 What did beef producers learn?

Interviewees' learning outcomes were sorted into categories of instrumental and communicative (Table 1). Instrumental learning outcomes were sorted into the categories developed by Sinclair et al. (2008): scientific and technical knowledge, legal/administrative and political procedures, social and economic knowledge and potential risks and impacts. The communicative learning outcomes were separated into the categories of 'insight into one's own interests' or 'insight into the interests of others' developed by (Sinclair et al. 2008).

Instrumental learning outcomes

All 28 interviewees reported learning new skills and techniques in relation to scientific and technical knowledge to improve land and cattle condition for production. Many interviewees had developed a new understanding of native pasture species and their condition. A consequence of this learning was often a changed management focus from less emphasis on cattle condition to more focus on pasture condition and, hence, an operational change from continuous grazing to cell grazing. Interviewees said that they had acquired new skills in monitoring the quality and quantity of pasture and keeping records on cattle numbers and movements. They had also learned the benefits for pasture from cattle agistment (i.e. moving cattle to another property that has greater pasture availability) and expanding grazing land through the lease of other properties.

Other scientific and technical skills and information interviewees reported learning related to improving cattle production and nutrition and property planning. Interviewees said that these skills had helped them reduce grazing pressure and improve pasture productivity. Main learning outcomes related to increasing the reproductive potential of cattle and developing more efficient cattle handling and sales. These outcomes included changing from continual to controlled mating, the early weaning of cattle and the sale of younger cattle. Other production-related learning outcomes included realising that a change in cattle breeds attains a higher quality meat; there are pasture benefits from resting riparian pastures; and the use of Geographic Information System (GIS) and Geographic Positioning System (GPS) tools to map and monitor resources can produce a more effective property management plan.

Interviewees also reported acquiring new knowledge in regard to social, economic, legal and political aspects and the risks associated with poor management practices.

Interviewees said that through workshops they had learned a new system and philosophy of financial and business management to improve the viability and efficiency of their business. Interviewees also said that through their increased involvement in natural resource management forums and networks they had become more aware of programs such as 'carbon farming' and funding for infrastructure to implement spelling riparian areas and weed control. Several interviewees also reported learning of avenues for participation in groups and committees that they perceived to be an influence on local, industry and government decision-making. Additionally, some interviewees had learned the risks and negative impacts of short term planning and overstocking and had, consequently, developed a more proactive and flexible management approach. A more proactive business was recognised by interviewees as requiring learning, long-term planning and management strategies and techniques that factor in a way of adapting to adverse events such as low rainfall and an increase in interest rates. The next section highlights communicative learning outcomes that happened in conjunction with many of the above-mentioned instrumental learning outcomes.

Table 1: Categories of beef producers' learning outcomes

Instrumental and communicative learning outcomes of changing practices to improve land condition for northeastern Australian beef producers' (n=28).

Learning domain	Learning outcomes
Instrumental (n=28)	Scientific and technical knowledge <ul style="list-style-type: none"> Cattle quality, reproduction, sales and handling Rotational spelling and/or cell grazing Pasture quality and quantity GIS and GPS property mapping and record keeping Expansion of grazing land Legal/administrative and political procedures <ul style="list-style-type: none"> Natural resource management programs Participation in government and industry decision-making Social and economic knowledge <ul style="list-style-type: none"> Property planning and management Adaptive management Potential risks and impacts <ul style="list-style-type: none"> Overstocking/overgrazing Short term planning
Communicative (n=9)	Insight into one's own interests <ul style="list-style-type: none"> Social networks and relationships Roles and responsibilities Land management style Property management goals Emotional and physical wellbeing Insight into the interests of others <ul style="list-style-type: none"> Understanding others' experiences with new practices Recognition of shared or different norms, values and interests Understanding others' hardships and reasons for poor practices

Communicative learning outcomes

Communicative learning outcomes were reported less frequently by only 9 of the 28 interviewees. Communicative learning was mainly through dialogue with peers in formal and informal settings and family members and to a lesser extent through communication with extension officers and consultants. Interviewees said that, as well as reading about other producers' experiences with practices, dialogue with peers was important for understanding how practices may or may not work in their own situation.

'New' group learning experiences had influenced interviewees to reassess, change and/or expand their social networks. Several interviewees said that they had developed the confidence through their participation in group learning experiences to seek out new friendships. Important aspects of these new friendships that interviewees identified included the opportunity to learn about new ideas and perspectives and share experiences with new practices; experiences they said they did not feel comfortable sharing with existing peers. A few interviewees reported that they had started to discern the people with whom they shared similar values and points of view and those with different values or culture.

Interviewees also described differences in values and management style between younger and older generations. A few 'older' interviewees said that they perceived the differences between generations being largely due to the younger generations' participation in different and wider learning experiences. The following interviewee described the difference between his and his father's attitude as a consequence of 'new' learning experiences:

'Since we've taken over we've been going to a few things like that breeding workshop and talking to other people and I'm on a committee and I'm learning different things, but my old man's attitude was "if it couldn't be done in 1910 you couldn't do it today". It was looking in a straight line' (P-15m).

Other reported communicative learning outcomes included the re-evaluation of property management and family goals. One interviewee said that through her reflections on conversations about property management goals with peers in a workshop she had realised that her goals were different to other producers. For example, she perceived her decision-making to be based on '*what can my property give me*' and others to be based more on '*this is what I want to achieve*' (P-2f).

Interviewees also reported that they felt they had become less judgemental and more empathetic through sharing personal experiences with others. One interviewee said that he had developed a better understanding of why others managed their land poorly through listening to a peer describe the reasons why he had overstocked his property. Another interviewee said that she had developed a greater understanding of producers' experiences with desperate and adverse circumstances through observing the decline in wellbeing and clear decision-making in her husband when he was stressed during the drought years.

3.4.4 Learning for sustainability

Evidence of learning that was transformative and fostered sustainability was apparent in five of the 28 interviewees' (from four properties) narratives. The five interviewees ranged in age from 35 to 60, two were females and three males, two had a young family and two were a married couple. Interviewees from two of the four properties were actively practicing cell grazing and the others were spelling paddocks from grazing, but not operating a 'set' system of cell grazing. The five interviewees showed evidence of many of the instrumental and communicative learning outcomes listed above (Table 1). However, in comparison to the other 23 interviewees, these five interviewees also revealed critical reflection of practices, self and cultural norms in accordance with learning for sustainability that was fostered through their participation in organised and sustained collective learning programs, experience with adversity and actively experimented with natural resource management skills and techniques.

The five interviewees described how their learning process and motivation to participate in organised collective learning programs was prompted by adversity (e.g. a 'transformative learning experience'). This adversity was associated with financial difficulties, land degradation, loss of productivity, family succession and/or a drought event:

'Financially, environmentally and people wise...everything was a bit under stress so we were pretty keen to try something different and you've got not much too loose' (P-13f).

All five interviewees had participated in organised and sustained collective learning programs (e.g. courses and project groups) with peers to solve individual management problems and introduce new management systems. These programs involved regular meetings with the same group of peers over a period of six months to sometimes several years. Topics in these programs included business management, pasture monitoring and management, Environmental Management Systems (EMS) and the philosophy and practice of cell grazing. The practice of cell grazing espouses learning, flexibility and notions of systems-thinking, with the integration of economic, social and environmental principles that are aligned with sustainability. Interviewees' interaction and dialogue with others in these programs fostered critical reflection and led to an increased awareness of land degradation problems caused by cattle grazing and practices to address the problems, as revealed in the following quote:

'These planned groups that we had were very influential in picking up information from other graziers. There were about six properties involved, all with different sorts of operations, and we did so much talking about management and what you need to do and people working out ways of monitoring and ways of sorting out problems and that sort of thing. It's just the business of talking really' (P-14f).

The building of trust relations and a sense of belonging developed through these collective learning experiences, in combination with extensive dialogue, fostered critical reflection of perspectives and practices. A few interviewees reported sharing personal and business information with peers in these new networks that they would, in the past, have only shared with family members and select others:

'People are learning about their own situations all over the country, but now they're transferring their knowledge to you and you are transferring your knowledge to them and there is a big learning pool that makes people a lot more open and aware' (P-20m).

In addition to collective learning, all five interviewees said that an important part of their learning process included experimentation with natural resource management techniques and skills, many of which were learned through workshops. Interviewees learned about native pasture species and had started to regularly monitor their condition, abundance and diversity. Interviewees revealed that monitoring native pastures and other aspects of the operation provided them with a concrete experience

to become more fully aware of the extent and severity of land degradation, rather than just an abstract understanding:

'It's only been since we've been measuring stocking rates, rainfall, like actually calculating pasture growth, calculating kilograms of dry matter that we've become aware of all this stuff [land degradation]. It's just awareness a hundred fold. These things slap you in the face now, whereas they'd just go past your window before' (P-20m).

Dialogue as part of the above-mentioned collective learning experiences and active experimentation with new practices cultivated learning outcomes that showed signs of enhanced sustainability. Evidence of 'learning for sustainability' in the narratives of the five interviewees that was similar to that identified by previous studies (e.g. Kerton & Sinclair 2010; Tarnoczi 2011; Sims & Sinclair 2008; Marschke & Sinclair 2009) included: (1) critical reflection of practices, (2) questioning self, others and cultural norms, and (3) an enhanced sense of environmental responsibility. The following sections provide details of these categories of learning for sustainability.

Critical reflection of practices

All five interviewees showed evidence of critically reflecting on their own and others' understanding of land management practices (i.e. process reflection on epistemic meaning perspectives in instrumental learning). They reported developing an understanding of how grazing properties get to a crisis point of land degradation and financial hardship. The interviewees described how—through a combination of assuming there will be adequate rainfall, lack of planning and attachment to cattle—producers keep cattle until they get to the point of starvation and consequently experience financial hardship and land degradation.

These interviewees had also critically reflected on the poor productivity and land degradation that had resulted from their own continuous grazing practices. Consequently, they had come to realise that their existing practices were unsustainable both economically and environmentally. The following interviewee describes this realisation process:

'I could see what we were doing was not sustainable in the long term. We just had this continuous grazing regime where it was a monoculture system, the pasture diversity

'was just going out the back door, we were slaves to whatever rainfall we got and there was no management planning. And then I suppose you start to look for answers and you start to think about how we can do it differently' (P-12m).

The five interviewees also revealed that they had developed 'communicative competence' (Mezirow 1991): they were not necessarily espousing the particular way of practicing and thinking learnt through workshops and courses and had, instead, reflected further on their own practices and natural resource management.

'The system suggests that you leave thirty percent of pasture behind—you make your calculation and leave thirty percent behind. Maybe that's not correct. It might be correct for a healthy system, but for one that's degraded it may not be enough to reverse that [degradation]' (P-20m).

Questioning self, others and cultural norms

All five interviewees provided evidence of questioning their cultural norms and self-identity. The interviewees showed evidence of many of the communicative learning outcomes highlighted in Section 3.4.3 and critical self-reflection (or 'emancipatory learning'). For example, the interviewee couple expressed how they had questioned their own and family members' perspectives, values and roles in the grazing operation as a consequence of their participation in courses and workshops (i.e. process reflection on psychological meaning perspective in the communicative learning domain). The couple reported personal growth associated with questioning and moving away from a culture that they perceived as resistant to learning and change:

'...finding a balance and we had to really grow ourselves. We started to get real internal. We've been constantly changing ourselves and we are constantly changing our attitudes and they are still not right. We realised that our little culture was not healthy' (P-13f).

The five interviewees said that they had gone through a process of questioning their culture and social networks following participation in organised learning programs and changing practices. For example, one of the female interviewees described how she had felt uncomfortable and judged when she shared new learning experiences with peers. Consequently, she and her husband had re-evaluated their social network and sought out new friendships.

Enhanced sense of environmental responsibility

All five interviewees expressed that they had developed a strong sense of responsibility for restoring the land condition for their own and future generations' benefit, but also for the wider society and the land itself. The interviewees provided evidence of critically reflecting on the normative ideologies of cattle grazing (i.e. premise reflection on epistemic meaning perspectives in instrumental learning). Through this questioning they reported a strong sense of environmental purpose and responsibility outside of their individual needs and interests. The interviewees said that they felt responsible for repairing what they had come to perceive as a degraded landscape as a result of their own and previous generations' continuous grazing practices. The following interviewee describes how he has shifted his perspectives of land management:

'When your whole focus is production related it's what you can get out of it and when that changes to being sustainable type thoughts it's certainly what you can put back. And it is a shift, there's no doubt about that. Put back, or what have we got to do to reverse the change, the wrong change' (P-20m).

3.5. Discussion

This chapter aims to increase understanding of learning that fosters sustainability in the context of natural resource management in general and, more specifically, for the beef industry in northeastern Australia. Results show aspects and processes of individual and social learning foster sustainability. More specifically, the combination of organised collective learning processes, adversity and active experimentation with natural resource management skills and techniques fostered learning for sustainability among beef producers in northeastern Australia. Evidence of transformative learning for sustainability among producers included critical reflection of practices, questioning of self and cultural norms and an enhanced sense of responsibility. Some aspects of beef producers learning (e.g. 'learning by doing') appear to not need changing for sustainability. However, producers may need to increase their engagement in collective and collaborative forums to foster questioning of assumptions behind practices if there is to be a cultural shift in land management. The following discusses what the results of this study mean for the beef industry in northeastern Australia, the aspects of producers' learning for sustainability and reflects on the frameworks and methods used in this study.

Change in frames of reference that involve critical reflection of practices, self and cultural norms in accordance with learning for sustainability do not appear to be a wide occurrence in the northeastern rangelands of Australia. More interviewees may have revealed evidence of critical reflection with more or different questions and/or repeat interviews. Some interviewees may have also had a frame of reference that is reflective, open, discriminating and emotionally capable of change for most of their adult life so the ‘changes’ are subtle. All producers were learning new techniques and skills to improve production through ‘doing’ (i.e. instrumental learning), which is an important element of learning for sustainability. However, most beef producers in this study did not reveal evidence of critical reflection on the assumptions underpinning practices that is also associated with learning for sustainability. Most beef producers were also learning informally, rather than collectively which, based on the results of this study, appears important for fostering critical reflection and cultural and personal changes for sustainability.

These results for the northeastern Australian rangelands emphasise the importance of understanding learning as situated in a specific cultural context which, in the case of the beef industry in northeastern Australia, is dominated by production values (Holmes 2006). Beef producers expressed largely instrumental learning outcomes learnt through informal sources to enhance production because this is what is needed to maintain livelihoods and culture. The need to make a living from beef production limits producers’ capacity to engage in different collective networks and forums that may enhance their sustainability. Producers’ participation in learning that facilitates a change in perspectives to ‘more sustainable’ practices will depend on the perceived financial and cultural viability of the change. Remote living with large property sizes also limits producers’ opportunities for interaction with peers and different discourses and networks. To question the assumptions behind a production-dominated culture producers have relied on for self-identity and livelihood is also likely to be a daunting task. With such limitations and cultural influences producers are most likely to adopt more sustainable production practices, as is demonstrated by this study.

Collective learning processes appear important for facilitating communicative learning, critical reflection and changes in frames of reference among beef producers in northeastern Australia. These results support the assertions of others that sustained, collective and facilitated problem solving, rather than just the provision of information and advice, is important for cultivating effective learning processes (e.g. Ingram 2008;

Jordan et al. 2000; Marschke & Sinclair 2009; Palis 2006; Sims & Sinclair 2008). This study shows, more specifically, how sustained and organised group learning programs, and the building of trust relations and a sense of belonging among peers as part of this learning, facilitate producers to question their practices, self-identity and cultural norms and values (e.g. '*we realised that our culture was not healthy*'). Increased collaboration among individuals is believed to be important for sustainability, as well as create strong identity for farmers (Källström & Ljung 2005). The collective learning experiences documented in this study also compare with key processes and outcomes of 'social learning'. However, collective learning processes in this study focused on individuals helping each other to solve individual management problems, rather than working with multiple stakeholders to address a shared or common natural resource problem, which is characteristic of most social learning (Ison et al. 2007).

The results of this study also suggest that active experimentation of new ideas by beef producers in their own settings and situations facilitates learning for sustainability. Beef producers in this study expressed learning about a recommended practice through experimenting with the practice in their own situation. Other studies have similarly revealed the importance of experimentation for fostering effective learning in the context of environmental management (e.g. Sims & Sinclair 2008; Fazey et al. 2006; Fazey et al. 2005; Bentley et al. 2010). Learning through natural resource monitoring facilitated an increased awareness of the decline in pasture quality and quantity from overgrazing for beef producers in this study. Other studies similarly show the importance of natural resource monitoring for triggering land managers to perceive their farms and resources differently (Gijt & Proost 2002). Learning 'by doing' and experimenting with new ideas, is thus, an important aspect of learning for sustainability.

Experiencing adversity appears to be another important aspect of beef producers' learning for sustainability. Land managers, more generally, who experience stress and adversity from drought either employ adaptive coping strategies that draw on social capital or less adaptive coping strategies such as cognitive dissonance and denial (Caldwell & Boyd 2009). The stress and adversity that producers in this study experienced, often in association with drought events, appears to have fostered critical reflection of their practices and motivated them to engage in organised collective learning programs. Adaptive coping strategies that foster sustainability and also have positive outcomes for human health may, therefore, be facilitated by the promotion of collective learning programs.

Further learning outcomes for sustainability in the results of this study are the questioning of the self and cultural norms and an enhanced sense of environmental responsibility. These results compare with others who have found that a change in self-identity as part of transformative learning is important for sustainability (e.g. Lange 2004). The trust, enthusiasm and confidence generated through collective learning processes appear important for fostering questioning of the self and normative ideologies. Others have similarly found that trust relations that develop between individuals through learning processes can shape personal identities and develop collective or group identity (e.g. Carolan 2003). Emotions, such as enthusiasm, have previously been found to be important for building confidence which, in turn, leads to genuine understanding and agreement among stakeholders and successful collective action (Ison et al. 2000). Further, the identification of an enhanced sense of environmental responsibility among the ‘transformative learners’ compares with Lange (2004) who observed that individuals’ transformative learning is not just an epistemological process that shifts mindsets, but ontological such that it changes individuals’ sense of purpose (e.g. *‘what have we got to do to reverse the wrong change?’*).

Finally, the mixed methods approach provides in-depth and broad insights into beef producers’ learning. The qualitative study provides an in-depth understanding of producers’ learning processes and outcomes. The quantitative survey, with use of data from the preceding qualitative study, identifies learning patterns more broadly. The telephone survey in this study was only used to identify some patterns in beef producers’ learning (e.g. learning sources). Future research could consider further use of a quantitative survey to quantify aspects such as different instrumental and communicative learning outcomes. This study also suggests that there could be differences in learning experiences for the older and younger generations. It may, therefore, be interesting to explore through future research the relationships between socio-demographics and different aspects of individuals’ learning.

3.6. Chapter conclusion

This chapter shows that there are aspects and processes of individual and social learning that facilitate critical reflection and change in perspectives for sustainability in the context of extensive grazing systems and improving land condition. There are two main sets of insights. Firstly, the combination of organised and sustained collective

learning, adversity, active experimentation with natural resource management skills and techniques appears to foster learning for sustainability. Secondly, evidence of learning for sustainability includes critical reflections of practices, questioning the self and cultural norms and an enhanced sense of environmental responsibility. Beef producers from northeastern Australia who participated in this study appear to be mainly engaged in instrumental learning (e.g. learning new skills and techniques) to improve production that is mainly learnt through informal sources and some communicative learning. While it is important for producers to keep ‘learning by doing’ for sustainability, increased engagement in collective learning sources would appear important for fostering questioning and cultural change for sustainability. The extent to which beef producers can change their outlooks and practices is limited by their need to maintain a viable livelihood from beef production and by dominant productivist cultural norms. The framework I developed to analyse beef producers’ descriptions of their learning provides multiple and integrated insights into individual and social learning processes that achieve changes in thinking and behaviour. The next chapter examines the influence of self-perceived roles in life, including roles constructed through collective learning sources highlighted in this chapter, on beliefs aligned with sustainability.

Chapter 4⁹

Beef producers' self-perceived roles in life and achieving sustainability

4.1. Introduction

Previous studies of self-identity in the context of sustainability show that land manager subjectivities or self-identity can have an important and complex relationship with achieving sustainability. Where producers have converted to less conventional practices such as organic farming there has been the cultivation of a new way of experiencing others and self, a more open and flexible self-identity and seeing men and women as variable and dynamic subjects (Coldwell 2007; Peter et al. 2000; Trauger 2004; Bell et al. 2004). Conversely, a study by Burton and Wilson (2006) revealed that even where there had been a structural shift to sustainability (e.g. through multifunctional land-use) production-orientated identities still dominate. Further, while individual subjectivity can be influential in differentiating the social practice of producers, it is not necessarily a determiner of producers' adoption of particular practices (Campbell et al. 2012).

This chapter builds on knowledge of farmer or land manager self-identity in the context of sustainability. More specifically, the chapter addresses the following research questions: (1) What are beef producers' self-perceived roles¹⁰ in life? (2) What are the most important roles for beef producers? (3) How do beef producers' self-perceived roles influence sustainability? I begin the chapter with a theoretical framework for understanding farmers' self-identity through different farming discourses, followed by an explanation of the methods. I then use the theoretical framework to qualitatively and quantitatively identify patterns and differences in male and female beef producers' descriptions of their roles in life. This analysis is followed by a quantitative analysis of

⁹ A modified version of this chapter has been published: Lankester, A. 2012. Self-perceived roles in life and achieving sustainability on family farms in northeastern Australia. *Australian Geographer*, 43 (3), 233-251.

¹⁰ 'Roles' are generally defined as behaviours characteristic of one or more people in a context and with various processes that produce, explain or are affected by those behaviours (Biddle 1979). Roles are seen to interplay with self-identity in the sense that they are generalised expectations of behavioural norms communicated in the environment, but are not assumed to be prescriptions for self-understanding (Sveningsson & Alvesson 2003).

how these roles relate to a set of beliefs to do with climate change, nature conservation, learning, change and adaptation. The chapter concludes with a discussion of what the results mean for fostering a more sustainable rural landscape in Australia.

4.2 Theoretical framework

Self-identity refers to how an individual sees him/herself in relation to others and the wider world. The theoretical framework for self-identity that I have used in this study views the self to be constructed through discourse. ‘Discourse’ and ‘discourse analysis’ has been interpreted in different ways within a range of theoretical contexts (Phillips & Hardy 2002; Mills 2004). In this chapter, discourses are interpreted as social structures that are socially and culturally constructed meanings and knowledge embodied in metaphors, representations, images, narratives, statements and everyday practices (Long 2001). The self is seen to be fragmented with multiple constructions across different, often intersecting and opposing discourses, practices and positions, rather than being unified and singular (Hall 2000). The relationship between agency and structure in the construction of discourses is viewed as dialectical in accordance with the perspective of theorists such as Bourdieu (1977) and Berger and Luckmann (1966); both agency and structure create discourse. Discourses reflect shared values and ways of seeing the world. Power relations within discourse work to accept, exclude and suppress different ways of knowing and understanding the world. Some discourses can become more dominant than others in defining what is culturally right and wrong and in shaping social relations and self-identity. In the process of delineating different ways of knowing about a phenomenon, discourse is also continually contested, repositioned and shaped (Carolan 2006). A person’s identity is continually constructed and reconstructed within a range of discourses, some of which may be more influential than others.

Early studies of family farms (mainly of women) identified a dominant ‘traditional’ discourse shaping self-identity (e.g. Shortall 1992; Little & Austin 1996; Whatmore 1991; Alston 1995; Liepins 1998). This discourse is imbued with agrarian ideology and patriarchal power relations and is largely maintained by patrilineal inheritance patterns. Agrarian ideology emphasises the independent male producer living on the land with his wife and children, a celebration of farming and farmers and a belief in a traditional gender division of labour (Naples 1994). Values that predominate include a preference

for the lifestyle of farming and an independent work style (Gasson 1973). Men and women's roles and responsibilities (perceived by him/herself and others) within a traditional family farm discourse are mostly gendered: women identify strongly with caring and household roles (even though they may identify with multiple household and production tasks) and men tend to own and control the operation and assume the 'outside' labouring roles (Keating & Little 1994; Liepins 1998). Women tend to be marginalised and subjugated within this traditional discourse, with their production tasks and economic contributions rendered 'invisible' and framed as the 'farm wife' assisting the male farmer (Brandth 2002; Alston 1995).

More contemporary studies of farmer identity reveal that an economical liberal discourse has become important in constructing a less traditional self-identity on family farms (Bryant 1999; Coldwell 2007; Ní Laoire 2002). This discourse has become prominent on family farms as a consequence of the industrialisation and globalisation of agriculture and the rise in neoliberal economic policies. Family farming has increasingly become linked to the industrial food sector so that the control over the production process has moved from the farmer to external institutions (e.g. markets) and farmers are no longer protected by the state (Tsouvalis et al. 2000). Family units continue to own and manage farms, but they have taken on a production system linked to legal and financial structures representative of the wider economy, that is, they have become enterprises (Pritchard et al. 2007). Values of rationality, professionalism and profit have become a noticeable feature on these farms (Vesala & Vesala 2010; Pritchard et al. 2007; Morgan et al. 2010). In this changed agricultural regime, farmers and producers have responded to regulations and technological change. Consequently, they have had to engage in more entrepreneurial activities to survive and manage risk and have, therefore, developed a self-identity that is 'less traditional' and more business-orientated. Bryant (1999) describes the 'detraditional farmer' as being male or female, feeling pride in achieving a viable and profitable farm and developing business skills, being open to changing practices to increase viability and putting more emphasis on planning the operation rather than on labouring.

Studies have also identified a change in gender relations on family farms in conjunction with changes in the structure of industrialised farming practices and the 'women in agriculture' movement. For example, Liepins (1998) paints a complex picture of Australian women and men on farms positioned (through narratives and discourses) in diverse 'masculine' and 'feminine' ways. Many women in agriculture have found increased capacities and involvement in their farms as well as in local or broader

networks and organisations thus rejecting the term ‘farmer’s wife’ (Panelli 2005). Women on farms have also begun to be associated with terms such as the ‘new entrepreneurs’ (Alston 2003). Business and administration roles that women have assumed within this changing agricultural regime have also increased their decision-making and power within the productive space of farming (Riley 2009; Farmar-Bowers 2010). Male farmers, on the other hand, who have responded to agricultural restructuring through becoming more business-orientated tend to be less fixed by traditional notions of the ‘farmer’ (Ní Laoire 2002; Coldwell 2007). The male ‘myth’ in farming seems to be fading despite the continual reassertion of patriarchy both on farms and elsewhere (Lawrence & Gray 2000). The case study in this chapter uses mixed methods to analyse men and women’s self-perceived roles in life for the extent that the above-mentioned prominent family farming discourses influences them.

4.3 Methods

I used qualitative and quantitative methods to answer the research questions for this chapter (see Chapter 2 for details of methods). The qualitative interviews sought to enable an in-depth insight into producers’ self-perceived roles in life, build survey items and help interpret the quantitative data. Collection of qualitative data allowed for actor determined roles or role categories in the quantitative survey that are specific to the northern cattle-grazing rangelands environment rather than the use of a set of literature derived roles or role categories that may or may not relate to participants experiences. I used the analysis of data from 91 quantitative telephone surveys to identify the influence of self-perceived roles on a set of beliefs aligned with sustainability and gender on roles. Identifying gender patterns and gender differences in interviewees’ descriptions of their roles in life, while not the main aim of the study, was an important part of discerning the influence of dominant farming discourses on producers’ ideas of the self.

The 28 qualitative interviews included two main questions to do with beef producers ‘roles in life’:

- What are the different roles that you have in everyday life?
- What are the most important roles for you when you are making decisions to change management practices?

The initial coding sorted the transcript data into different types of role descriptions for men (n=18) and women (n=10) in accordance with the research questions for the

thesis. Subsequent analysis of the coded data created themes that identified the influence of prominent farming discourses on interviewees' descriptions of their roles in life.

A survey item in the quantitative telephone survey asked participants to rate (on a 4-point Likert scale) how important 14 different roles were to their everyday life. These roles were determined from the list of roles described by interviewees in the qualitative study. Some roles such as 'house keeper' and 'home keeper' were the exact words of interviewees and other roles (e.g. 'business development planner') were labels for a range of similar tasks described by interviewees. I explained the role titles of 'resource condition monitor', 'paddock worker', 'on-ground planner' and 'business development planner' to the interviewee by giving examples of the tasks (based on the qualitative data) associated with each role.

I used a principal components analysis (PCA) to reduce the 14 roles into fewer correlated dimensions in order to correlate with the beliefs aligned with sustainability. The suitability of the data for factor analysis was assessed prior to performing the PCA by examining frequency distributions. The factorability of the correlation matrix was supported based on the correlation matrix having many coefficients of .3 and above, a Kaiser-Meyer-Okin value of .704 and the Bartlett's test of Sphericity reaching statistical significance. The PCA revealed five components with Eigen values exceeding 1, explaining 24.5 per cent, 14.8 per cent, 10.2 per cent, 8.0 per cent and 7.7 per cent of the variance respectively (a total of 49.5 per cent of the variability). An inspection of the scree plot revealed a clear break after the third component. It was, therefore, decided that three components would be retained for further investigation (Table 2). Each participant was given a score on each of the three principal components. The score represents the strength with which the participant identifies with the type of role represented by the principal component.

The principal components were interpreted according to themes associated with similar social relationships, discourses and work activities. Principal component 1 was labelled as 'domestic and administration roles' due to high loadings for house based roles to do with childrearing and bookwork. Principal component 2 was interpreted as 'wider community roles' due to high loadings for roles constructed through community and peer networks and interactions external to the immediate family farm environment. Some of these 'wider community' roles (e.g. resource condition monitor and business planner) are associated with changes in management approach due to producers'

participation in ‘newer’ discourses. Principal component 3 was interpreted as ‘labouring and property planning roles’ due to high loadings for day-to-day planning and outside labouring roles.

Table 2: List of beef producers’ roles and the results of the principal components analysis

Roles created from the qualitative data and the results of the principal component analysis used to identify three ‘types’ of roles for beef producers in northeastern Australia (n=91).

Roles created from the qualitative data	Principal component loadings		
	Domestic and administration roles (24.5% of variance explained)	Wider community roles (14.8% of variance explained)	Labouring and property planning roles (10.2% of variance explained)
Housekeeper	.751		
Parent/family manager	.737		
Bookkeeper/finance manager	.668		
Home teacher	.648		
Business development planner (e.g. overall and long-term decisions to do with the future of the business)			
Workshops and/or course participant (to do with finance, business, cattle and/or natural resource management)	.405	.653	
Resource condition monitor and record keeper (e.g. pasture condition, stock numbers)		.651	
Assisting other producers with management decisions		.627	
Political and/or industry meeting participant		.527	
Member or volunteer with a community group or institution		.488	
Property planner (e.g. tasks include ordering and costing supplies, infrastructure and cattle movement decisions)			.846
Paddock worker (e.g. tasks include cattle and property maintenance and improvements)			.827
Off-farm business manager or worker	.453		-.490
Companion to parents and/or in-laws	.432		.444

Rotation Method: Varimax with Kaiser Normalization.

Note: Values less than .4 were suppressed and sorted by size

Bivariate correlation analysis was used to explore the relationship between the principal components (representing different types of roles), gender and participants' response to statements about beliefs aligned with sustainability. Survey participants were asked (using a 4-point Likert scale) two main sets of questions about (1) their extent of agreement with nine belief statements aligned with sustainability, and (2) the extent of importance (on a 4-point Likert scale) of four goals and two collective learning sources were to their management decisions. These survey items were based on the conceptual understanding of sustainability outlined in the introduction to the thesis. Statements were developed to represent concepts of 'climate change', 'nature conservation', 'learning' and 'change and adaptation'. The statements were drawn from a combination of the data collected for Chapter 3, the study by Marshall and Marshall (2007) on social resilience, Nieymayer et al's (2005) study on climate change and a study by Greiner et al. (2007) on cattle producers' motivations. A statement on climate change was thought to be necessary due to its prominence in influencing change in the Australian agricultural sector (e.g. Cocklin & Dibden 2009). Correlation analysis was also used to explore the relationship between gender and the 14 different role categories. Averages of the importance level of the different roles were calculated to determine which gender was more likely than the other to identify with particular roles.

4.4 Results

4.4.1 'More traditional' roles

A 'more traditional' family farm discourse was important in shaping what roles beef producers perceived to be important in their everyday life and gender expectations of particular roles. Quantitative survey results showed that survey participants perceived the most important roles in everyday life to be associated with production, business and family (Table 3). Many (12 out of 28) interviewees said that being a parent or family manager was the most important priority and role in life when they were making decisions to change practices. The parent role was often perceived by interviewees to be the overriding role in their life.

Table 3: Importance of different roles in life for male and female beef producers
 Mean level of importance of different roles for survey participants overall, and males and females separately. Bivariate correlations between roles and gender for survey participants (n=91).

Roles	Mean response ¹			
	Overall (n=91)	Males (n=62)	Female (n=29)	Significance levels ² (males vs. females)
Paddock worker	3.47	3.62	3.17	**
Property planner	3.47	3.55	3.31	-
Parent/family manager	3.36	3.17	3.76	**
Business development planner	3.28	3.27	3.31	-
Bookkeeper/finance manager	2.87	2.52	3.59	***
Companion to parents and/or in-laws	2.81	2.77	2.89	-
Resource condition monitor and record keeper	2.78	2.72	2.89	-
Workshops and/or course participant	2.44	2.30	2.72	-
Member or volunteer with a community group or institution	2.35	2.23	2.59	-
Housekeeper	2.30	1.98	2.96	***
Assisting other producers with management decisions	2.07	2.13	1.93	-
Political and/or industry meeting participant	1.79	1.85	1.66 (.81)	-
Off-farm business manager or worker	1.71	1.75	1.62	-
Home teacher	1.54	1.38	1.86	*

¹ Measured on a 4 point scale ranging from 1 = not at all important to 4 = very important.

²*p<0.05 (significant at 5% level), **p<0.01 (significant at 1%), ***p<0.001 (significant at 0.1%).

The survey results also revealed that participants' self-perceived roles in life were gendered (Table 3). Female survey participants were significantly more likely than male participants to consider bookkeeping, housekeeping, parenting and teaching roles to be important in their everyday life. Male participants, on the other hand, were significantly more likely than female participants to consider the role of 'paddock worker' to be important in their everyday life.

A gender division of labour was also apparent in male and female interviewees' descriptions of their roles in life. The 18 male interviewees mainly listed labouring, business management and parenting roles as part of their everyday lives. No males listed housekeeping, teaching or companionship roles nor mentioned 'husband' as one of their roles. The following male interviewee gave an example of his daily manual labour and parenting roles:

'Well this morning I've been a mechanic. I was a plumber first because I had to go get the water pump going and then I had to get my bike going and now I'm horse breaking and this afternoon I will have to be a father and play footy with the kids' (P-9m.)

There were also signs of a traditional masculinity where to be a ‘good producer’ was to be good at manual labour tasks:

‘The thing with farmers, their identity comes from being really good at what we call ‘operational skills’: I can shoe a horse and I can drive cattle and I can build a strong fence’ (P-12m).

The ten female interviewees, on the other hand, gave descriptions of their roles in life that were largely shaped by reproduction and marriage. The role of ‘mother’ and ‘wife’ were often at the top of female participants’ lists of their multiple roles in life. It was common for females to report multiple ‘inside’ and ‘outside’ roles in life. The following interviewee listed her multiple roles and discussed the challenge of incorporating them into her daily life:

‘If someone asks me what I am I say well I’m a wife, I’m a mother, I’m a fencer, I’m a ringer, I’m a cook, I’m a teacher and then on top of all the other voluntary stuff you do, you think “what am I?” You’re incorporating the outside work, you’re thinking about that and your next role in office worker. No matter what you do there’s always something involved from outside and you just seem to juggle it all’ (P-8f).

Female producers outside roles in life also showed signs of being ‘invisible’. For example, the same interviewee expressed that she felt that women’s labouring roles in life were not recognised enough by the wider community:

‘It amazes me when you go to town and people say, “what do you do all day?” Women on the land have always been busy people it’s just never been recognised. We’re out in the paddock just as much, the majority of us’ (P-8f).

4.4.2 ‘Less traditional’ roles

Interviewees’ self-perceived roles in life also reflected ‘less traditional’ discourses that have emerged in response to agrarian change and changes in society. Many (12 out of 28) interviewees described how a more competitive and changing cattle industry had motivated them to participate in workshops and networks that had lead them to assume more business, planning and natural resource management tasks rather than just day-

to-day operational tasks. The following female participant described the change that she sees in her husband's roles:

'From all this change and everything he's gone from being someone who used to plan musters and things like that to use his brain a fair bit more, even with his feed budget records and things like that and how much grass is taken out. It's a lot more paperwork and figuring than I think he's ever done in his life before' (P-1f).

Interviewees said that following their participation in courses associated with the practice and philosophy of cell grazing they no longer felt they identified with production-orientated titles such as 'grazier' or 'producer' and, instead, preferred to label him or herself with titles such as '*business manager*' (P-3m), '*land manager*' (P-12m), '*custodian*' (P-4m), '*landscape manager*' (P-12m) and/or '*grass growers*' (P-5m).

There were also signs of a change in gender relations in the decision making and management of the operation characteristic of a business-orientated discourse. Female interviewees said that they made decisions jointly with their partner, especially in connection to book-keeping, parenting and natural resource management. The quantitative survey results also indicate gender equality in these roles with 'business development planning', 'companion to parents or in-laws', 'resource condition monitoring and record keeping' and 'off-farm business' roles being of similar importance to men and women (see Table 3). The following interviewee described the change she sees in operations towards more equal decision making processes:

'Generations past it was the father [who made decisions] and I think a lot of decisions were made at the cost of the family. But I think that's changing. That's not just in our business, but it's all over' (P-2f).

Interviewees who had diversified into managing an off-farm business said that they had become part of two different worlds of doing business and relating to others. For example, one participant said that his off-farm business had given him "*more control of his destiny*" (P-7m), rather than waiting for family succession of the grazing operation. Similarly, another participant said that having both an off-farm business and a grazing operation enabled him to "*get the best of both worlds*" (P-10m).

4.4.3 Roles and beliefs aligned with sustainability

Survey participants who identified strongly with ‘wider community roles’ and ‘domestic and administration roles’ were more likely than those who identified strongly with ‘labouring and property planning roles’ to favour beliefs to do with nature conservation, learning and adapting to change (Table 4). Participants who identified strongly with ‘wider community roles’ were likely to agree that they aspire to learn in general and collectively, aspire to become more adaptable and protect biodiversity, have other career options and manage proactively. Participants who identified strongly with ‘domestic and administrative roles’ (and this was mainly women: see Table 3) were likely to agree that they aspire to protect natural resources, biodiversity, learn and become more adaptable, learn collectively and through networks, but not likely to be unperturbed by adverse changes in the industry and environment. Participants who strongly identified with ‘labouring and property planning roles’ (and this was mainly men: see Table 3) were the least likely to favour beliefs aligned with sustainability and were likely to be worried about a decrease in cattle price occurring. There were no significant correlations between the three ‘types’ of self-perceived roles and beliefs that acknowledged climate change and a loss of biodiversity from continual grazing, agreed with destocking during drought times and that showed that they were unperturbed by adverse changes in the environment and industry.

Table 4: Relationship between beef producers' self-perceived roles and beliefs aligned with sustainability

Bivariate correlations of the three 'types' of self-perceived roles with belief statements aligned with sustainability for beef producers in northeastern Australia (n=91).

		Pearson correlation coefficient		
Belief statements		Labouring and property planning roles	Domestic and administration roles	Wider community roles
Climate change	Claims that suggest there will be more unpredictable climatic events in the future due to climate change are not exaggerated	-.043	.159	.197
Nature conservation	I believe that continual grazing pressure on the landscape has lead to a loss of native plant and animal diversity over time	.049	-.030	-.001
	'Protect native plants and animals' is an important goal	.012	.336**	.228*
	'Improve the resource condition' is an important goal	.103	.241*	.146
	I participate more in natural resource management groups and networks now than I ever have	-.023	.392***	.204
Learning	'Increase my learning and skills' is an important goal	.002	.293**	.335**
	Workshops are an important learning source	.084	.267*	.496***
	Project groups ^{are} an important learning source	-.003	.319**	.461***
Change and adaptation	'To become more adaptable to changes in the industry and environment' is an important goal	-.015	.121	.359***
	It has not always taken a crisis of some sort before I change practices	-.091	.062	.363***
	A decrease in cattle price occurring in the future is not what I worry about the most	-.284**	-.218*	.028
	Having to manage my operation during drought times is not one of my biggest worries	-.067	-.116	-.058
	An increase in interest rates is not what I worry about the most	-.053	-.292**	-.087
	I have options available to me other than being a beef producer	-.089	.234*	.234*
	The loss of short term income by destocking during drought times is quite acceptable to me	.150	.020	.144

*p<0.05 (significant at 5% level), **p<0.01 (significant at 1%), ***p<0.001 (significant at 0.1%)

4.5 Discussion

The purpose of this chapter was to increase understanding beef producers subjectivities in the context of achieving sustainability. The northeastern Australian case study found that beef producers perceived a range of more or less 'traditional' roles to be important in their everyday lives. Results found that producers who identified strongly with 'wider community roles' and 'domestic and administration roles' were more likely than those who identified strongly with 'labouring and property planning roles' to favour beliefs aligned with sustainability. Producers who are part of wider networks and who are heavily involved in the financial management of the farm are likely to agree with beliefs that favour learning and change in order to achieve economic goals in the context of market liberalisation (Morgan et al. 2010). However, producers' participation in these 'wider networks' is fostering their engagement in 'less traditional' and alternative discourses that appear to be constructing a more open and flexible self-identity, thus concurring with the idea of sustainability as involving personal and cultural change. Redefinition of the self to less production-orientated labels also suggests that beef producers are negotiating a self-identity with different cultural meanings that will, in turn, guide different social practices (Smith-Lovin 2002). Conversely, results imply that producers who still strongly identify with 'traditional' roles may find it difficult to engage in new learning and adapt to change, which compares with research by Holmes and Day (1995) in regard to the self-identity of South Australian pastoralists.

Beef producers' identification with roles constructed through traditional discourse reflects the dominant productivist culture that they are a part of. Production and parenting roles are likely to be perceived by beef producers to be most important to their everyday lives because these roles are the ones they need to do, as part of the current cultural context, to maintain family and livelihood. Labouring roles, especially for men, also appear to be sources for producers' self-worth and pride. A productivist dominated culture could be especially strong in northeastern Australia (compared to southern Australia) due to remote living and a monoculture of cattle grazing creating fewer opportunities for men and women to participate in alternative discourses and activities.

While the culture surrounding beef producers is still heavily influenced by traditional and productivist values, it is likely to be difficult for producers to forge new roles and practices that challenge these values. For example, Lawrence et al. (2004) argue that

unless there are considerable market and governance shifts to alternative and viable forms of land-use, the financial, personal and social ‘costs’ of changing production make it a rational choice for producers to stay with the status quo. Until there are wider economic and cultural changes, the adoption of new practices and policies that require a redefinition of the self may be a challenging prospect for many producers and may be resisted. There may be growing opportunities for producers to change to alternative and viable land-uses with programs such as ‘carbon farming’ and ‘environmental stewardship’, thus reducing the financial costs of changing practices. However, there are likely to still be personal and social costs in changing to an alternative land-use and/or livelihood that would need to be considered with the introduction of new policies.

An economic liberal and business-orientated discourse appears to be a main influence shaping the less traditional roles that producers identified. Sustainable agriculture in the utilitarian discourse is seen to be within the limits of the market with foremost concerns of cost-price efficiency defining what is possible in terms of environmental measures (Hermans et al. 2010). In other words, the change to an ‘entrepreneur farmer’ does not necessarily challenge the prevailing productivist paradigm (Pritchard et al. 2007), and suggest a personal and cultural shift for sustainability that is ecologically enhancing. This might explain the lack of positive correlations between the three ‘types’ of self-perceived roles and beliefs that acknowledged climate change and a loss of biodiversity from continual grazing, agree with destocking during drought times and that indicate a capacity to adapt to adverse changes. Furthermore, while producers need to intensify their production practices to remain competitive, they may also need to be subtle about acknowledging environmental problems caused by livestock. Adhering to what one knows and being resistant, or even in denial, to different ways and new knowledge can be appealing in an uncertain world (Bell et al. 2004).

Women’s roles on cattle grazing operations appear to have changed with the prominence of less traditional discourse, but still appear to be strongly influenced by traditional cultural expectations. The prominent business discourse on family farms appears to have increased the importance of women’s administration role and, in turn, their overall role in property management. However, women do not appear to be doing less work on properties as a result of being more involved in the business; they are also doing physical labour tasks and are the main domestic workers. In addition, finding that women strongly identified with domestic roles and that they felt unrecognised in their labouring roles suggests that there are still strong gender expectations of roles on

family farms and in the industry. This situation may be difficult to change while there are still mainly patriarchal inheritance patterns. Women in this study, through their identification with domestic and administration roles, also showed a tendency to be anxious about adverse economic changes. Women's exposure to the financial realities of the operation through their bookkeeping role could lead them to feel insecure around events that they cannot control. Women, through their identification with domestic and administrative roles, were also likely to favour belief statements that show an interest in learning and nature conservation. As suggested by Alston (2003), women's perspectives have an important role to play in shaping, and increasing the prominence of, alternative agricultural discourses associated with environmental sustainability.

4.6 Chapter conclusion

This chapter shows that both traditional and less traditional discourses are shaping northeastern Australian beef producers self-identity, and that the more their identity is shaped by diverse or alternative discourses the more likely they are to favour beliefs aligned with sustainability. A gender division of labour associated with a traditional family farming discourse is still apparent in the rangelands. Male beef producers' identity and self-esteem appears strongly linked to labouring and cattle production roles. Women, on the other hand, seem to strongly identify with domestic and administration roles. Beef producers who strongly identify with 'wider community' and 'domestic and administrative' roles appear more likely to favour sustainability than producers who strongly identify with labouring and property planning roles. These results suggest that beef producers' participation in new and alternative discourses and practices, including collective learning forums, is fostering personal and cultural changes for sustainability. However, there is still a need to define to what extent alternative discourse that has an entrepreneurial view of sustainability is a departure from environmentally unsustainable behaviour and fosters a conservation-orientated identity. The next chapter focuses on another aspect of producers' self-identity: their relationship to place and occupation through the lens of 'sense of place'. The chapter explores what constitutes beef producers' sense of place and how this aspect of their self-identity influences the same set of beliefs aligned with sustainability used in this chapter.

Chapter 5¹¹

Beef producers' sense of place and achieving sustainability

5.1 Introduction

Beef producers who have a strong attachment to their place and occupation have previously shown to have a low likelihood of adopting strategies to enhance their capacity to adapt to change (Marshall et al. 2011b). There is, however, limited understanding of the meanings behind this attachment to place and occupation. The aim of this chapter is to increase understanding of beef producers' relationship to their place and occupation through the lens of 'sense of place' and further investigate how this relationship may influence sustainability. Specifically, the chapter addresses the following research questions: (1) What is the nature of, and meanings behind, producers' attachment to their family property, occupation and way of life? (2) What does it mean to be a beef producer? (3) How does this 'sense of place' influence sustainability?

5.2 Theoretical framework

A sense of place refers to the relationship a person has with a place. The 'sense of place' concept has been used by multiple research disciplines each defining the concept according to their different philosophical foundations (Patterson & Williams 2005). However, among these definitions there appears to be a general understanding that a sense of place refers to a space becoming a place through the symbolic, tangible, instrumental and emotional meanings that people develop through lived experience and relationship with that place (Davenport & Anderson 2005; Manzo 2003; Relph 1976; Tuan 1974). These meanings and feelings can contribute to 'place attachment' (Low & Altman 1992). A person's self-identity can also become strongly interconnected with their sense of place such that one can develop 'place identity' (Proshansky et al. 1983); a process of becoming who one is through, among other

¹¹ A modified version of this chapter is in preparation: Lankester, A.J., Marshall, N.A., Sutton, S., Cottrell, A., Gordon, I.J. Sense of place and sustainability on the Australian rangelands. Target journal: Social and Cultural Geography

factors, a sense of belonging and purpose associated with a particular place. Places become important for the maintenance and development of identity processes such as distinctiveness, continuity, self-esteem and self-efficacy (Twigger-Ross & Uzzell 1996). A person who has come to know themselves in relation to a place in great depth, is seen to be ‘inside’ a place (Chawla 1992). Main factors and processes that shape an individual’s sense of place include: (1) the constantly changing social and cultural interactions and the associated power relations; (2) the main activity and extent to which a person relies on that place to support their needs, goals and desires; and (3) the physical nature and scale of the place.

A sense of place and a sense of who we are in a place is not static and discrete, but rather a reflection of the surrounding fluid, dynamic and constantly changing social context. A person’s sense of place is shaped by the norms and values of the surrounding rural and farming culture. The power relations associated with social, political, historical, economic and cultural interactions and dynamics that structure individuals’ lives and settings are a dominant influence on their sense of place (Brandenburg & Carroll 1995; Manzo 2003; Massey 1995; Tuan 1974). What it means to be a ‘good farmer’, for example, is derived from an interaction of farmer subjectivity with the larger political economy (Silvasti 2003). There is also often one set of power relations that will be more dominant than others in a place and particular context. In many industrialised agricultural areas, a neoliberal and productivist discourse has dominated (Fish et al. 2006). A dominant sense of place can also lead to the exclusion of others such that there will be ‘insiders’ who belong to a place and ‘outsiders’ who do not (Riley 1992). The rural/urban ‘divide’ is a common example of where the insiders/outsiders dynamic can come into play in the context of farming (Panelli et al. 2008).

An individual’s dominant mode of interaction with the landscape also plays an important role in shaping their sense of place (Stedman 2003b; Greider & Garkovich 1994). An individual’s sense of place is influenced by the extent to which they rely on the place to support their goals, desires and needs (Gunderson & Watson 2007; Williams & Sofranko 1979; Stokols & Shumaker 1981). Land managers have a range of economic, social and environmental goals (Pannell et al. 2006). Previous research of land managers’ sense of place shows that reliance on the land and its resources for an income plays a key role in constructing their relationship with that land (Cross et al. 2011; Jacobs & Buijs 2011). Individuals who rely on a place for their livelihood have different landscape preferences than people who do not rely on a place for a living

(Kaltenborn & Bjerke 2010). For example, landholders who derive an income from the land tend to prefer short term conservation programs that offer large financial incentives, whereas landholders who do not rely on the land for an income prefer long-term programs that are voluntary or offer small financial incentives (Moon & Cocklin 2011).

An individual's response to a place will be further influenced by the physical nature and scale of the place (Sampson & Goodrich 2009; Stedman 2003b; Steele 1981). For example, Stedman (2003b) found that similar levels of shoreline development were significantly associated with quite different place meanings and concluded that landscape characteristics underpin both place attachment and satisfaction in different ways. In the context of family farming, a beef producer with a large remote property who relies on the land for their main income is likely to have a different sense of place to a hobby farm beef producer on a small property on the outskirts of a town. The influence of the physical nature of a place on an individual also becomes evident when the place changes. A change in the physical landscape leads to changes in an individual's sense of self through a process of negotiating new symbols and meanings (Greider & Garkovich 1994; Hiss 1990; Proshansky et al. 1983). This chapter explores beef producers' relationship to their extensive rangeland family property, occupation and way of life and the interaction of this relationship with management changes and beliefs aligned with sustainability.

5.3 Methods

I used qualitative and quantitative methods to answer the research questions for this chapter (see Chapter 2 for details of methods). Data from 28 qualitative interviews were used to identify the different meanings of the family property and occupation of cattle grazing for beef producers and to help interpret the quantitative survey results. Interviews were semi-structured and included the following questions:

- Why do you feel connected to your property?
- What are the different meanings or values that the property has for you?
- What does it mean to be a producer?
- How does your connection to your property and the values you hold for it influence your decision-making to change management?

I coded the interview data by selecting out the relevant parts from the transcripts and identifying themes among these parts based on the research questions and theoretical framework. The analysis was particularly influenced by the categories and sub-categories of place meanings (identity, sustenance, tonic and nature) identified by Davenport and Anderson (2005).

Data from the 91 quantitative telephone surveys were analysed to identify how a set of beliefs relating to beef producers' sense of place, derived from the qualitative data, relate to a set of beliefs aligned with sustainability. Survey participants were asked to what extent they support the same 15 statements aligned with sustainability used in Chapter 4 and eight statements relating to sense of place. The survey items relating to sense of place were generated from the themes of belonging, lifestyle, occupation and livelihood in the qualitative data and grouped into the same categories. Three items measured place attachment (Table 5). There was high agreement among participants for most of these statements. Cronbach's alpha of 0.70 indicated an acceptable level of reliability for the place attachment scale. The statements representing place attachment were developed from data from the qualitative study and earlier studies of place attachment (e.g. Kaltenborn & Bjerke 2010).

Table 5: Reliability analysis and average responses of place attachment belief statements for beef producers

The correlation coefficients and average responses of the belief statements used to measure place attachment in the rangelands of northeastern Australia. Cronbach's alpha = 0.70 (n=91).

Survey statements	Average response	Item-total correlation	Cronbach's alpha if item deleted
'I feel like I have a very strong attachment to this property'	3.41	.53	.62
'I feel like this property is part of me and is in my heart'	3.28	.56	.57
'No matter how hard things get, I could never sell this property'	2.32	.51	.66

I used a principal components analysis (PCA) to reduce the three place attachment items into one place attachment component. The single factor had an Eigenvalue of 2.2 and represented 54.8 per cent of the variance. The factorability of the correlation matrix was supported based on correlation coefficients above 0.3, a Kaiser-Meyer-Okin value of 0.701 and the Bartlett's Test of Sphericity reaching statistical significance.

Pearson's correlation analysis was used to explore the relationship between the place attachment component and socio-demographic variables, and the eight statements relating to producers' sense of place and the 15 beliefs aligned with sustainability.

5.4 Results

5.4.1 Place attachment and socio-demographics

Correlations between the place attachment component and socio-demographic variables revealed that a strong attachment to the family property was associated with having a long, lived and ancestral connection to the property (Table 6). Beef producers with a strong place attachment were likely to have low debt levels, inherited the property and owned the property for a long time and low education levels. Gender, property succession, property size, previous employment in a different occupation, having an off-farm business or investments, age and income made no significant difference to survey participants' strength of place attachment.

Table 6: Relationship between place attachment and socio-demographics
 Pearson's correlations (r) between the place attachment component and socio-demographic variables for beef producer survey participants in northeastern Australia (n=91).

Socio-demographic variables	Summary of responses	Place attachment component
Equity below 85%	46.3%	-.375**
Have inherited the property	36.3%	.275**
Average length of property ownership	19.8 years	.33**
Modal education level	Completed to Grade 10	-.27*
Modal number of generations to have owned the property	2.4	.25*
Number of participants to have worked on other grazing operations	77%	-.22*
Modal age bracket	40–49	.20
Gender	68% male	.16
Number of participants with an off-farm business	25%	-.15
Average property size	51,472 ha	-.12
Number of participants who intend to hand the property onto future generations	91%	.09
Modal annual income bracket	\$150–\$500,000	-.09
Number of participants with off-farm investments	40%	-.08
Number of participants to have had other occupations	65%	.00

* $p<0.05$, ** $p<0.01$, *** $p<0.001$

5.4.2 Place meanings

Beef producers strong attachment to the family property was also based on a range of place meanings. Data from the qualitative interviews revealed that the family property and life as a producer had a range of emotional, functional and social meanings that were expressed in four main themes: (1) belonging, (2) lifestyle, (3) occupation, and (4) business. Strong place meanings for beef producers were feeling a sense of belonging and wellbeing through an emotional, functional and spiritual connection to their property. Beef producers' properties and their livelihoods associated with cattle grazing were central to their self-identity. The following sections provide details of these place meanings.

Belonging

The majority (22 out of 28) of interviewees said that they felt a strong sense of belonging through an ancestral connection to their property and/or a deep bond with the landscape. A bond that they said got stronger with time:

'I think a lot of your personal identity becomes tied up in your patch of land. It's just a feeling you have that in some way that's where you belong. That's where you want to be' (P-14f).

The six interviewees who said that they did not feel a strong attachment to the property did not have a long association with the property; they were either new owners or had married into the family who owned the property. Theoretical conceptions of 'home' as positively symbolising comfort, self-identity, security (Lewicka 2011), 'roots' (Gustafson 2001) and 'place belongingness' (Proshansky et al. 1983) were dominant themes in the interview data. Interviewees described an emotional connection to the property that was part of their self-identity. For example, two interviewees said that they felt 'emotional ties' to their property.

Two interviewees talked about how the emotional attachment to their property influenced their decision to stay on the property even if it made better business sense to sell the property for a high price and buy a more productive enterprise. One interviewee made reference to a fellow producer in a different location who had struggled through a long period of poor pasture following a drought and still had no inclination to leave the property. Interviewees' emotional connection or feeling of

belonging was hard for them to put into words. The connection was often spatially defined within the boundaries of the property and very ‘inside’ them to the extent that it was a physical sensation:

‘Sometimes when you’re driving home and you just go over the grid...it’s a physical thing definitely’ (P-2f).

Interviewees described how a large part of their connection to the property was an emotional connection with the nature and natural features of the property, especially water areas (e.g. waterholes, permanent river), as suggested by the following quote:

‘I really don’t know what it is, but it’s [connection to place] something that just binds you. I think it’s got to do with all the living stuff out there. You get a sort of sense of fellow feeling of things. It’s absolutely emotional. It’s a visceral thing. It’s something that creeps up on them and they don’t know it’s happening. Then they’re utterly bound in some way to the landscape they live in’ (P-14f).

The ancestral connection interviewees had with their property also contributed heavily to their strength of place attachment and the importance of the property to their self-identity. One interviewee described her sense of belonging through having ‘*an historical attachment to the land*’ (P-8f). The family’s historical connection was not just associated with people from the past, but also material possessions (e.g. the homestead, diaries and letters) and stories that had been passed on through generations:

‘Dad’s parents were living here when he was born. Mum and dad were here when I was born and our kids have been born while we’re living here and it’s just all a part of it. It’s [the property] a part of who we are, it’s a part of everything we are’ (P-7m).

Three interviewees compared their emotional connection to the property to that of Traditional Owners connection to country seen from both the point of view of ‘insiders’ and ‘outsiders’ (Manzo & Perkins 2006). Two interviewees said that through the bond they had developed with their property they could sympathise with, or relate to, Traditional Owners’ connection to country. Whereas, another interviewee said that she felt that her emotional attachment equalled that of Traditional Owners in the sense of property ownership rights.

Lifestyle

The way of life associated with the cattle grazing occupation, rural living and living and working in the same place provided strong meanings to most (19 out of the 28) interviewees. Aspects such as the solitude of working on one's own in big, open and quiet areas of bushland and the autonomy and flexibility of the occupation were important to (especially) male interviewees:

'I guess you wouldn't be anything else. It gives you the freedom to make your own decisions and you reap the rewards or you cop the penalty if you make the wrong decision, so you dictate to yourself what sort of life you have I guess: it is job satisfaction' (P-21m.)

Interviewees were also attracted to characteristics of rural living (e.g. clean air, lots of open space and quietness) that they were able to access from living and working on a grazing property. These positive 'lifestyle' place meanings were frequently framed in comparison to urban settings and urban culture. For example, interviewees listed features of the city life (e.g. pollution, traffic, nine-to-five work hours, noise, regulations, closed-in-space, population masses and lack of vegetation) that they found difficult to tolerate. These characteristics were mostly listed as part of a narrative of their recent visits to a city. One interviewee described how he felt uneasy in cities due to the lack of control over essential resources such as water, power and fresh air:

'If you didn't love it you'd be an absolute fool to be here. It is all about lifestyle: what you can teach your children and that sort of thing. It does get hard, very hard at times, but to live in a suburb, I couldn't do it' (P-21m.).

The connection between having a grazing operation and other people was also valued by two interviewees. One interviewee said that she valued her community and contacts in the local township. Another interviewee expressed how he valued the opportunity the property gave him to interact with travellers.

Occupation

Some (4 out of 28) interviewees said that the most satisfying and enjoyable aspects of being a beef producer was working with cattle, dogs and horses. Their relationship with animals had become a core part of their enjoyment in their life of being a beef producer:

'We get a lot of satisfaction out of our horses. You know, there's all those sort of things that makes work satisfying. We just like working with animals' (P- 20m).

Two interviewees said that they enjoyed the challenge of, and pride and sense of purpose they felt from, being a beef producer and producing good quality cattle and developing new infrastructure such as water points and fences. The following male interviewee described the pride he feels in producing good quality cattle and infrastructure:

'There's nothing better than seeing a young beast that's in real prime condition and know that you've managed it all. And the other real pleasure is making a new water point: when you've got an abundance of grass that hasn't been utilised and you can put a water point there' (P-11m).

Alternatively, the following female interviewee described how she developed an attachment to the operation through becoming involved in administrating the business:

'Before I took over doing the bookwork I had no real attachment to the place at all. I didn't really belong, it was just somewhere to live, but once I took over the bookwork I felt it was more my business' (P-1f).

Business

The production value of the land was also a salient feature of the property for a few (3 out of the 28) interviewees. These interviewees said that business management had become a preoccupying aspect of their life. The business side of the grazing operation had become such a dominant part of their life that they found it difficult to fathom how it could be possible for a producer to be living and working on a grazing operation for mainly lifestyle reasons:

'Well it's not a lifestyle. It's a fair dinkum business. The economic thing's just too great a pressure to live a lifestyle, unless you've made enough money' (P-11m).

5.4.3 Relationship between beliefs related to beef producers' sense of place and beliefs aligned with sustainability

Survey items based on the sense of place variables identified in the qualitative study were correlated with a set of beliefs aligned with sustainability. Correlations were slightly significant. Results showed that survey participants who had a strong place attachment and who were attracted to business-innovation tended to be slightly more likely than those attracted to the lifestyle and occupation of cattle grazing to agree with beliefs aligned with sustainability (Table 7). Participants who felt a strong sense of belonging and attachment to the land were slightly correlated with participating in natural resource management networks, forsaking short term income by destocking during drought and coping with adverse institutional and environmental change.

Participants attracted to lifestyle, cattle grazing and business-innovation aspects of the operation were slightly correlated with being worried by adverse changes in the industry and environment. Participants attracted to business and innovation aspects showed a propensity for participating in natural resource management networks, group learning and alternative employment options. Conversely, participants attracted to the lifestyle of cattle grazing were slightly correlated with being less proactive managers, having a low aspiration for learning, including group learning, and becoming more adaptable. Participants attracted to the solitude of the occupation showed a likelihood of aspiring to improve the resource condition. There were no significant correlations between any of the sense of place beliefs and beliefs that acknowledged climate change, a loss of biodiversity from cattle grazing and that protecting biodiversity as an important goal.

Table 7: Relationship between beliefs related to beef producers' sense of place and beliefs aligned with sustainability

Pearson's correlations between sense of place statements and beliefs aligned with sustainability for beef producers in northeastern Queensland, Australia (n=91)

Beliefs aligned with sustainability		Sense of place beliefs							
		Business	Belonging			Lifestyle		Occupation	
			I love thinking of new and better ways to improve the business	I am not more attached to the amenities on this property than the land itself	I feel like this property is a part of me and is in my heart	No matter how hard things get I could never sell this property	I love the solitude of being a producer	I am mainly a beef producer because of the lifestyle	I like mustering cattle and working with animals more than I like other jobs on the property
Climate change	Claims that suggest there will be more unpredictable climatic events in the future due to climate change are not exaggerated	.127	-.050	-.170	.028	-.088	-.174	-.176	.042
Nature conservation	I believe that continual grazing pressure on the landscape has lead to a loss of native plant and animal diversity over time	.092	-.157	-.114	-.056	.016	.035	-.022	.085
	'Protect native plants and animals' is an important goal	.154	-.075	.094	.085	.138	-.176	-.026	.054
	'Improve the resource condition' is an important goal	.132	.123	.156	.174	.299**	-.011	-.065	.112
	I participate more in natural resource management groups and networks now than I ever have	.239*	.010	.033	.265*	.016	-.136	.051	.002

Learning	'Increase my learning and skills' is an important goal	.201	-.162	-.096	-.079	.147	-.264*	.051	.068
	Workshops are an important learning source	.235*	-.098	.061	.105	.101	-.167	-.003	.122
	Project groups are an important learning source	.248*	-.082	.042	.132	.013	-.230*	.146	-.107
Change and adaptation	'To become more adaptable to changes in the industry and environment' is an important goal	.122	.084	-.061	-.044	.116	-.405**	.136	.095
	It has not always taken a crisis of some sort before I change practices	.077	.243*	-.010	-.179	.046	-.364**	-.097	-.104
	I have options available to me other than being a beef producer	.345**	.173	-.079	-.111	.020	-.167	-.174	.116
	A decrease in cattle price occurring in the future is not what I worry about the most	-.136	.238*	-.132	-.211	-.095	.026	.106	-.164
	Having to manage my operation during drought times is not one of my biggest worries	-.223*	.113	-.183	-.143	-.238*	-.051	-.311**	-.278**
	An increase in interest rates is not what I worry about the most	-.221*	.212*	-.039	-.131	-.173	.088	-.087	-.273*
	The loss of short term income by destocking during drought times to increase my long term income is quite acceptable to me	.137	.263*	.307**	.181	.191	.071	-.021	-.150

*p<0.05 (significant at 5% level), **p<0.01 (significant at 1%), ***p<0.001 (significant at 0.1%)

*The 'agree' value includes the 'agree' and 'strongly agree' responses (on the Likert scale) combined

*The 'important' value is the 'moderately important' and 'very important' responses (on the Likert scale) combined

5.4.4 Influence of sense of place on management decisions

The qualitative data of the influence of beef producers' connection to their family property on their management decisions helps with the interpretation of the previous quantitative results. Most (21 out of 28) interviewees said that their sense of belonging or place attachment motivated them to want to improve the natural resources, economic viability and production value of their property, especially for the benefit of future generations. Interviewees said that their attachment to the property, and the desire to keep the property in the family, motivated them to increase their investments (e.g. purchase new infrastructure), expand and buy other properties, diversify (e.g. invest in a small tourism venture) and make changes to improve pasture and retain water resources. Two interviewees also said that their connection to the family property had given them a respect for the land and a sense of responsibility to protect and improve it. For example:

'Leaving here is not in question so we best make it as best sustainably as we can otherwise we won't be here' (P-20m).

Two interviewees, on the other hand, believed that their attachment to their property and cattle negatively impacted on their ability to be proactive land managers and maintain a viable business. One of the interviewees discussed the pitfalls of having sentimental attachments:

'The trap I think maybe I've fallen into is sentimentality because this is where I was born and bred, my Grandfather started the place off and I think if you really want to make money in the rural and land business you want to be prepared to buy and sell whenever. Don't get married to home. You can get bogged down with the sentimentality and not only with land, but stock as well' (P- 20m).

5.5 Discussion

The purpose of this chapter was to enhance understanding of a sense of place in the context of extensive cattle grazing family farms and provide new insights into how this sense of place may influence sustainability. Beef producers appear to have strong attachments to their properties, which is associated with a long, ancestral and

lived connection to the property and landscape. Beef producers' attachment to place tended to be central to their self-identity; similar to findings from other rural studies (e.g. Silvasti 2003; Dominy 2001; Gosling & Williams 2010). Results revealed that beef producers have a range of place and occupational meanings. Strong place meanings included a sense of belonging, through an emotional and functional connection to the family property and an attraction to the lifestyle and occupation of being a cattle grazier. Aspects of the occupation of cattle grazing such as working with animals, producing beef and business-innovation were other place meanings. Beef producers' appear to have 'place-based identity': their self-identity has become linked to a particular landscape through process, project and performance (Pratt 1998; Carter et al. 2007).

Results showed that there were some relationships between beef producers' extent of agreement for beliefs aligned with sustainability and beliefs related to their sense of place. For example, characteristics such as feeling a sense of belonging and being attracted to the solitude and business-innovation aspects of the operation were slightly positively linked to beliefs that favoured resource conservation, learning and adapting to change. In comparison, producers who were attracted to the lifestyle and occupation of being a grazier were slightly unlikely to have a proactive approach to management, an interest in learning or the capacity to cope well with adverse circumstances such as drought. Although these correlations were of moderate significance, they help to understand the influence of sense of place on sustainability in the context of extensive cattle grazing. The following discusses the results of this study and what they might mean for achieving sustainability in the Australian rangelands.

Results suggest that a strong attachment to the family property has a complex influence on beef producers' capacity to adapt to change. Beef producers with a strong sense of belonging and attachment to place appear to have an ability to manage proactively and cope with adverse economic changes. These results could be explained by finding that beef producers with a strong place attachment also tend to have low debt levels and to have inherited the property; indicating that these producers may have the financial capacity to endure changes like an increase in interest rates or a decrease in cattle prices. Qualitative data revealed that attachment to the family property might also inhibit producers' ability to make management

decisions that increase their options and flexibility. Producers with a strong attachment to the family property may, therefore, cope well with adverse economic changes, but be less adaptable to changes that threaten their physical and emotional connection to their property and way of life.

Beef producers with a sense of belonging to the land and who are attracted to the solitude of the occupation appear highly motivated to do what they can to improve the resource condition and viability of the property. These results suggest that spending a long time on the property and building a sense of ‘place-based identity’ builds a strong desire within producers to change practices for sustainability. The motivation to conserve and improve resources could be related strongly to the desire to hand the property onto the next generation and keep the property in the family; indicating an individual sense of stewardship and sustainability in the ‘agri-ruralist discourse’ (Hermans et al. 2010). However, these results could also indicate a shift towards a more conservation-orientated identity similar to the findings of McGuire et al. (2013) and Gosling and William (2010), and thus conferring with the idea of sustainability as requiring personal and cultural change.

Producers’ found it difficult to describe their physical and emotional connection to place. It is also a difficult phenomenon to measure. However, this emotional connection is an important factor bonding producers to their property. As rural landscapes become more multifunctional in an effort to address social-ecological decline, as is predicted (e.g. Dibden & Cocklin 2009), it will be important to understand and capture emotional and other non-economic connections. For example, producers who consider emotional or non-economic values to be more important than profitability may resist a planned intervention that financially compensates producers for a loss of property rights.

Results further suggest that beef producers who are attracted to business aspects of the grazing operation are likely to be interested in learning and change. These findings support the conclusion by Burton et al. (2008) that shifts in conventional producers’ understanding and management of natural resources that induces sustainable cultural change is likely to be achieved through promoting entrepreneurialism and innovation. However, entrepreneurialism is based on building financial capital through business-innovation, rather than ecological enhancing

principles; ‘sustainability’ is interpreted through a utilitarian discourse focused on cost-price efficiency (Hermans et al. 2010). While an interest and tendency towards business-innovation appears to be sustainability enhancing in this study, it is unclear how much of a departure an entrepreneurial type of sustainability is from ecologically unsustainable behaviour.

Attachment to the occupation and lifestyle of cattle grazing and rural living does not appear, from the results of this study, to be very aligned with an interest in learning and adaptation, nor a capacity to cope well with adverse changes. Characteristics (e.g. open space, peace and quiet, solitude, clean air) of rural living that are attractive to beef producers contain aspects of the ‘rural idyll’ that have been identified by other rural studies (e.g. Milburn et al. 2010; Halfacre 1995). Beef producers attracted to these aspects of rural living and aspects of the occupation, such as autonomy, producing cattle and working with animals, appear to have a low propensity for engaging in new learning and managing proactively. Other studies have similarly found that a strong attachment to qualities of the rural life and livelihood can be a source of resistance to nature conservation interventions and initiatives (e.g. Jacobs & Buijs 2011; Cross et al. 2011). Beef producers could be resistant to learning and change because they may not want to compromise or alter their valued lifestyle and occupational interests. Aspects of the occupation of grazing such as working with animals and producing good quality cattle appear to be practices that are identity enhancing and provide sources of self-worth and satisfaction.

Results of this study suggest that beef producers may find it difficult to adapt to changes that involve new interpretations of the landscape, cultural change and/or changes to home. It makes sense, for example, that with a self-identity linked strongly to the occupation of cattle grazing and the family property, and a culture still dominated by productivist values, producers are likely to favour beliefs and practices that support these connections and culture. Beliefs that favour change may threaten a long standing idea of self and what it is to be a ‘good farmer’ (Burton 2004b). Such ‘cultural’ factors may be why this study found no positive correlations between different place meanings and beliefs in climate change and a loss of biodiversity from cattle grazing. Livestock industries are predicted to have a whole new set of linkages to post-production economy, information and social networks (McAllister et al. 2006). Such changes may require producers to adopt a different land-use, occupation or place. Producers who have management practices that are influenced by productivist

notions of what it means to be a ‘good farmer’ (e.g. produce good quality cattle) may find it difficult to change to practices that suggest, for example, to be a ‘good farmer’ is to conserve biodiversity.

These findings for the interaction of sense of place with sustainability suggest that there are some aspects of producers’ sense of place that may need changing more than others to achieve personal and cultural change for sustainability. For example, results of this study suggest that a strong attachment and emotional connection to the family property can be important for achieving sustainability. However, what may need to change in order to achieve greater sustainability outcomes is for producers to become more flexible and open to changes in their self-identity tied to their connections to place and occupation and more critically engaged with the type of sustainability discourse that they are part of.

5.6 Chapter conclusion

This chapter investigates beef producers’ sense of place. More specifically, why beef producers feel connected to their family property, the meanings of the occupation, property and way of life and how this ‘sense of place’ may influence management decisions and beliefs aligned with sustainability. Interview and survey analyses revealed that beef producers who have a long and lived connection to the family property feel a strong attachment to place based on four main meanings: belonging, lifestyle, occupation and business. Feeling a sense of belonging to the family property and being attracted to the lifestyle of rural living and cattle grazing held strong meanings for producers. Beef producers’ sense of place appears to have a mixed influence on their sustainability. In summary, producers who feel a sense of belonging to the family property and who are attracted to the business side of the operation tend to have more of an interest in learning and ability to adapt to change than those attracted to the lifestyle and occupation of cattle grazing. These results suggest that some aspects of producers’ sense of place such as their emotional connection to place are important to nurture and may not need changing for sustainability. However, other aspects such as connections to place, occupation and lifestyle that inhibit flexibility and becoming open to different ideas of self and practice may need to reflect on for personal and cultural shifts for sustainability. The next chapter discusses theoretical contributions from this thesis and the implications of the

findings of this chapter, and the previous two chapters, for planned interventions to enhance sustainability in general and specifically for extensive cattle grazing systems.

Chapter 6

Theoretical contributions and implications for planned interventions for sustainability

This thesis sought to increase understanding of learning, self-perceived roles in life and sense of place—and how these dimensions influence sustainability—in the context of extensive grazing systems and a personal and cultural shift in thinking and practice. The main finding of the thesis is that organised and sustained collective learning, experiencing adversity, experimentation with new ideas, alternative discourses, interest in business-innovation and connections to place are aspects that can foster sustainability. In this chapter I discuss the theoretical contributions of this thesis for the disciplines of geography, environmental psychology, adult learning and sustainability; and, what the implications of these findings are for achieving the sustainable management of natural resources more broadly and in the context of extensive cattle grazing systems. I also discuss how natural resource practitioners might consider factors associated with self-identity, sense of place and learning in the development of strategies and interventions for sustainability.

6.1 Theoretical contributions

This thesis contributes novel interdisciplinary contributions to the disciplines of geography, environmental psychology, adult learning and sustainability. In particular, the thesis provides new insights for the concepts of ‘place identity’, ‘place attachment’, and ‘learning for sustainability’, ‘adoption of innovations’, ‘transformative learning’, ‘farmer identity’ and ‘gender roles’.

This thesis offers a culturally informed perspective to agricultural geography. Over the last decade or more there has been much published in reference to a social change in rural Australia due to factors such as a rise in neo-liberalism, globalisation, climate change, land degradation and changing demographics (e.g. Pritchard and McManus 2000). This literature includes reference to a ‘transforming countryside’ or transition to ‘multifunctional’ agricultural landscapes (e.g. Morell and Brandth 2007, Holmes 2006). This thesis contributes to discussion of changing rural and agricultural

landscapes in Australia through highlighting the complex and dynamic values that exist on extensive remote family farms in the rangelands of northern Australia. Specifically, this thesis shows that while alternative discourses exist, they are marginalised by the ‘collectivised dominance’ of production values. Evidence of alternative discourses in the rangelands compares to a study by Bell (2004) where farmers’ participation in a new way of farming cultivated a new way of experiencing others and one’s own self that recognises difference and encourages it as a source of learning, change and vitality. However, more alternative and diverse ways of production, land management and being in the rangelands are likely to remain on the fringe until there is a wider structural shift that promotes and supports cultural change.

Knowledge of gender, roles and self-identity on family farms in the context of changing rural landscapes and sustainability is a further contribution of this thesis. This research provides a novel mixed method approach for identifying a set of actor defined or subjective roles in life. There is emerging literature that suggests that gender roles and relations are changing with changing agricultural landscapes; creating space for women to engage in new practices and activities and off-farm employment (Morell and Brandth 2007, Brandth and Haugen 2011). While this thesis suggests that there are changes in gender roles and dynamics on northern Australian family farms with changing discourses, the change is slow and hampered by the persistence of a dominant patriarchal discourse (compare Bennett 2004). The conclusions of the thesis also provide a useful contribution to literature on the influence of subjective perspectives of self on the predisposition to changes in land use in support of sustainability. More specifically, the thesis shows that graziers are identifying with roles that provide an opportunity for changing less sustainable discourses and traditions through the influence of external or off-farm networks.

Knowledge of land managers’ relationship to place and the environment and what aspects of their sense of place might foster or hinder sustainability has also been expanded through this research. More specifically, knowledge generated through this thesis in relation to the family farm contributes to theoretical conceptions of place as a ‘home’ (Lewicka 2011), providing ‘roots’ (Gustafson 2001) and belonging or identity (Proshansky et al. 1983). In particular, this research contributes a range of meanings and values associated with ‘place-based identity’, family farming and extensive

rangeland cattle grazing. The thesis also shows that a strong attachment to a place can have both positive and negative consequences for achieving sustainability and that, depending on what people value about the occupation and place, there will be different responses to change. For example, strong attachment to occupation and lifestyle might create resistance to changes in land-use.

This thesis also contributes to literature that views sustainable land management requiring shifts in thinking as well as practice. I argue in this thesis that more than a practice change or adoption of innovations is needed; a change in culture that moves away from productivist and fixed uni-dimensional ideas of land management is required. This research contributes to understanding of how aspects of self-identity and learning interact with this idea of sustainability. Findings of the thesis show that shifts are occurring in practice and thinking that is influenced by an entrepreneurial discourse and more holistic management practices (e.g. cell grazing). While some literature views entrepreneurship as being on the path to achieving sustainability (e.g. 'Sustainopreneurship' (Abrahamsson 2006)), there is also a body of literature that questions to what extent this path for sustainability is equally achieving the social and environmental goals of sustainability (Troughton 2002, Hall et al. 2010, de Lauwere 2009). These disparities reveal the social-cultural construction of the term 'sustainability' and highlight the need to critically reflect on power relations of capitalist accumulation to ensure that environmental and social unsustainability are equally achieved alongside economic sustainability (Tilzey 2002).

Knowledge of learning for sustainability has also been advanced by this thesis. This thesis contributes (1) a novel conceptualisation of transformative learning as a process of individual in social learning processes, (2) new insights in regard to individual management problems being addressed collectively and (3) new indicators of transformative learning in the context of achieving sustainable natural resource management (e.g. enhanced sense of environmental responsibility). The thesis, more broadly, contributes to understanding of farmer learning and the adoption of sustainable land-use practices, particularly in the context of beef grazing and rangelands. Findings emphasise that the adoption of new practices is a learning process influenced by socio-cultural processes.

6.2 Implications for planned interventions for sustainability

6.2.1 Learning that fosters sustainability

One of the main findings of the thesis is that change towards sustainability involves learning. Common approaches for achieving sustainability have tended to be hierarchical, market-based and controlling (e.g. regulation), and based on the provision of information and education and ‘tool box’ policy options rather than on enhancing learning (Ison et al. 2007). These findings for learning support the idea that a shift is required from a view of knowledge as a ‘thing’ that can be transferred to a ‘process of relating’ that involves negotiation of meaning among partners (Magne et al. 2012). More specifically, the thesis found that the combination of sustained collective learning, experiencing adversity and experimentation foster critical reflection of practices, self and cultural norms and enhance individuals’ sense of environmental responsibility. The implications of these findings for applied natural resource management are discussed in the following sections.

Collective learning

The importance of sustained collective learning processes for fostering sustainability is supported by the findings of this thesis. This finding confirms the assertions of others that social learning is needed to address complex policy problems associated with social-ecological change (e.g. Martin et al. 2009). Collective learning programs in the case study for this thesis fostered trust and a sense of belonging among peers that encouraged producers to critically reflect on their practices, self and culture and, thus, feel supported to change practices. Integrating collective learning processes into the design of planned interventions to foster sustainability would, therefore, seem essential.

Collective learning experiences such as the ones identified in this study could go further to focus on shared problems with multiple stakeholders, rather than a focus on just improving individual management problems. Addressing shared natural resource problems such as poor water quality requires collaboration and collective action that is based on knowledge sharing among multiple inter-dependent stakeholders (Ison et al. 2007). Achieving sustainability will require individuals, as well as the communities and organisations that they are a part of, to embrace new

learning experiences that encourage questioning and different perspectives (Tilbury 2009). The focus of the collective learning programs in this study was, however, on beef producers working together to solve individual management problems.

Collective learning programs such as those identified in this study could be extended or adapted to include multiple stakeholders with a focus on addressing shared resource problems such as the spread of exotic animal and plant species or poor water quality. Research and development programs could build on existing collective learning programs to include the ‘second-order tradition’ of critically reflecting on traditions of practice through systematic action research (Ison & Russell 2000).

Adversity and learning

The results of this thesis indicate that the hardship producers endure as a consequence of adverse events and circumstances such as drought can be a catalyst for participation in collective learning programs. Conversely, collective learning programs are likely to also increase social capacity and, therefore, producers’ capacity to adapt and cope with changes such as drought (Adger 2003). Increased opportunities for producers to participate in collective learning programs around critical events could serve to strengthen their capacity to learn and cope with events such as drought. Opportunity to participate in collective learning would seem especially important with the current policy climate framed around land managers, rather than governments, managing risk. It is important, however, that interventions to encourage and assist producers to participate in organised learning programs happen contextually over years rather than just during a drought episode (Stafford Smith et al. 2007). Policy that assists land managers with coping with the stress surrounding drought times requires complex and collaborative public policy decision-making and early intervention and prevention strategies (Stehlik 2013). Future extension programs that aim to enhance sustainability and increase producers’ capacity to cope with adverse events such as drought may benefit from research that explores the pathways, conditions and processes of learning following producers’ experience with adversity. Identifying the features of individuals’ learning, and how this learning is linked with social learning and wider scale processes, following adverse experiences could be used to increase the effectiveness of programs. There is also the potential to strengthen the collaboration between natural resource

management and health services for the design of programs that foster positive outcomes for both human and ecological health.

Finding that the experience of hardship and adversity can be a catalyst for learning highlights the emotional process of learning. Change is not usually an instrumental process; it involves shifts in thinking, values and practice and can be an emotionally challenging process requiring the trust and support of others (Taylor 1998). Collective learning forums are, therefore, likely to be important vehicles for providing individuals with the social support they need for undergoing change. Taylor (2003) asserts that emotions have an important role to play in the learning and change process, but there is still a lack of understanding of how to effectively engage emotions in practice and the role of particular feelings (e.g. anger, fear, shame, happiness) in relationship to transformative learning. Future extension programs that aim to enhance sustainability could be more effective with an increased understanding of the internal or emotional processes of individuals' learning. For example, increased understanding of the emotions that signal transformative learning, and the processes and practices that are important to support individuals to process difficult emotions, should help to design more effective programs.

Experimentation

Experimentation with natural resource management techniques and skills appears, from the findings of this thesis, to be another important component of producers' learning process. Active experimentation with new ideas appears important for producers to create their own knowledge of a practice in their own situation and setting. Scientific knowledge alone has little meaning for producers. Sustainable natural resource management practices can best be achieved through an intensive interaction between scientific knowledge and the knowledge generated by farmers (Somers 1998). Policies that create space for producers to try out new things, put forward their thought, and reflect on their action in a purposeful way, are necessary for fostering effective learning processes (King 2003). Active experimentation with new ideas would, therefore, seem to be another necessary component of programs designed to cultivate sustainability.

6.2.2 Alternative cultural capital and diverse self-concepts

Another main finding of this thesis is that alternative discourses and practices, which include collective learning, are important for cultivating diverse self-concepts that favour sustainability. Historically, environmental problems such as land degradation have been isolated from the social and cultural context (Ison et al. 2007). Market-based incentives have been a main tool under a neoliberal dominated agricultural regime for encouraging producers to change to more sustainable practices (Cocklin et al. 2006). However, the findings of this thesis emphasise that more than just market-based incentives are needed to achieve cultural change towards sustainability. Policy-makers need to cultivate approaches that allow for the creation of cultural and social capital within farming and pastoral communities rather than simply compensating for lost economic capital (Krasny et al. 2009). The findings of this thesis suggest that producers who want to change practices that diverge from conventional ways do not feel supported by the dominant productivist discourse (e.g. feeling judged). Therefore, planned interventions for sustainability may need to focus on building the social and cultural capital of alternative discourses and practices at all scales.

Planned interventions could enhance sustainability through encouraging the critical reflection of strategic narratives and discourses at the individual, community and regional level. Discourse reflection requires decision-makers and stakeholders to critically reflect on and reconsider their discourses (Runhaar et al. 2010). It also requires being aware of different traditions of understanding and how they influence participation and action (Ison et al. 2007). Learning processes that encourage individuals to develop critical and systematic thinking skills that question the thinking and assumptions behind actions, rather than judging the actions themselves, are essential for enhancing sustainability and learning (Tilbury 2009; Wals 2009). In the case study for this thesis, the strategic discourses that would seem to require concerted critical reflection are those that are more ‘traditional’ and production-orientated.

6.2.3 Business-innovation and sustainability

Entrepreneurialism appears, from the results of this thesis, to have been an important influence on changing beef producers' self-identity and practice so that it is less structured by conventional discourses and practices. These findings support the conclusion by Burton et al. (2008) who showed that shifts in conventional producers' understanding and management of natural resources that induce sustainable cultural change is likely to be achieved through promoting entrepreneurialism and innovation. Beef producers in this study revealed a re-thinking of identity from the traditional conceptions of 'grazier' or 'cattleman' towards more business aspects of the enterprise, similar to the cell graziers in the study by Richards and Lawrence (2009). However, entrepreneurialism is based on building financial capital through business-innovation, rather than ecological enhancing principles. While an interest in, and tendency towards, business-innovation appears to be sustainability enhancing in many ways, it is unclear how much of a departure entrepreneurialism is from ecologically unsustainable behaviour. Planned interventions could foster sustainability through encouraging entrepreneurial interests and practices, but they may also need to encourage critical reflection of the type of sustainability discourse producers are engaged in and promote ecological enhancing principles and practices.

6.2.4 Encouraging women's participation

The findings of this thesis further emphasise the importance of encouraging women's participation in organisations and planned interventions for sustainability. Female producers in this study, through their identification with domestic and administrative roles, agreed with beliefs that favoured learning and nature conservation. Results of this study suggest that women are active participants and creators of alternative discourses and practices that emphasise business-innovation and resource and nature conservation. These results support the conclusion by Petty et al. (2010) that:

Changing agricultural research and development from current biases towards male farmers to gender equitable is not merely an issue of political correctness or ideology; it is a matter of development effectiveness that can benefit all of society (p. 299).

Recommendations for encouraging gender equity include directly addressing, through critical analysis, the gender composition of groups and organisations and

any norms, rules, or networks that exclude women from participation and decision-making (Westermann et al. 2005). A critical analysis of the gender division of labour that appears evident on conventional family properties, and actively encouraging the gender balance of organisations, including support for women's inheritance of family farms, would appear important for achieving sustainability.

6.2.5 Nurturing connections to place

Another main finding of this thesis is that beef producers have a strong emotional connection to the family property that is central to their identity. This connection to the family property seems to both facilitate and hinder producers' efforts to learn, change and adapt. This mixed response might be explained by Vanclay (2004) who concludes that looking after the land or stewardship has always been a part of the notion of 'good farm management'; only the physical expression of many of the management practices that sustainability invokes are contested. Changes that are imbued with the cultural symbolism of what producers understand to be 'sustainability' and that allow the maintenance of practices that contribute to producers' long established sense of place and identity are likely to be more accepted than changes that are culturally unfamiliar. For example, most beef producers' connection to place, in this study, is embedded through their family history, occupation and a lifelong physical connection to the property. Practices and discourses related to family and beef production appear to have largely shaped beef producers' sense of place. Therefore, planned interventions to foster sustainability, especially interventions that may involve a change in culture and place, are likely to be more effective if beef producers' emotional connections to place are considered and the cultural capital around the change is cultivated. Sustainable practice change is likely to involve individuals developing a different sense of place through a different use and appreciation of the place.

6.2.6 Incorporating place and identity into strategies

The findings of this thesis emphasise the importance of considering and incorporating social-psychological dimensions associated with place and identity in assessments and planned interventions for sustainability. Policy frameworks in relation to land managers and their natural resource management have tended to

focus on financial drivers and assume homogeneity among individuals (Maybery et al. 2005). The findings of this research support the assertions of others that there will be a diversity of responses by producers to planned interventions to foster sustainability (e.g. Valbuena et al. 2010; Bohnet et al. 2011). Different interventions or changes may impact more on some aspects of self in relation to place, relationships and occupation than others. For example, a proposal for a changed land-use (like carbon farming or conservation tenure) may threaten beef producers who are mostly attracted and attached to the occupation and lifestyle of cattle grazing, but not necessarily those for which a sense of belonging to the place and the rural lifestyle is most important.

The effectiveness of natural resource management policies would be assisted by a better appreciation and understanding of the diversity of values, attitudes and socio-cultural characteristics and how these frame the challenges of sustainability (Stratford & Davidson 2002). Understanding cognitions is also important for predicting people's evaluations of new policies (Stedman 2002). For example, knowledge of producers' different place meanings provides insight for understanding motivations and attitudes in regard to natural resource management and helps explain the diversity of responses to new policies. Aspects of producers' self-identity are difficult to identify and measure, and are not easy for individuals to express, but they are likely to play an important role in their response to new policies.

Discussions around place meanings could be a good starting point for constructing and addressing natural resource management problems. Place meanings may be a uniting and soft entry point, in conjunction to building social capital, for engaging individuals who have tended to favour non-organised learning in collective learning programs. Place meanings can be used as a tool for dialogue, framing negotiations and interpreting action alternatives (Davenport & Anderson 2005). Understanding place attachments and meanings can also provide lessons about what mobilises people and their feelings about place, which can help a community resolve conflicts or even reach consensus (Manzo & Perkins 2006). Drawing on collective place meanings could be a powerful way to encourage individuals' participation in collective learning processes and collective action to address natural resource management problems.

6.2.7 Enhancing sustainability in the northeastern rangelands

The northeastern rangelands are experiencing a range of interrelated and escalating natural resource management problems that stem from the grazing of livestock (Ludwig & Stafford Smith 2005). Understanding social-psychological factors and processes that foster sustainability in this region is, therefore, important for developing policy that can help accelerate the adoption of ‘more sustainable’ natural resource management practices. In the case of northeastern Australia, beef producers do not, in the main, appear to be engaged in discourses and collective learning that fosters critical reflection and an interest in learning and change. These results for northeastern Australia reflect the nature of remote living, producers’ reliance on beef production for a main income and the dominant productivist culture that producers are a part of. Policy settings in Australian agriculture still favour productivism and promote intensive and efficient farming practices in line with an economic rationalist ideology (Gray & Lawrence 2001; Argent 2002; Dibden et al. 2005). Producers may have limited financial and human capacity to engage with new or alternative discourses, but the opportunities through organisations in the northeastern rangelands to participate in alternative discourses also appears minimal. It is likely to be difficult for producers to forge ‘new identities’ if the cultural norms and values around them are slow to embrace new ways and perspectives.

Planned interventions to foster sustainability in the northeastern rangelands may be effective if there is a focus on building the social and cultural capital of alternative discourses and encouraging producers’ participation in collective learning programs. Other recommended strategies for encouraging participation in learning opportunities include: (1) expressing the benefits of learning in terms that have meaning for producers (e.g. appealing to place meanings), (2) localised learning (e.g. involving local people in the design of programs so that they are relevant to local needs and conditions), (3) two-way communication and open interaction, (4) extension officer training to support a greater understanding of social learning and the land manager context, (5) building relationships with individuals, and (7) monitoring and revising as change takes place in an area (Andrew et al. 2005).

6.3 Chapter conclusion

This chapter discusses the theoretical contributions of this thesis and implications of the findings for planned interventions to foster sustainable natural resource management. The findings of this thesis have contributed a cultural perspective to agricultural geography and new knowledge to concepts of 'place identity', 'place attachment', 'learning for sustainability', 'adoption of innovations', 'transformative learning', 'farmer identity' and 'gender roles' in the context of changing agricultural landscapes. The findings of the thesis suggest that four main strategies are important to enhance sustainability in the context of extensive grazing systems. Firstly, programs need to be based on enhancing learning, rather than just transferring knowledge. In particular, learning that is collective and/or collaborative, experimental and encourages critical reflection. There is also opportunity for collaboration between health and natural resource management agencies in the design of collective learning programs. Secondly, strategies could focus on building the social and cultural capital of alternative discourses and practices. Thirdly, facilitating the equal participation of women in organisations and strategies. Fourthly, insights into producers' sense of place is likely to help understand responses to strategies and interventions. Understanding the subjective realities of producers assists management agencies with the design of policy that is sensitive to these realities and the socio-cultural context. The next chapter provides a general conclusion for the thesis that reflects on the findings relative to the objectives, limitations of the approach and opportunities for future research.

Chapter 7

Conclusion: Reflections for future research and practice focused on learning and change for sustainability

This thesis set out to increase understanding of aspects and processes of learning and self-identity, as self-identity relates to roles and place, in the context in extensive grazing systems. This thesis viewed sustainability as requiring cultural and personal shifts in thinking and practice. Considering this perspective, the objective of the thesis and the findings of the research, the main conclusion is that sustained, collective and experimental learning processes that encourage critical reflection and build the social and cultural capital of alternative discourses are important for fostering ‘more sustainable’ ideas of self and others, beef production and natural resource management. However, there may need to be critical reflection on the extent of ecological sustainable behaviour fostered by alternative discourses and change dominated by entrepreneurialism. Some aspects of beef producers’ learning and self-identity such as their ‘learning by doing’ and emotional connection to the family property may not need changing. However, other aspects such as producers’ low engagement in collective learning and alternative discourses, and attachment to the occupation and lifestyle of cattle grazing, could be limiting change for sustainability. These aspects of individuals will be slow to change without institutions and the communities that individuals are part of also questioning cultural norms that may be barriers for sustainability .

Collective and experimental learning processes appear important for beef producers to develop a sense of self, others and the environment that favours sustainability. Results of the thesis show that collective learning processes encourage questioning the self, cultural norms and practices, develop a sense of environmental responsibility and cultivate self-perceptions and a sense of place that favours sustainability. Results also suggest that collective learning processes facilitate producers’ participation in alternative ‘less traditional’ discourses that cultivate ‘more sustainable’ ideas of the self, others and the environment.

This thesis developed a novel conceptual framework of learning for sustainability that provides multiple, integrated and contextual insights into the motivations, processes and outcomes of individual learning. The framework provides insights into cognitive and relational learning outcomes, but also how these outcomes are linked to practical and social learning processes. The framework also integrates contextual aspects: the influence of social and cultural norms and values on individuals' learning. Use of the framework to analyse the results of the case study produced new insights into transformative learning in the context of natural resource management. Specifically, the results emphasise the role of adversity in fostering sustainability and the enhanced sense of purpose to address environmental degradation that can be generated through transformative learning.

The social-cultural perspectives of self-identity and sense of place used in this thesis to analyse beef producers' narratives revealed novel and rich insights into beef producers' self-identity. These frameworks conceived aspects such as roles in life and relationship to place as processes changing with the constantly social-cultural-physical environment. Use of these frameworks to analyse producers' narratives reveals the complexities of individuals' ideas of self and relationships with others and place. It is not that clear-cut, for example, that an attachment to place and occupation is a barrier to 'more sustainable' behaviour. This thesis shows that there are many aspects to people's self-identity and sense of place that can influence achieving sustainability in different ways.

Reflecting on the findings of the thesis in relation to the objectives also highlights the challenges and opportunities for research focused on change in the context of sustainability and agricultural and pastoral systems. Changes in thinking and practice that foster sustainability are difficult to measure and define. In this study, it was difficult to judge whether or not there had been a change in beef producers' perspectives that enhanced sustainability. This difficulty can be attributed to an analysis of beef producers' narratives of their past experiences, rather than a report of the 'change' as it occurs, and the lack of clear definition in the literature as to what the 'transformation' entails. More participatory, collaborative and longitudinal approaches would have produced more in-depth and refined ideas of learning and change processes, but such an approach was difficult within the time parameters of a

thesis research project. Future research that is participatory, and explores individuals' learning before, during and after their participation in collective learning programs, might give a more definitive and in-depth analysis of learning that is transformative and fosters sustainability. Further theoretical and empirical research into what the 'change' or 'transformation' constitutes should also help to more easily identify learning processes that foster sustainability.

This thesis also highlights opportunities for future research that explores self-identity and the interplay of self-identity with learning and change in the context of sustainability. For example, the trust relations that develop between individuals through learning processes shape not only personal identities, but can also develop collective or group identity (Carolan 2003). Future research could focus on further identifying what cognitive, emotional and relational processes lead to changes in learning, practice and self-identity, and what role adversity plays in the learning and change process. Research could, for example, explore the learning conditions, processes and pathways that foster sustainability following a producers' experience with stress and adversity and the programs that encourage this learning. Further research could also focus on understanding the processes and aspects of change in self-identity, including sense of place and gender roles, with participation in collective and collaborative learning, alternative discourses (including entrepreneurialism) and 'more sustainable' and 'new' land use and practices (e.g. carbon farming). For example, how much of a conservation-orientated self-identity is fostered by entrepreneurialism? These insights could help to enhance the effectiveness of planned interventions for sustainability. Research that examines the differences between identity, learning and change processes at individual, community and regional scales might also identify miss-matches in scales and provide insights for policy directions.

Future research could also adapt aspects of the approach used in this thesis to increase validity and reliability. The interpretative qualitative and quantitative research design offers an instrument to elicit inductive categorisations of rural peoples' cognitions in regard to their relationship to learning, place and occupation that provide rich and broad conclusions. However, there are aspects of the approach that could be adapted and further refined to enhance the trustworthiness and richness of the data. For example, the set of belief statements aligned with

sustainability could be modified and expanded by drawing on further literature, studies and previously used scales to create a more reliable and comprehensive list of beliefs. There could also be more in-depth and reliable insights into producers' self-identity through exploring what the self-perceived roles mean for producers. The mixed method research approach used in this thesis could be used and developed further in similar or other contexts.

Social-ecological decline driven by the unsustainable use of natural resources, and other factors such as climate and cultural change, requires a new approach to food production. This thesis suggests that beef producers most able to change in a way that averts social-ecological problems and is sustainable are those engaged in more contemporary and participatory discourses and practices that encourage learning, diversity and flexibility. Opportunity exists for more conventional production systems, such as the beef industry in northeastern Australia, to enhance learning for sustainability through creating collaborative spaces and places (at all scales) for individuals to explore new ideas and critically reflect on traditions and habits of practice. Change is a social-cultural process: individuals increased participation in sustainability enhancing discourses and practices requires cultural and social support and resources through institutional change.

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Appendix A: Publications and presentations produced during PhD candidature

Journal publications

Lankester, A. 2012. Self-perceived roles and sustainability on family farms in northeastern Australia. *Australian Geographer*, 43(3), 233-251. (Chapter 4)

Lankester, A.J. 2013. Conceptual and operational understanding of learning for sustainability in the beef grazing rangelands of northeastern Australia. *Journal of Environmental Management*, 119, 182-193. (Chapter 3)

Lankester, A.J., Marshall, N.A., Cottrell, A., Sutton, S., Gordon, I.J. In preparation. Sense of place and sustainability on the Australian rangelands. Target journal: *Social and Cultural Geography* (Chapter 5)

Report

Lankester, A. 2012. Understanding producers' change to more sustainable grazing practices in the tropical savanna rangelands of North Queensland. Final Report, Meat and Livestock Australia, Brisbane.

Conference presentations

Lankester, A. 2012. "It's a part of who we are": The influence of beef producers' sense of place on their capacity to adapt to change. 2012 National Climate Change Adaptation Research Facility Conference: Climate Change Adaptation in Action: Sharing Knowledge to Adapt, Melbourne, Australia.

Lankester, A. 2012. Exploring 'otherness' on beef producing family farms in northeastern Australia. 2012 Institute of Australian Geographers Annual Conference: 'Inspiring Connections', Macquarie University, Sydney, Australia.

Lankester, A. 2011. Learning and self perceptions in transforming to more sustainable land-use practices. 2011 Environmental Research Event Postgraduate

Conference: Wicked Problems: Applied Environmental Research in a Changing World, Moreton Bay Research Station, Stradbroke Island, Australia.

Lankester, A. 2010. Facilitated social learning experiences are important for the change to more sustainable land-use practices. The 2010 International Climate Change Adaptation Conference, Gold Coast, Australia.

Lankester, A. 2009. Roles in life and practice change in the beef grazing rangelands of northeastern Queensland. 2009 Conference of the Agri-Food Research Network. Auckland, New Zealand.

Appendix B: Interview Guide

Learning and decision-making process

- Have you changed management in recent years to improve land condition?
- If not, why not? If not, are there other changes you have made? If so, what were they and what was the process you went through in making this change (go through questions below)?
- If so, why did you start thinking about whether or not you will change management?
- Did you change management to address a problem? If so, what was the problem/issue (and has the change solved or improved the problem/situation)?
- What process do you go through when making a decision to change management?
- What are the most important things that you consider when making decisions to change management?
- What are your goals that you want to achieve when making a decision to change management?
- How do you learn about practice changes and their implementation?
- What are your main learning sources?
- How do you go about making this change?
- Is the change easy to implement or does it take a lot of re-organising?
- Do you trial a management change first? If so, what does this entail, why do you undertake the trial and how does it help your decision? If you can't trial a practice, do you straight away not decide to adopt it or implement the practice in full?
- Do you review your decisions? If so, what makes you review the decision and what things are important to you when deciding whether or not to continue with the practice change? What questions do you ask?
- Have you changed management and then decided later to go back to how things were? If so, in what situation and why?

Identity

- What are the different roles that you have in your daily life?
- What does it mean to you to be a grazier?
- What are the most important roles to you when you are making decisions to change management practices?

Place

- What place or landscape do you feel the most attachment or connection to?
- Why do you feel connected to this place?
- What are the different meanings or values that this place has for you?
- What are the experiences and feelings that you associate with this place?

- How do these values you hold for this place and your connections to this place influence your decision making to change management?

Appendix C: Telephone survey

A: Background

To start with I am interested in a knowing a little bit about you and your operation.

How long have you owned the property for? _____ years / months

Did you inherit it? Yes No

How many children do you have under 16? 0_1_2_3_4_5_6_7 or more

How many children do you have over 16? 0_1_2_3_4_5_6_7 or more

What is the size of this property? _____ ha km² acres

Is the property (a) grazing leasehold, (b) freehold (c) other? _____

How long have you been working as a grazier on this property? _____ months / years

Have you worked on other beef grazing properties in the rangelands of North Australia? Yes
No

Have you had other occupations or grazing experience? Yes No

Do you have an off-farm business? Yes No

How many generations of your family have owned this property (including your children)?
0_1_2_3_4_5 or more

Do you intend to hand the property onto future generations? Yes No

How many properties do you or your family own? 1_2_3_4_5 or more

B: Decision Making

1. I would like to read out a list of goals. Could you please tell me to what extent you agree that the following goals are important in driving your property management decisions?

Where **1** is “Not at all important”, **2** is “Slightly important”, **3** is “Moderately important” and **4** is “Very important”.

	Not at all	Slightly	Moderately	Very
	1	2	3	4
Increase my learning and skills				
Protect native plants and animals				
Improve resource or land condition				
Become more adaptable to changes in the industry and environment				

2. I have another list here of different learning sources. Could you please tell me which ones you think are important influences on your management decisions?

Where **1** is “Not at all important”, **2** is “Slightly important”, **3** is “Moderately important”, and **4** is “Very important”.

		Not at all 1	Slightly 2	Moderately 3	Very 4
Observing other graziers operations and their successes and failures		1	2	3	4
Reflections, trials, errors and observations of my own management		1	2	3	4
Sharing management experiences with other graziers		1	2	3	4
Participating in workshops and courses		1	2	3	4
Participating in field days		1	2	3	4
Being part of a Landcare or Catchment group		1	2	3	4
Being part of a project group that works collectively on problems		1	2	3	4
Learning from other family members experiences.....		1	2	3	4
Interaction with extension officers		1	2	3	4
Interaction with resource management and business consultants		1	2	3	4
Research trials (e.g. Wambiana trials)		1	2	3	4
Reading newspapers, magazines (e.g. Country Life, The Register)		1	2	3	4
Searching the internet		1	2	3	4
Interaction with accountants and financial advisors		1	2	3	4

C: Beliefs aligned with sustainability

The next section is interested in your perceptions to do with various aspects of your property management.

One of the easiest ways for us to compare your opinions to others is to read out a list of statements. Can you please tell me the extent that you agree or disagree with each of the following statements? (Where, **1** is “Strongly disagree”, **2** is “Disagree”, **3** is “Agree” and **4** is “Strongly agree”)

		S disagree 1	Disagree 2	Agree 3	S agree 4
Having to manage my operation during drought times is one of my <u>biggest</u> worries		1	2	3	4
I do <u>not</u> believe that continual grazing pressure on the landscape has lead to a		1	2	3	4

- loss of native plant and animal diversity over time
- An increase in interest rates is what I worry about the most 1 2 3 4
- Claims suggesting that there will be more unpredictable climatic events in the future due to climate change are exaggerated 1 2 3 4
- I participate more in natural resource management groups and networks now than I ever have 1 2 3 4
- It has always taken a crisis of some sort before I will change management 1 2 3 4
- The loss of short term income by destocking during drought times to increase my long term income is quite acceptable to me 1 2 3 4
- A decrease in cattle price occurring in the future is what I worry about the most 1 2 3 4

D: Place Identity

The next lot of statements are interested in the different meanings your grazing life and property(s) has for you and the social networks and roles you have in everyday life.

- (1) I will again read out a list of statements and if you could please rate to what extent you agree or disagree with each statement?

	S disagree 1 2 3 4	Disagree 1 2 3 Agree	S agree
I love thinking of new and better ways to improve the business	1 2 3 4		
As long as I am cattle grazing it doesn't matter where I am	1 2 3 4		
I love the solitude of being a grazier	1 2 3 4		
I do not feel like I have a very strong attachment to this property	1 2 3 4		
I like mustering cattle and working with animals more than I like other jobs on the property	1 2 3 4		
I am more attached to the amenities such as the house and yard on this property than the land itself	1 2 3 4		
I am mainly a cattle grazier because of the lifestyle	1 2 3 4		
I feel like this property is part of me and is in my heart	1 2 3 4		
I have options available to me other than being a cattle producer	1 2 3 4		
No matter how hard things get, I could never sell this property	1 2 3 4		

- (2) People can have a whole range of different roles in their lives. Could you please tell me how important each of the following roles are to you in your life?

	Not at all 1 2 3 Moderate Very
Paddock worker (e.g. day-to-day jobs like mustering and lick and water management)	1 2 3 4
On ground planner (e.g. yard and cattle movement decisions, orderings, costing)	1 2 3 4
Business development planner (e.g. develop business ideas, plans and initiatives)	1 2 3 4
Book-work or finance manager	1 2 3 4
Off-farm business manager or worker	1 2 3 4
Parent/family manager	1 2 3 4
Housekeeper	1 2 3 4
School teacher	1 2 3 4
Companion to parents or in-laws	1 2 3 4
Member or volunteer with a group, organisation or institution	1 2 3 4
Participating in workshops and training	1 2 3 4
Participating in political and industry meetings	1 2 3 4
Assisting other graziers with their management decisions	1 2 3 4
Resource condition monitoring and record keeping (e.g. property mapping, stock books, grass budgets)	1 2 3 4

F: Demographic information

The last few questions are interested in information about your education, age and income. We are interested in this information only in relation to how you answered the previous questions. I'd like to again emphasise that the information you give is confidential and will be treated with the utmost respect.

What is your highest level of education?

- Less than Grade 10
- Completed school to Grade 10
- Completed school to Grade 12
- University degree (completed or uncompleted)
- Agricultural college degree (completed or uncompleted)
- TAFE certificate (completed or uncompleted)
- Postgraduate degree (completed or uncompleted)

Do you mind telling me what age bracket you are in? 20-30__ 30-39__ 40-49__ 50-59__ 60-69__ 70 years or older

Do you have off-farm investments? Yes No

Approximately what proportion of your 07/08 income came from this property? _____ %

Do you: **(a)** own the title of this property outright, or **(b)** are you still paying if off?

Is your equity level on this property **(a)** above, or **(b)** below 85%?

Would you mind telling me approximately how much income your business produces (before tax) each year? <\$150K \$150K-\$500K \$500K-\$1M \$1M-\$5M >\$5M