TRANSFORMING THE EARTH:

A STUDY IN THE CHANGE OF AGRICULTURAL MINDSCAPES

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‘This ideological power…the chain of ideas in the heads of your citizens’:

‘A stupid despot may constrain his slaves with iron chains; but a true politician binds them even more strongly by the chain of their own ideas; it is at the stable point of reason that he secures the end of the chain; this link is all the stronger in that we do not know of what it is made and we believe it to be our own work; despair and time eat away the bonds of iron and steel, but they are powerless against the habitual union of ideas, they can only tighten it still more; and on the soft fibres of the brain is founded the unshakable base of the soundest of Empires.’

(J.M. Servan. 1967: 35)\(^1\)

The history of social movements is a history of people operating in the cracks of superstructures. Of using the energies generated at the margins of systems and organizations. Of exercising considerable imagination, critical thinking, subversion and undutiful behaviour to destabilize and de-construct the authority of the inevitable…Taking back control and joining with others in collective action to achieve change is at the root of concepts like participation and democracy. It finds its impetus in human agency and can transform people’s lives. As well as transforming views about oneself.’

(J.L. Thompson. 1996: 21)\(^2\)

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CANDIDATE’S DECLARATION

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university. To the best of the author’s knowledge, it contains no material previously published or written by another person, except where due reference is made in the text.

Charles Massy

Date: 20th February 2013

Wordage: The body of the thesis (Prologue to Chapter 10) comprises 96,956 words.
ABSTRACT

This thesis links three interconnected stories relevant to humanity’s future:

1. Exposition of a different form of agriculture;
2. An exploration of the nature of transformational change; and
3. Revelation of a new way of regenerating Mother Earth via the melding of new and old knowledge.

A confluence of multiple and interconnected crises now threatens the self-regulating capacity of the planet and thus the future of humanity itself. Food security is one of these crises, placing agriculture front and centre in addressing this challenge. Agriculture is problematic because practices integral to industrial agriculture are known to inhibit the continuing provision of essential ecosystem services (including adequate healthy food and water). This thesis explores both the reasons why traditional agricultural practices fail, and the rise of a change-oriented new-organic agriculture that is taking their place.

The study population comprised seventy-nine innovative Australian farmers who have successfully developed ruminant-based, agro-ecological practices that cover broad areas of land. The challenge was to find how and why this group of agriculturalists undertook transformational changes in their practices. Preliminary investigation suggested farmers’ belief-systems were central to the answer.

Multi-method research based on critical, open trans-disciplinary inquiry was used to analyse interviews, documents, and historical material. The study focussed on the interconnection of language and metaphor, the role of discourses, and the power-knowledge nexus in the formation of personal psychological constructs.

A study of Western thought since 1500 revealed that an earlier organic view of the cosmos was replaced by science- and technology-based mercantile capitalism which led to an embedding of the mechanical metaphor in Western thinking. This metaphor regards nature as dead and passive, and something to be reconstructed, dominated, and controlled: as opposed to the ancient organic metaphor which saw the cosmos as a living female earth, to be nurtured and sustained.
Analysis of this metaphor shift revealed that major personal psychological constructs appear to drive society and land-use practices. Socially-embedded constructs have regularly been found resistant to change. *Mechanical* constructs, deeply entrenched and unrecognised by most farmers, are behind harmful land-use practices in Australia.

By contrast, analysis of the evolving regenerative agricultural discourse revealed startling differences in language and metaphor. Transformative agriculturalists have overthrown the mechanical metaphor and thinking for what is termed the new-organic. The new-organic is a bio-philic, earth regenerating and transformative frame of ‘mind’ with associated practices that combines *new* agro-ecological knowledge and rediscovered ancient knowledge (the pre-mechanical *organic*). This fundamental transformation involved farmers changing their personal construct systems.

Transformative agriculturalists had reflected on their situation and undertaken social learning within communities of practice. Here they exhibited different ways of learning, thinking and feeling, exemplified in their use of the *transdisciplinary imagination*: the bringing together of multiple knowledges in a synergy of new ideas.

Given the urgency of the sustainability challenge and the promise offered by a rapid shift to sustainable-regenerative land-use, these findings have major implications for agricultural practice and extension services. While transformative change cannot be forced, nevertheless the ground can be prepared for change.
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A thesis such as this could not be completed without an enormous amount of assistance from others.

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PROLOGUE

Michael McKernan in his book *Drought. The Red Marauder* recounts an interview between a journalist and a World War I returned soldier who had been placed on a soldier settlement block near Kulwin on the Victorian Mallee. It was just before Anzac day 1931, in the midst of both drought and the Great Depression. The man had been attempting for eleven years to farm his pitifully small 320 acres: half a square mile of poor, sandy country in a low rainfall region that had, when he took it up, been thick with mallee stems and roots. Mercifully unmarried, the man still lived in a hessian humpy; for blankets he had *Waggas* (wheat-sacks sewn together). He had never been able to buy clothes in that eleven years; threadbare khaki dominated his ‘wardrobe’. And while working seven days a week, daylight to dark, and with a mountainous debt, he lived on less than 25 per cent of his army pay (McKernan 2005: 2-4 – citing *The Argus*, 25\textsuperscript{th} April 1931).

The solider settler had virtually gone straight into farming on returning home after surviving the horrors of the Western front. He told the journalist ‘I would sooner do ten years at the War than one at the Mallee’. Yet the man refused to leave his land, even as his very soil capital blew away across the horizon. What was it that made him stay in a place he rated ten times worse than the Western front? Was it an immigrant’s, a political radical’s, or a poor man’s hunger for land? Was it a fierce desire for independence after the incompetent leadership and mindlessness of the war? Or did he just want to live the agrarian dream of being a self-sustaining yeoman farmer who could feed a family off his own land? Who knows. But this story reveals something central and of vital importance to this thesis.

Whatever his reasons, beliefs, values, his inherited or acquired attitudes, and/or his world views, it came down to the fact that it was the man’s personal psychological constructs\(^3\) that drove him on: drove him to stick out a living hell of suffering and utmost poverty.

\(^3\) n.b. Personal constructs or personal psychological constructs: a concept crucial to this thesis and based on the work of psychologist George Kelly. These comprise the personal psychological predictive tools that enable humans to represent the environment to themselves, to construe their reality (Kelly 1955). See Glossary, and Section 3.4.
This raises key questions regarding Australian land-use. The foremost of these include: ‘Why are our personal constructs so powerful?’; ‘Where have they come from?’; and ‘How did they evolve?’
CHAPTER 1 INTRODUCTION

1.1. Rationale for the Thesis

Today humanity is confronted by what has been described as a massive ‘sustainability challenge’; what Jane Lubchenco (1998) terms the eco-challenge. Overwhelming evidence reveals this challenge involves a confluence of multiple and interconnected crises that not only threaten the capacity of ecosystem services to continue sustaining humanity, but which places the very survival of the human species and its supporting biosphere in jeopardy.

Aside from the threat of an issue like climate change, the most pressing of the linked wicked problems of the sustainability challenge is global and local food security (or the ‘food challenge’ as Horlings and Marsden [2011] call it): of feeding an estimated human population of nine billion by 2050 with less ecological capacity to do so (and where food security can be defined as ‘the ability of the world to provide healthy and environmentally sustainable diets for all its people – Godfray et al. 2010: 2769). Even the most optimistic estimates calculate this would require increases in food production of at least 50% (The Royal Society 2009).

If the wicked problem of food security looms front and centre then so does agriculture, which is part of the problem of not just food security but the sustainability challenge itself. Agriculture’s crucial importance is highlighted in the title of Julian Cribb’s book The Coming Famine, in which he encapsulates the core nature of the wicked problem of food security. ‘The challenge facing the world’s 1.8 billion women and men who grow our food’ says Cribb, ‘is to double their output of food – using far less water, less land, less energy, and less fertilizer. They must accomplish this on low and uncertain returns, with less new technology available, amid more red tape, economic disincentives, and corrupted markets, and in the teeth of spreading drought’ (Cribb 2010: 13).

Contributing causes of this wicked problem are not only proving difficult to address, but in the nature of wicked problems, resolution to these problems is required by the very societies

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4 n.b. wicked problems: frustratingly complex, multi-dimensional problems that are often found at the boundaries of natural and social systems (Rittel & Webber 1973).
causing them. Exacerbating the problem, as Cribb points out, is ‘the confluence of many large and profoundly intractable causes that tend to amplify one another’ (Cribb 2010: 9).

One of these intractable causes is the problem that the dominant approach of modern industrial agriculture is known to be exacerbating the capacity of Earth to continue providing essential ecosystem services, including healthy and adequate food and water. Traditional extension approaches to inculcating less harmful practices seem to consistently fail. And therein lies the conundrum: that farmers’ attitudes and practices, which lie behind such issues as land degradation, are known to be deeply ingrained and hard to change, even in the face of evidence why they should do so.

This thesis postulates that while part of this constraint on change includes false conceptions of how the world and its social-ecological systems function (which in turn leads to non-sustainable human behaviour), the core issue appears to be the embedded power of personal psychological constructs and their organizational systems. This then influences how we socially construct meaning and reality. This in turn appears inescapably linked to the key factors determining our construction of meaning and reality. These factors appear to be the generators of the systemic failures causing humanity’s sustainability challenge: the counter-productive and/or destructive values and associated dominant technologies linked to modern industrial capitalism and its underpinning world-views.

This thesis set out to explore why an expanding group of Australian farmers who are successfully executing regenerative ecological practices using ruminant animals over broad areas (the emerging transformative discourse), were able to change and transform themselves and their practices. This change and transformation appears to yield startling results biophysically, ecologically, economically, socially, and individually. However, this thesis does not concentrate on the quantification of biophysical and economic change, but on the basis for individual psychological change.

Given that the resolution of wicked problems must come from within the societies causing them, then this proposed journey of exploration into transformation raises a key question. That is, if I can find answers to this process of transformation (defined as ‘a switch to a distinct new system where a different suite of factors become important in the design and implementation of response strategies’ – Marshall et al. 2012:1), do these answers have
implications for successfully addressing not just the wicked problem of food security, but also humanity’s wider issue of the sustainability challenge?

This seemingly audacious quest, therefore, seeks to take-up the ancient Greek incitement to wisdom: ‘Man [humans] know thyself!’

1.2. Of ‘Rat-Bags’ and the ‘Vegie-Garden’ Paradox: The Beginnings to a Thesis Journey

I conducted over 80 interviews in the course of researching this thesis. In a number of ways the recollection of the returned soldier in the Prologue captures the essence of what I was seeking to understand: from where, how and why are farming land-use practices and their underlying attitudes and belief systems derived? And conversely, why can they be so immovable in the face of the obvious need for change? These were questions that had long puzzled me. Indeed, I felt the questions were of such significance that I resolved to re-arrange my life and return to university so as to explore them properly. But why would I do this?

There were a number of connected reasons. Each year in the course of my previous work (sheep classing, ram-client servicing and wool marketing) I travelled up to 70,000 kilometres across Australia’s landscapes and across every state except the Northern Territory. Evidence of widespread and worsening land degradation was self evident (and clearly supported by the literature - Chapter 2).

Moreover, I realised this degradation was occurring in the face of multiple crises which were beginning to savagely impact human societies and the ecosystems supporting them across the globe. While it is clear poor agricultural land-use practices lie at the heart of the loss of many of our ecosystem services, at the same time it is clear there is an urgent need to change this, particularly given the fact that farmers routinely manage some 61% of the Australian land mass, and are responsible for 65% of its fresh water (Productivity Commission 2009).

Yet it is known that attempts to apply new remedies in the context of land degradation have been fraught with difficulty and disappointment. Part of the reason for this is because those that have sought to apply new remedies have actually been dealing with a group of complex
wicked problems, and so they have frequently either failed in their ‘change’ attempts or made things worse. As we shall see (Chapter 3), wicked problems are frustratingly complex because they contain many paradoxes. Not only do they call for social change, they have strong moral, political and professional dimensions (Rittel and Webber 1973; van Bueren et al. 2003; Conklin 2009). In short, wicked problems can’t be managed in a linear, top-down manner, which is how Western, reductionist scientific society attempts most solutions. Instead, I will argue that what is required is a transdisciplinary response (Brown et al. 2010a; and see Chapter 3).

Second, I came to realise that the story of farmer land-use attitudes and why they change or are resistant to change has many other complex dimensions to it. This realisation resulted from my extensive personal experience of nearly four decades in ‘the bush’, in business, and an involvement in the process of innovation (genetics, wool marketing, and R&D management). This was then combined with an extensive literature research and discussions with key informants (not to mention reflection on my early interviews). It was this combination of factors that finally led me to realise that a more holistic study of the origins of farming practice, beliefs and attitudes could provide answers that may assist change towards less harmful – and indeed to regenerative – land-use practices.

Third, the powerful role of personal psychological constructs in farmers’ thinking and behaviour became apparent when I reflected on my own behaviour. Having gained a degree in science (Zoology) and Human Ecology at ANU (and, following such an holistic and analytical education, one would presume gained an open, inquiring and flexible mind), in 1993 I attended one of the early courses involving new thinking on holistic grazing management: courses and thinking that have since spawned some of Australia’s leading innovative regenerative or sustainable land management practices. I even began to implement such strategies on our farm, but then did not persist with them. That is, at the very inception of a new and potentially sustainable land-use revolution I had missed the boat. I was subsequently to recognise this behaviour of mine in others. This ‘creep-back’ or ‘dis-adoption’ phenomenon raised further questions in my mind concerning adoption of new farming practices and the powerful cognitive factors at work preventing farmers from undertaking pro-active adoptive behaviour.
A key reason for my ‘creep-back’ was that I concentrated on my Merino sheep stud, based on innovative and different thinking (for a conservative Merino stud industry, that is), and using new biological and molecular-genetic knowledge. However, the result of my traditional farming practice across our landscape was that I amassed a large debt due to a prolonged spate of drought years (and largely through purchasing fodder), along with minimal enhancement of landscape productivity and function. I eventually realised that, notwithstanding the ‘success’ of the Merino stud, I had become trapped by a number of counter-productive, ecologically damaging constructs. I blamed the drought for my problems while our land suffered. Droughts, I believed, were abnormal, and so had to be ‘fought’ via purchasing fodder and other inflexible management strategies. A second construct concerned my lack of understanding of landscape function.

In looking back, it is clear that the root cause of my debt and landscape dysfunctionality was a collection of accepted but unexamined personal psychological constructs that I had either inherited from my traditional farming family; from peers in my district; or from mentors, scientists, and/or Department of Agriculture officers who reinforced the dominant paradigm of industrial agriculture. For example, I too had held onto livestock in case ‘this dry period’ would soon pass and we could all return to a ‘normal’ season.

Furthermore, I believed native grasses were inferior to introduced or ‘improved’ species in terms of production, which led to heavy investments in pasture ‘improvement’ despite frequent failures. And despite early training in holistic grazing management, I did not flexibly manage stocking rate to the country’s carrying capacity. I thought soils were resilient, needing occasional ‘top-ups’ of Sulphur and Phosphorous (based on laboratory soil tests). Yet, despite some training in soil science, I had little concept of soil biology and its important symbiotic role in agricultural production and sustainable practices.

So, in the words of Forest Carter, the education of this ‘little farmer’ had proceeded apace (Carter 2001). But it was two more puzzling experiences that finally convinced me that this issue of land-use change needed to be probed through an entirely different set of questions. Pat Francis, long-term editor of the Australian Farm Journal, told me how he had noticed that some farmers appeared to carry two constructs in their head at the same time. Such farmers would proudly show Francis healthy re-vegetated riparian corridors, but to view
these they had to travel through sprayed-out and bare or over-grazed cropping and pasture paddocks (Francis, pers.comm. 2009).

The second experience arose in my previous stud Merino business and extensive visits to clients across the Australian landscape. On such trips I had noticed what I call the ‘vegie garden paradox’. On visiting a farming family’s home I frequently observed a well-managed, healthy, chemical-free organic ‘vegie’ garden. Then we would leave the perimeter of the home garden en-route to work beyond, and outside the garden fence were piles of chemical drums behind machinery sheds, while the paddocks were heavily modified, sprayed and chemically fertilized examples of modern industrial mono-cultural farming. That is, such farmers appeared to hold at least two different and opposing views of reality in regard to how agricultural practices worked: these constituted distinct world views.

In short, it became evident that two key factors concerning either change or resistance to change in agricultural practices existed. The first was social: factors influencing farmers’ attitudes, beliefs and practices. The second was cognitive-affective: psychological constructs and beyond-conscious processes highly resistant to change. Clearly, what was involved were issues to do with deeply-held personal psychological constructs, adult learning, history, power connections (visible and hidden), habit, and much more. As one farmer expressed it, ‘the secret resides in that one square foot of real estate between our ears’.

1.3. Discovering the Research Question

Beginning a PhD after 33 years since attending university meant for me an intensive, crammed catch-up of new information, research and ideas that had accrued in my absence, and across multiple disciplines. It was as if, as a jackaroo, I had been pointed to a 10,000 ha paddock of thick mallee, and told ‘go find the 50 stray sheep’. I felt I was setting off with just a waterbag but neither a useful dog nor a compass.

However, as I continued to muster the strays into a mob, my research question clarified. Language is what defines us as humans: how it evolves in iterative, cognitive development; how we use it; how it is socially constructed; how it shapes our view of the world. This was my starting place.
Poet Adrienne Rich observed that ‘[i]f our language is inadequate, our vision remains formless, our thinking and feeling are still running in the old cycles, our process may be “revolutionary” but not transformative’ (Rich 1979, cited in Parini 2008: 23). In talking about ‘adequacy’ of language, Rich alluded to the power of language to influence thoughts, actions and transformation, or its converse. It was at this stage of my background research that I was led into the field of metaphors, and a rich, indeed seminal, paddock it proved to be. Three key statements immediately galvanised me. They emerged, in combination, as a key pathway of pursuit in this thesis.

The first came from the ground-breaking work by George Lakoff and Mark Johnson, *Metaphors We Live By*. In this the authors state that ‘our conceptual system is largely metaphorical’ and that metaphors ‘structure how we perceive, how we think, and what we do’ (Lakoff & Johnson 1980: 3-4). This was expressed more graphically, and in metaphorical terms, by Ray Ison, who stated that by exploring metaphors ‘we can make part of our language use “picturable” and thus rationally visible, publicly discussable and debatable, as well as socially useful as a practical resource’ (Ison 2005: 29). In other words, metaphors structure experience and are mutually constructed. Moreover, this involves a form of communication that allows participants to reconsider their worldview and so adjust the way that they categorize experience.

The second galvanising but directly linked concept came from anthropology and neuro-science and the work of Karen Watson-Gegeo. She stated that ‘not only is language metaphorical, but because of the kind of neural networks we build in our brains, thought itself is metaphorical’ (Watson-Gegeo 2004: 333). Taking this the next step, food systems theorist Kenneth Dahlberg stated in regard to a question on how to ‘alter the present trajectory of our agro-food system towards increasing degradation of the earth, transnational concentration, and inequities in distribution’, that we needed ‘new metaphors to describe our relationships to farming and food’. This, said Dahlberg, was because ‘metaphors touched us at deep emotional and aesthetic levels, and can thereby powerfully reconfigure how we experience and understand the world’ (in Campbell 1998: 57-58).

Finally there came the piece of ‘Aha’ relevance in regard to metaphors and the core of my thesis: of the capacity for transformative change in behaviour and land-use practices.
Building on Dahlberg’s observation and the work of Lakoff and Johnson, Richard Norgaard was more explicit: that ‘it is through enlisting new and extending old metaphors that we communicate evolving understandings and design new institutions’ (Norgaard 1995: 129).

Extending the link between metaphors and ‘the power of language to influence thoughts, actions and transformations’ (or its converse), linguist and political analyst George Lakoff stated that ‘[f]rames are mental structures that shape the way we see the world. We know frames through language.’ Crucially, Lakoff then concluded that ‘[b]ecause language activates frames, new language is required for new frames. Thinking differently requires speaking differently’ (Lakoff 2004: xv).

On reading Lakoff’s final sentence I realised this linked to metaphors and was central to my thesis: that here was a touchstone which was directly related somehow to embedded attitudes in agricultural practice, and to the capacity of people to change or to resist change. In turn I also quickly realised that this related to George Kelly’s Personal Construct Psychology (Chapter 3). Kelly summed this in his foundational text in 1955, when he stated that ‘[w]e create “meaning” through the formation of “constructs”: transparent patterns or templates which we attempt “to fit over the realities of which the world is composed”. Importantly, Kelly later concluded that ‘[t]he structure we erect is what rules us’ (Kelly 1955: 8-9; 126).

Lakoff’s concept of frames – ‘mental structures that shape the way we see the world’ – is analogous to Kelly’s personal constructs, but where a construct is a building block, and for example a political frame might have a number of constructs. Of fundamental importance is the fact language is integral to both, and, as Kelly alludes, the integration of construct-frame-language ‘is what rules us’. Here appeared to be another golden thread in understanding attitudes and agricultural land-use practice.

The next question in this pursuit of rabbits down warrens was ‘where do constructs come from?’ This was where the late 20th century sociological concept of ‘discourses’ emerged as the next element in shaping my thesis question (see Chapter 3 on discourses). The concept of discourses was particularly relevant because George Kelly did not focus on the social and historical factors that shape constructs, yet these two factors seemed crucial.
John Dryzek, in *The Politics of the Earth*, described a discourse as ‘a shared way of apprehending the world.’ ‘Discourses’, he said, ‘construct meanings and relationships, helping to define common sense and legitimate knowledge. Each discourse rests on assumptions, judgements, and contentions that provide the basic terms for analysis, debates, agreements and disagreements’ (Dryzek 2005: 9). Significantly, the last few words allude to the issue of a contestation of beliefs and world-views, and thereby to ideology, power issues, and their derivation.

Therefore, the concept of discourses not only made central the role of language, and of frames and personal constructs, but addressed the origin of these: including such factors as the social nature of meaning and values; ideology within society; and how the power-holding group/s determine the dominant ideology and society’s ‘truths’.

For this next gap I found relevant answers in the writings of two of the 20th century’s great contemporaneous scholars: Michel Foucault and Thomas Kuhn, and of Kuhn’s successor, Jerome Ravetz, along with the approach of ‘thematic discourse analysis’: analysis of text, practice and other material that revealed, through language, the thinking and ideas behind what was being said and done (Chapter 3).

### 1.4. Importance of the Thesis

A study of the literature concerning both agricultural innovation and innovation in general, along with material relating to adoption and extension of knowledge (Chapter 2), reveals that thinking in the field of adoption of innovations remains largely embedded in the traditional top-down approach. Further, such thinking infrequently considers major systems and world-view (or paradigm) changes as being particularly relevant. Yet world-view change would appear integral to the necessary transformative agricultural change that is required to address a nest of interrelated wicked problems (such as food security and land degradation) that are connected to deleterious land-use practices.

Furthermore, I found little relevant research work linking the origin of personal constructs in agricultural practice and attitudes to the role of discourses, and thereby to the issue of change or resistance to change. However, there exists useful leads and work in the approach of
holistic thinking and transdisciplinarity in addressing wicked problems. The role of collective learning (a type of social learning) across all the knowledge cultures also seemed highly relevant to my thesis question (see Chapter 3).

Barnett, in a recent comprehensive review of current extension and adoption approaches in Australian livestock management (and particularly relating to ‘best practice pasture utilization and natural resource management’), concluded that: ‘[d]evelopers of innovation in the livestock industry must shift their research focus toward obtaining a much deeper understanding of producer perceptions of problems and the attributes of solutions to these problems that will be more widely adopted. This insight can only be gained by an observational form of inquiry…[or] ethnography’. In the context of agricultural innovation and extension, Barnett described such inquiry as ‘a social research technique that is based on studying people’s behaviour in everyday contexts’ (Barnett 2007: 10; 97).

Barnett’s identification of this critical area in Australian (and indeed wider) agricultural research, extension and adoption, points to a major knowledge gap in this vital field. This presents an exciting opportunity for me to link the work of Kelly’s Personal Construct Psychology to the linguistic approach of Lakoff, and to the use of thematic discourse analysis (the latter using the combined lenses of the work of Foucault, Kuhn, and Ravetz). Through a qualitative, sociological research approach, based on me interviewing agricultural practitioners and innovators (combined with the collation of other discourse material), there seemed to be a great opportunity to get to the heart of what lies behind innovation in regenerative-transformational agricultural systems, and what lies behind adult learning, adoption and/or resistance to change. If I could discover new insights from this project, the significance of my thesis research is that it has the potential for new knowledge to lead to more rapid transformative change in ecological agriculture (and perhaps in even wider systems and spheres). Critical to this was me identifying the thesis question.

1.5. The Research Question and Thesis Narrative

Core Proposition: Cultural mental models, personal psychological constructs, and social discourses are what determine the different approaches of land-managers to their landscapes and social ecological systems, whether intransigent or courageous.
**Logic Behind the Research Proposition:**

(Step 1) Embedded discourses constitute blocks to change (Moore 2002).

(Step 2) Such discourses are comprised of personal psychological constructs (George Kelly 1955).

(Step 3) Personal constructs don’t fully encompass the effects of knowledge-power. So elements in Steps (1) and (2) above need to be encompassed under the umbrella of discourses.

(Step 4) Lack of learning/communication/adaptation occurs when a message clashes with, or is out of synch with, the recipient’s personal constructs and discourses.

(Step 5) Innovation and change in agricultural systems rests on people changing their personal constructs and discourses (Kelly 1955; Meadows 1997).

(Step 6) Transdisciplinary inquiry provides an innovative approach that includes collective learning (which incorporates reflexivity of one’s own constructs); open inquiry into other’s constructs, models, discourses; and the ability to thus learn iteratively from the experience/s.

**Concluding Proposition:** It would seem, according to the logic above, that the road from land degradation to agricultural regeneration is paved with cognitive-affective reconstructions. This thesis will now test this proposition. This is best expressed in the thesis question:

‘Regarding transformative change in regenerative agri-cultural systems, is there a closely integrated nexus between discourses, knowledge, power, communities of practices, and personal psychological constructs?’

**Thesis Narrative**

The structure for this thesis is depicted in Figure 1.1 (page 12). Chapter 2 provides background for the key issues surrounding the current global social-ecological crisis and
Australian land degradation. This chapter includes an examination of the issues around different approaches to both agriculture and innovation (adoption, change-learning).

Chapters 3 and 4 support the four ‘Results’ chapters (5 to 8). Chapter 3 deals with the ontological, epistemological and theoretical approaches I have taken to address the thesis question. These fall into a human ecological, holistic approach making use of different knowledge cultures. Chapter 4 addresses the methodology I use. This was largely ethnographic, where I become an anthropologist studying my own tribe. The open-ended interview questions were interpreted through adaptive, grounded theory. Of the four results chapters, Chapter 5 is an historical examination of prevailing Australian land-use attitudes and personal psychological constructs. The rest of the ‘Results’ chapters (6 to 8) devolve from this. Following the four results chapters, a discussion chapter ties the threads together (Chapter 9), and then I draw conclusions (Chapter 10).
As we are dealing with social-ecological systems and a substantial global wicked problem over-shadowing these, this thesis is designed to test, explore, and hopefully generate new insights into, for example, Jules Pretty’s bold assertion that ‘all the recent significant progress with sustainable agriculture involves both social and natural transformations’ (Pretty 2002: 28).

As stated earlier, this thesis is not designed to ascertain the bio-physical, ecological, economic and other changes occurring in transformative agriculture in Australia (though these are necessarily briefly referred to in describing the case studies; Chapter 4, Section 4.3; and Appendix 8). Instead, it focuses on the beliefs and personal psychological constructs of transformative agriculturalists (Chapter 7, Section 7.3). That is, as Australia appears to have an emerging group of agri-culturalists enacting transformative change, key questions I wish to probe include: How did such transformation occur? If this led to new land-use approaches, then how did this arise, and who initiated them? And why were these changes taken up? Finally, can such alleged personal transformations and their associated transformative approaches deal with the sustainability challenge now besetting society in the area of land-use?
CHAPTER 2 CONTEXT OF THE STUDY

This thesis concerns transformative change in agriculture. To set the thesis in context the first part of this literature review examines the global social-ecological situation and where agriculture (encompassing both food and fibre production) is positioned. Both the dominant discourse of modern industrial agriculture and the emerging discourse of an ecologically-based regenerative-transformative agriculture are therefore examined.

As learning and change in agricultural land-use practices is core to this thesis, the second part of the literature review examines the role of innovation and rural extension-adoption in Australia. This includes an examination of constraints on the growth of an emerging transformative discourse.

2.1. The Current Global Ecological Situation

*Humanity’s Sustainability Challenge*

As addressed in Chapter 1, agriculture will be front and centre in addressing the sustainability challenge: a confluence of multiple and interconnected social-ecological wicked problems or crises that threaten both the capacity of ecosystem services to sustain humanity and to address food security issues. The very survival of the human species also appears threatened.

Rockström et al. (2009) encapsulated this macro threat when describing how humanity is now in the *Anthropocene* epoch (‘where humans constitute the dominant drivers of change to the Earth System’; Crutzen 2002), and appear to have crossed at least three out of nine interdependent planetary boundaries within which humanity can safely operate. These three crossed boundaries comprise *climate change*, *rate of biodiversity loss*, and *changes to the global nitrogen cycle*. Humanity is rapidly approaching at least two more planetary boundaries: those of *freshwater use* and *land-system change* (Rockström et al. 2009: 13). The remaining planetary boundaries (also being approached) include *ocean acidification; stratospheric ozone; the phosphorous cycle; chemical pollution; and atmospheric aerosol loading*. The expansion of industrial agriculture since 1950 is seen as a major contributor to the rapid approach to, or crossing of, all but the last of these boundaries.
This macro approach is timely, as it enables the discussion of global sustainability to be seen in the context of disruptions to the equilibrium of the self-organizing system and self-regulating capacity of the planet ‘within which humanity has evolved and thrived’ (Rockström et al. 2009: 4; and see for example Lovelock 1979; 1988).

The concept that ‘planetary boundaries’ and critical thresholds when crossed could have disastrous consequences for humanity allows a clear focus on ‘choices and actions’ and thus on ‘governance and management’ (Rockström et al. 2009: 2). As agriculture is strongly implicated in deleterious planetary, ecosystem and local social-ecological impacts and boundary-crossings, its role is clearly vital in addressing the sustainability challenge and its bundle of wicked problems. However, as was also discussed in Chapter 1, wicked problems are frustratingly complex and multi-dimensional; are full of paradoxes; and can’t be handled in a linear fashion but instead require a transdisciplinary response. So, new and transformative responses will be required to those hitherto attempted. Concerning Solutions for a Cultivated Planet, Foley et al. conclude that ‘to achieve global food security and environmental sustainability, agricultural systems must be transformed to address both challenges’ (Foley et al. 2011: 338).

The massive social-ecological problem of the sustainability challenge consists of two elements: (i) a trio of key drivers that have precipitated the problem; and (ii) a range of social-environmental constraints that are complicating any attempted resolution.

**Key Drivers of the Sustainability-Challenge**

There are three key drivers that appear to have precipitated the ‘eco-challenge’. The first is over-population. A plethora of writers point to the unsustainable growth of the human population (UN 2011; Cribb 2010; Dyer 2008; Flannery 2008; Speth 2008; Diamond 2006; UN Population Division 2003; Tribe 1994; Meadows et al. 1972; Ehrlich 1971; and Malthus 1798). From over-population comes one of the major issues now confronting humanity: food security. As Cribb points out, this ‘stems from the magnifying and interacting constraints on food production generated as civilisation presses harder against the finite bounds of the planet’s natural resources combined with human appetites that seem to know no bounds’ (Cribb 2010: 8).
At the heart of the sustainability challenge is the second key driver: a dominant set of belief systems that undergird ‘modern industrial capitalism’, and which comprises the philosophical platform behind the exploitation of the earth’s resources due to humankind’s ‘boundless appetites’. Major components to this include the ‘Growth Imperative’ (Hamilton 2003; McNeil 2000; Bell 1978); consumer capitalism; and market and political failure (Speth 2008; Barnes 2006; Mandel 2006; Bowles et al. 2005; Hamilton and Dennis 2005; Hamilton 2003; Myers and Kent 2001; Friedman 1999; Oates 1999; Dryzek 1997; Scholte 1996; Ostrom 1992; Mishan 1967; and Polanyi 1944).

The third driver, which reinforces contemporary industrial capitalism, is a raft of world-views and values associated with dominant technologies. These key values, which have become entrenched since the European Enlightenment and the industrial and scientific revolutions, include: materialism (human needs being met via consumption of goods and services); anthropocentrism (that nature belongs to humans, not humans to nature); and contemporancentrism (a focus on the present and a discounting of the future). All this has led to a mechanistic view of nature linked to technocentrism (a belief that more complex, energy-intensive technologies, aligned with humankind’s inventiveness, will solve all problems and will deliver all human needs) (Shiva 2009; Speth 2008; Jackson 2005; Hamilton 2003; Fox 2002; Noble 1997; Postman 1993; Zerzan and Carnes 1991; Merchant 1980; Fry and Long 1977; and Baudrillard 1970).

As a result of the above drivers, humanity’s current ‘ecological overshoot’ is calculated to be 1.33 times its available resources. However, given current approaches to unsustainable living, by 2050 it is estimated that more than two planet’s worth of resources will be required to sustain humanity (Flannery 2008; WWF 2006; Global Footprint Network 2009, 2006; Kitzes et al. 2008; Wackernagel and Rees 1995; Rees and Wackernagel 1994; Vitousek et al. 1986).
Constraints to Resolving the Sustainability Challenge

This heavy ecological footprint now serves to constrain attempts at resolving the sustainability challenge (Speth 2008). At least twelve main constraining factors serve as the background constraints against which the thesis is set, and where, as we have seen, modern industrial agriculture is implicated as a causative agent in most of them.

These constraining factors include the nine interdependent planetary boundaries suggested by Rockström et al. (2009), and supported in the literature by numerous other authors (some notable reviewers comprising Cribb 2010; the IPCC 2007; FAO 2008, 2007, and 2006; ISC 2007; UN Secretariat of the Convention on Biodiversity 2006; WWF 2006; UNESCO 2006; MEA 2005a & b; Worldwatch Institute 2002; UNEP [UN Environment Programme] 2002; ISRC 1990; Pimental et al. 1991).

To these can be added three more fundamental socially-driven ecological constraining factors:

- **Peak Oil/Energy**: where the world is now close to the point of ‘peak oil’, just a few years away from ‘peak coal’, and probably only two decades from ‘peak natural gas’ (Cribb 2010; Gilbert 2008; Heinberg 2007; Hubbert 1956). What makes these statistics alarming is that much of the world’s population is dependent on oil for their food, as this energy source is the main driver of industrial agriculture (Giampetro and Pimentel 1994).

- **Socio-Economic and Socio-Political factors**: These include a widening gulf between rich and poor, the haves and have-nots; an ongoing erosion of democratic governance and popular control; and such issues as inequitable agricultural and trade barriers, subsidies, and the distortions in power and wealth due to corporatised globalisation (see, for example, Speth 2008; Barnes 2006; Mazoyer and Roudart 2006; Gabel and Bruner 2003; Greenfeld 2001; Scholte 1996; Clairmont and Cavanagh 1981; Barnet and Muller 1974).

- **Factors Relating to Cognitive Denial/Resistance to Change**: A focus of this thesis is resistance to changing clearly harmful practices, beliefs and values in agriculture, and which contribute to the imminent threat to the future of the human species. Therefore
this barrier - the cognitive and also affective (emotions, feelings, intuition, the beyond-conscious) – may be the greatest constraint of them all.

The above confirms that agriculture is central to addressing the wicked problem of food security and the larger issues connected to humanity overshooting critical planetary boundaries. Clearly, innovative new and transformative solutions are needed.

2.2. The Role of Agriculture

The challenge for agriculture is to double food production to meet population growth simultaneously as resources and ecosystem services continue to be destroyed or eroded (Foley et al. 2005; Tilman et al. 2002). This thesis examines the potential of livestock playing an integral role in this.

So, what are the contextual elements in the above scenario that are relevant to this thesis? Agriculture currently occupies about 38% of Earth’s terrestrial surface (livestock pasturelands around 26% of ice-free land): the largest use of land on the planet and humankind’s largest engineered ecosystem (Zhang et al. 2007; Foley et al. 2011). Concomitant with this, the period post-1945 saw a dramatic increase in food production which meant a significant decrease in the proportion of the world’s people that were hungry, despite a doubling of the human population (Godfray et al. 2010; FAOSTAT 2009; World Bank 2008).

However, from 1987 onwards human population growth began outstripping that of food production as the productivity gains of the post-1950s ‘Green Revolution’ reached their ceiling (Huang et al. 2002; Khush 1999; Conway & Toenniessen 1999; Conway 1997). Consequently, more than one in seven people today do not have access to sufficient protein and energy from their diet and so live a life of permanent or intermittent hunger whilst being chronically malnourished (such as lacking micronutrients; Godfray et al. 2010; Conway & Toenniessen 1999; Conway 1997). Driving this issue is population growth, which is behind the wicked problem of food security. A connected issue is increasing wealth in both developed and developing nations leading to higher consumption and higher demand for processed food, meat, dairy and fish. This further exacerbates food security issues (Godfray
et al. 2010; MEA 2005). Ironically, a number equal to those hungry are now over-fed (Godfray et al. 2010; Hawkesworth et al. 2010; Pollan 2006).

Summing the scenario on food production and security, Foley et al. state that ‘[r]ecent studies suggest that production would need to roughly double to keep pace with projected demands from population growth, dietary changes (especially meat consumption), and increasing bioenergy use, unless there are dramatic changes in agricultural consumption patterns’ (Foley et al. 2011: 337).

The constraints discussed in Section 2.1 (especially those relating to less available arable land, water and key nutrients) effectively means that more food needs to be produced from the same or even less land, and without severely affecting the environment; or what is called ‘sustainable intensification’ (Godfray et al. 2010; Royal Soc. of London 2009;). However, most of the major recent reviews concerning the issues of the sustainability challenge and food security predominantly see ‘intensification’ as coming from within the dominant industrial agricultural model, and are thus highly dependent on industrial technology (including biotechnology) (see, for example, Fedoroff et al. 2010; Conway & Toenniessen 2009; Huang et al. 2002; Beddington 2002; Khush 1999). While many see such technology as assisting sustainability goals, most of these leading workers see research-driven science delivering the answers (top-down solutions): hence calls for a technology- and scientist-driven new ‘Green Revolution’, a ‘greener revolution’, and even a ‘Doubly Green Revolution’ (Beddington 2010; Huang et al. 2002; Conway 1997). Few see solutions coming from the bottom-up: from farmers. What also seems to be overlooked in many of these leading reviews (which understandably focus on agronomic and crop production for food) is the role of agriculture in fibre production (particularly cotton and wool), and also of the capacity of broad-scale pastoralism\(^5\) in countries like Australia to sustainably produce increased meat for human consumption (and, as this thesis will reveal, also crops in a ruminant grazing situation).

There is, however, a growing group of workers in the sustainable agriculture field who have described pitfalls in fossil-fuel driven industrial agricultural practices and the associated top-down approach (see for example Jackson 2010; Scherr & McNeely 2007; Pretty 2002;\(^5\)

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\(^5\) n.b. By this is meant a minimum farm operation of 1,500 livestock units (see discussion p. 89).
Tilman et al. 2002; Allen 1993; Soule & Piper 1992; Berry 1977). Instead they recommend an ecological approach that also recognises farmer-driven innovation. This field, known under the rubric of *agroecology*, was originally regarded as a narrow scientific description (Wezel et al. 2009), but from the perspective of this thesis it is unarguably now a multi- and cross-disciplinary field. Francis et al. defined *agroecology* as ‘the integrative study of the ecology of the entire food system, encompassing ecological, economic and social dimensions’ (Francis et al. 2003: 100). However, fibres like cotton and wool are also grown off the same agricultural systems as food, and so for this thesis I adopt Gliessman’s definition of agroecology as ‘the application of ecological concepts and principles to the design and management of sustainable agroecosystems’ (Gliessman 1998). This thesis deals with farmer-driven innovation that is dependent on ruminant grazing animals, and which includes integrated livestock-crop and polyculture production. The Australian situation regarding both agriculture in general, and livestock in particular, will be covered in section 2.4.

**What Constitutes a Healthy, Sustainable, Non-Ecologically Harmful Agriculture?**

Given the crises of the sustainability challenge and food security, and given the disparity of opinions described above that separate into dominant (industrial) and emerging (regenerative-transformative) paradigms or discourses, it is important to describe what a healthy and sustainable agriculture looks like.

Agricultural systems are distinctive because their success and health is dependent upon the resources (particularly ecosystem and social) that they control or influence. Five types of resources or capital assets were typically recognised as being important: natural, social, human, physical, and financial (Pretty 2002; Pretty and Ward 2001; Costanza et al. 1999; Benton 1998; Ostrom 1998; Uphoff 1998; Putnam 1995; Bourdieu 1986; and Coleman 1988). More recently, and derived from the *Sustainable Livelihoods Approach*, two more capital assets have been added: political and spiritual (Love et al. 2011; Carney 2002; Conway et al. 2002; Nicol 2000; and Ashley and Carney 1999).

Directly relevant to this thesis are natural, social, human, political and spiritual capital (for an explanation of the first four see Love et al. 2011 and Pretty 2002; and for the spiritual see Love et al. 2011; Berry 2009, 1999, 1988; Gibson 2009; Delio et al. 2008; Moseley 2008;
The crucial components of **natural capital** provided by ecosystems are **ecosystem services**. Agriculture can both consume and provide ecosystem services. Those they consume include pollination, biological pest control, nutrient cycling and hydrological services, and maintenance of soil structure and fertility. The ecosystem services provided by agriculture include regulation of soil and water quality, support for biodiversity, and cultural services (like scenic beauty, education, and recreation), and carbon sequestration (Power 2010). Thus the negative effects of agriculture can also be described as **disservices**, and the chance of this increases with intensification of agricultural practices (Power 2010; FAO 2006b; Matson et al. 1997). These disservices are covered in Section 2.1 above.

The balance for agriculture has traditionally involved trade-offs between its provisioning services (production of food, fibre, bioenergy, space) and its regulating services (such as water purification, soil conservation or carbon sequestration – Power 2010; MEA 2005a and 2003; DeFries et al. 2004; Daily 1997). The object in a sustainable agricultural situation is to have a win-win situation. But this is not easy, given that the responses to land-use in complex-dynamic ecosystems are usually non-linear, and can easily cross unanticipated thresholds (DeFries et al. 2004; Gunderson & Holling 2002). Nevertheless, the agroecologists mentioned above and other workers have evidence that ‘win-wins’ are possible (e.g., Badgley et al. 2007; Pretty et al. 2006; Foley et al. 2005; DeFries et al. 2004). As DeFries et al. point out (2004: 256), balancing trade-offs in land-use ‘ultimately depends on societal values’, and it is such social issues that are a focus of this thesis in terms of what sustainable-regenerative agriculture means, and in building resilient agricultural systems. As Foley et al. conclude, sustainable land-use must ‘enhance the resilience of different land-use practices’ in ‘managed landscapes’, which means practices that ‘are more robust to disturbance and can recover from unanticipated “surprises”’ (Foley et al. 2005: 572). Therefore, we need to define the type of agriculture being examined in this thesis.
**Principles and Definitions of Sustainable-Regenerative Agriculture**

To render agriculture’s effects on social-ecological systems not just visible and understandable but also accountable, environmental historian Donald Worcester prescribed three principles for good farming:

1. It should make people healthier;
2. It should promote a just society; and

Hundreds of books and articles, and tens of thousands of words have been printed in attempts to define ‘sustainability’ and ‘sustainable agriculture’ (see for example Tilman et al. 2002; Hansen et al. 1996; Gold 1994; Lehman et al. 1993; AAC 1991; Lélé 1991; Beus and Dunlap 1990; Duesterhaus 1990; Poincelot 1990; Altieri 1987; Brundtland 1987; Redclift 1987; WCED 1987; O’Riordan 1985; and Douglas 1984).

Relevant to this thesis, two words need to be defined: sustainable and regenerative. The word sustain comes from the Latin sustinere (sus-, from below, and tenere, to hold) and means ‘to keep in existence’ or ‘maintain’ – which implies long-term support or permanence (Pretty 2002; Gold 1994). Concerning agriculture, Ikerd defines sustainable farming systems as those ‘capable of maintaining their productivity and usefulness to society indefinitely. Such systems…must be resource-conserving, socially supportive, commercially competitive, and environmentally sound’ (Ikerd, in Duesterhaus 1990:4; see also Tilman et al. 2002: 671).

Gliessman points out that the concept of sustainability ‘has an ecological basis’, and can be regarded as a version of the concept of sustained yield (Gliessman 2007: 17). The concept of ecosystem renewal is central to this thesis, which particularly examines regenerative innovative agricultural systems (see definitions below).

Most definitions of sustainable agriculture allude to the presumption and/or enhancement of the seven types of resources or assets mentioned at the start of the section above. Jules Pretty expanded these definitions to incorporate concepts of both ‘resilience (the capacity of systems to buffer shocks and stresses’ without breaking apart) ‘and persistence (the capacity of systems to continue over long periods)’ (Pretty 2008: 447). Pretty then went on to define four key principles for agricultural sustainability, all of which are directly relevant to the
investigations of this thesis and a regenerative landscape and systems approach by
agricultural innovators.

These principles are (i) the integration of biological and ecological processes, such as nutrient
cycling, nitrogen fixation, soil regeneration, allelopathy, competition, predation and
parasitism into food production processes;
(ii) minimizing the use of non-renewable inputs that cause harm to the environment or to the
health of farmers and consumers;
(iii) making productive use of the knowledge and skills of farmers so as to improve their self-
reliance and to substitute human capital for costly external inputs;
(iv) making productive use of people’s collective capacities to work together to solve
common agricultural and natural resource problems (Pretty 2008: 451).

The concept of regenerative agriculture is derived from the verb regenerate, from the Latin
regenerátus (made over, produced anew), and has a number of synonymous connotations: ‘to
effect a complete moral reform’; ‘to re-create, reconstitute, or make over, especially in a
better form or condition’; ‘to generate or produce anew; bring into existence again’
(Macquarie Dictionary 1995). This in turn links to a central theme of this thesis:
transformation.

Regenerative agriculture therefore implies an active rebuilding or regeneration of existing
systems towards previous, full or imagined health (including of degraded landscapes and
social-ecological systems). But it also implies an open-ended process: of ongoing
improvement. This can mean the rebuilding or regeneration of soil and soil fertility, and of
biodiversity more widely; the reduction of toxins and pollutants; the recharging of aquifers;
the production of healthier food; the replacement of external inputs; and the enhancement of
social capital and ecological knowledge (Berry 1997 (1996); Rodale 1984, 1946; Balfour
1976; Howard 1972, 1943; King 1911). The social-ecological in this context also needs to be
emphasised, particularly in an era of increasing corporatisation of agriculture as part of the
industrial model. Douglas highlights this key aspect of sustainable/regenerative agriculture,
which he says should extend to ‘promoting vital, coherent, rural cultures and encouraging the
values of stewardship, self-reliance, humility and holism’, and particularly ‘associated with
family farming’ (Douglas 1984; and see Pretty 2002).
As is discussed in Chapter 3 (Section 3.4), regenerative agriculture is deeply rooted in enabling the expression of nature’s capacity for self-organisation and the generation of greater complexity and emergent properties. It is this more open-ended regenerative view of agriculture that is the focus of this thesis via the examination of twelve case-studies.

2.3. The Dominant Industrial Agricultural System

*Characteristics*

Gliessman pointed out that conventional industrial agriculture is built around two related goals: the maximisation of production and the maximisation of profit (Gliessman 2007:3). Indeed, some authors use the term ‘productivist’ agriculture and ‘productivism’ to denote agriculture’s enmeshment with a dominant, state-supported agricultural approach, and particularly in developed nations. Lowe et al. (1993: 221) define ‘productivism’ as ‘a commitment to an intensive, industrially driven and expansionist agriculture with state support based primarily on output and increased productivity’. From here on my use of the term ‘industrial agriculture’ assumes that ‘productivist’ is implicit in its use. To date, this approach to agricultural production appears to have largely fed the increasing world population. However, serious questions have been raised as to ‘at what cost?’, and, ‘is it sustainable?’

Seven basic practices underpin conventional industrial agriculture and a concomitant heavy dependence on fossil fuel usage. Problems arose because these tend to be implemented and integrated (a) without regard for their unintended, long-term consequences; and (b) without consideration of the ecological dynamics of agro-ecosystems. The frequent result has been an intermeshing of counter-productive practices that are destroying social ecological systems, and which are full of inherent paradoxes (such as weed and insect resistance to chemicals and destruction of natural pest predators). These paradoxes appear to be largely ignored by practitioners and supporters of what is a powerfully dominant system (see, for example, Gliessman 2007; Shiva 2007, 1997, 1993; Kimbrell 2002; Brown 2001; Altieri 1995; Pretty 1995a).
The seven underpinning practices of conventional industrial agriculture identified by these and other authors comprise: (1) Intensive Tillage; (2) Monocultures; (3) Application of Synthetic Fertilizers; (4) Irrigation; (5) Chemical Pest and Weed Control; (6) Manipulation of Plant and Animal Genomes; and (7) Factory Farming of Animals (Pollan 2006; FAO 2005, 2002; Pimentel 2005; Pimentel et al. 1991; Carson 1962).

It is in the context of these seven underpinning practices or systems of industrial agriculture that issues of sustainable/transformative agriculture will be examined. The deleterious impacts of modern industrial agriculture are now well catalogued and will only be summarised here. The key point, as many historians and economists have demonstrated, is that if a society or civilisation destroys its healthy soils and their structure then that society invariably collapses (see for example, Montgomery 2007; Diamond 2006; Daily 1995; Hyams 1952 (1976)). The modern problem is that agriculture is not only the world’s largest industry, but at the same time the intensity of production has vastly increased (Pretty 2008; Robertson and Swinton 2005).

We now know that agricultural lands are among the most modified habitats in the world. Gliessman encapsulated the issue when he stated that the practices of conventional industrial agriculture ‘all tend to compromise future productivity in favour of high productivity in the present’ (Gliessman 2007: 8). The deleterious impacts are multiple (see Kitzes et al. 2008), comprising a key factor in the problem of ‘Ecological Overshoot’ and humanity’s heavy Ecological Footprint. Specifically, at least nine major deleterious impacts of industrial agriculture on our social-ecological systems (the last four specifically social) have been described. They comprise:

- **Unsustainable impacts on soil and loss of arable land** (Harrigan et al. 2002; Wood et al. 2000; Oldeman et al. 1991);
- **The widespread unsustainable use of scarce water** (Gleick 2003; Postel 1996);
- **Loss of Biodiversity**, which is a cornerstone of any healthy and complex social ecological system (Hazell and Wood 2008; Lindenmeyer 2007; Green et al. 2005; WRI 2005; Pimm and Raven 2000; Shiva 2000; Moffat 1998; Winston 1997; WRI, IUCN, UNEP 1992; Fowler and Mooney 1990; Kloppenburg 1988);
- **Unsustainable energy use in industrial agriculture** (Pimentel and Pimenel 1996);
• A contributing cause of climate change (Hazell and Wood 2008; Tilman et al. 2001; Vitousek et al. 1997; Matson et al. 1997);

• Industrially produced animal-based foods that contribute to chronic human diseases (as in Mad Cow Syndrome) (Harrigan et al. 2002; De Onis et al. 2001; DHHS 1988);

• Pesticides, agvet chemicals, and industrial fertilizers, which induce human health problems (Brussaard et al. 2007; Sait 2003; Harrigan et al. 2002; DHHS 1988; Albrecht 1975);

• Direct impacts of modern industrial agricultural practices on human health, which include food processing factory pollution; new strains of food-borne pathogens; and non-medical use of antibiotics for animals (Harrigan et al. 2002; DHHS 1988);

• Severe impacts on the functioning of healthy rural and human societies. These are due to the cumulative effects of overpopulation, large-scale industrial agriculture, and the combined impacts of destruction of the earth’s ecological systems and biodiversity, plus collateral effects on human health (Miller 2008; Tegtmeier and Duffy 2004; Grewell et al. 2003).

*The Green Revolution*

Internationally, the ‘Green Revolution’ was rolled out to the developing world by developed nations, their Non Government Organisations, and their large multinationals from the 1960s into the 1980s. It was described as the defeat of Paul Ehrlich’s touted population crisis, and the feeding of the burgeoning world population whilst providing a benign modernization of the less developed world (Kimbrell 2002; McNeil 2000; Shiva 1991, 1988; Ehrlich 1971). While larger quantities of food were produced, along with ‘modernization’ in developing countries, there were some serious unintended or unforeseen consequences.

Food production in the Green Revolution was dependent on large inputs of fossil fuel, industrial fertilizers, pesticides, herbicides and irrigation, and with non-water inputs supplied by large multinational companies (McNeill 2000; Kimbrell 2002). This in turn led to the rise of corporate control of both the seed industry and agribusiness. This shift (part of the wider emergence of the move from modernization to globalization, and which rapidly expanded across developed nations like Australia) involved a new power relationship, centred on disempowerment of local farming and ecological knowledge; increased wealth disparities and
social friction – including class, ethnic, and religious conflicts; the worldwide sale of petroleum-based fertilizers, pesticides, weedicides and US-made farm tools, and also pharmaceuticals; and serious ecological and social problems (Spielman et al. 2010; Kimbrell 2002; McNeill 2000; Allen 1993; Shiva 1993, 1991, 1988; Sharma and Poleman 1993). Accompanying these epoch-shattering shifts was an equally fundamental shift, that: ‘working with and within ecological systems was replaced by subjugation and conquest’ (Kimbrell 2002: 3-4; and D’Emden et al. 2008).

Conservation Agriculture

Due to past soil erosion resulting from excessive tillage and exposure of soil to wind, ‘Conservation Tillage’ practices were evolved and began to be popularised in the latter stages of the ‘Green Revolution’. They were variously labelled ‘no-tillage’, ‘direct-drilling’, ‘minimum tillage’ and/or ‘ridge tillage’ (Hobbs 2007; Utz et al. 1938). This was aimed at minimum soil disturbance and the maintenance of a residue of vegetable matter cover on the soil. This technological development arose because other industrial agricultural practices adopted post World War II under conventional tillage had increasingly begun to cause a variety of problems. The result from the 1980s to the present was the global adoption (initially in developed nations) of what is intriguingly called ‘Conservation Agriculture’ or ‘CA’ (Kassam et al. 2009; Hobbs et al. 2008; Hobbs 2007; Knowler and Bradshaw 2007).

Conservation Agriculture is ostensibly based on the goal of enhancing natural biological processes above and below the ground, and is meant to be characterised by three sets of linked principles, comprising: (a) continuous minimum mechanical soil disturbance; (b) maintaining permanent organic soil cover; and (c) diversified crop rotations (annual crops) or plant associations (perennial crops) (Kassam et al. 2009; Hobbs et al. 2008; Hobbs 2007; Derpsch & Benites 2003).

The Emerging ‘Green’ Industrial Paradigm based on Conservation Agriculture

When the United Nations Food and Agricultural Organisation (FAO) formally adopted Conservation Agriculture in 2002, an imprimatur was placed on this development as the next crucial phase in the evolution of industrial agriculture. This was because the move was heralded as a turn to the ‘sustainable’ by mainstream agriculture, and as ‘a fundamental
change in production system thinking’ (FAO 2011; Kassam et al. 2009: 292; Hobbs et al. 2008). Some evidence tends to support claims of sustainability. These include reduced soil damage, increased soil health and the building of organic matter (Mazvimavi & Twomlow 2008; Shaxson et al. 2008; Hobbs 2007; Stewart 2007; Doran & Zeiss 2000); natural system nitrogen provision and the liberation of plant nutrients and micronutrients from the soil (Boddey et al. 2006; Flaig et al. 1977); and other alleged benefits, along with improved yields and lowered costs of production (Friedrich et al. 2009; Kassam et al. 2009; Gan et al. 2008; FAO 2008; Blackshaw et al. 2007; and Mariki & Owenya 2007).

Nevertheless, it must be noted that these claims are made by comparing Conservation Agriculture practices to those of previous conventional industrial tillage agriculture and older traditional farming practices rather than to emerging agroecological and regenerative practices (Ernstein et al. 2008; FAO 2008, 2001; MEA 2005a; WDR 2008; and IAASTD 2008; Landers 2007; Pretty et al. 2006; Derpsch & Benites 2003).

The incorporation of Conservation Agriculture’s principles are still within an industrial agriculture paradigm, as key elements of industrial agriculture are still at the heart of practiced Conservation Agriculture in countries like Australia and the United States. Therefore the shift to a new ‘production system thinking’ is not transformative. That is why Conservation Agriculture still appears to generate many of the same problems as conventional agriculture (such as soil compaction, necessitating corrective systems such as ‘controlled traffic’, ‘flotation tires’, and ‘precision agriculture’; Hobbs et al. 2008; Derpsch & Benites 2003).

This exposes the use of the word ‘Conservation’ concerning practices still within an industrial paradigm. This issue goes to the heart of a key theme of this thesis: the role of language in discourses (including relationships between knowledge and power). Like ‘clean coal’, Conservation Agriculture would seem to be a clever piece of re-framing a discourse.
2.4. The Australian Situation

The situation in Australia parallels that globally, except for the fact that extensive industrial agriculture has only been practiced here for a little over 150 years. The rapidity and extent of ecological destruction is therefore profound in its scope and impact.

The current status of land degradation in Australia and its historical status has been extensively studied and recorded, and only needs to be summarised here. Relative to their return, but intrinsic to their occupation, Australia’s livestock grazing industries are ‘land hungry’. Thus, while 61.5% of Australian land-use is devoted to agriculture (4,728,429 km²), of this component cropping, horticulture, and irrigation comprise less than 2%. The vast bulk of agricultural land (around 95%) is devoted to grazing natural vegetation, while some 2.5% is utilised by dryland grazing and ‘improved’ pastures (192,213 km²) (ABS 2008, 2006; Malafant et al. 1999; Conacher and Conacher 1995; Daily 1995; FAO 1980). This thesis focuses on the latter segment (including native pastures) in the non-rangeland areas (see ‘Research Design’ in Section 4.3).

Due to the ancient, unique and diverse nature of the Australian landscape and its co-evolved biota, its soils generally are shallow, fragile, lacking in nutrients and organic matter (relative to many European and North American soils), and exhibit slow to nil renewable capacities even when undisturbed. Most are also underlain by salt. When this is combined with a dry and irregular climate, limited water resources, and high evapo-transpiration rates, then inappropriate land-use practices can have damaging consequences (see references below).

As a result, most of the grazing ecosystems in Australia are significantly damaged and in an ecologically and economically unsustainable state (Productivity Commission 2009): some estimates putting the degree of ‘significantly disturbed’ grazing land at 60% (Lenzen & Murray 2001). In terms of the physical, chemical and biological restructuring of the Australian environment, there has been widespread decline in soil nutrients and soil structures for many and varied reasons (ABS 2008, 2002; Pannell 2008; Australian State of the Environment Committee 2001; Malafant et al. 1999; Williams 1995; Lines 1991).
Poor agricultural practices are thereby implicated in most of the known plant and animal extinctions in Australia in the last 200 years; in the 50% loss of forest cover since 1788; in the equally alarming reduction in woodland cover from 23% to 15% of the country (Malafant et al. 1999); and in massive weed invasion and the deliberate introduction of damaging feral animals (National Rangelands Management Working Group 1994). The literature on this area and concomitant soil erosion and salinity (as indicated above) is extensive, including by such well known authors as Lindenmeyer 2007; Lines 1998, 1991; O’Connor 1998; Flannery 1994; Heathcote 1994, 1983; Suzuki, in Lines 1991; Powell 1988, 1976; Bolton 1981; Rolls 1969; Serventy 1966; Marshall 1966; and Ratcliffe 1938. It is also summarised in such government reports as Productivity Commission 2009; ABS 2008; DEWHA 2008; ‘State of the Environment 2001, Federal Department of the Environment and Heritage; and Gretton and Salma 1996.

All this equates to a heavy ecological footprint. Because of these impacts, and when combined with population growth, it has recently been estimated that by the latter half of the 21st century Australia will no longer be able to adequately feed itself (Stokes & Howden 2010; Sheales & Gunning-Trant 2009). However, in recent studies on food security issues, not only were Australian farmers not consulted, but according to Knight (2011: 1), other government reports ‘deny any concern for food security at all, explicitly dismissing the significance of primary producers for Australian food provision’ (see, for example, Moir & Morris 2011 and Sheales & Gunning-Trant 2009). Moreover these government reports offer no practicable ideas to assist farmers to mitigate such impacts as global environmental climate change, despite acknowledging this and similar issues (such as water and labour shortages).

Nevertheless food security and the sustainability challenge loom larger than ever despite such ‘neutral’ government positions. Moreover, despite the voluminous evidence of land degradation in Australia and the nation’s heavy ecological footprint, such ecologically deleterious and maladaptive behaviour still continues despite extension work aimed at preventing it. This raises a central question for this thesis: Why deleterious land-use practices continue, despite such evidence? It would appear that most farmers are not economically suicidal, perverse, nor wilfully destructive of the environment, and so cognitive-affective factors are strongly suggested as the cause of degradation of land and ecosystem services.
What is clear is that other factors linked to the ideology and power of a dominant discourse must also be examined.

**The Need for an Alternative, Livestock-Based Approach to Agriculture in Australia**

*Sustainable-Regenerative Agriculture*

In regard to regenerative agriculture, Pretty stated in 1995 that ‘[t]here is now strong evidence that regenerative and resource-conserving technologies and practices can bring both environmental and economic benefits for farmers, communities and nations’ (Pretty 1995a: 1). By 2002 he was even more emphatic, stating that ‘many stories of successful transformation…are based on sound methods and trustworthy evidence’, and that a ‘sustainable agriculture revolution is now helping to bring forth a new world’ (Pretty 2002: xiii). Pretty is supported by numerous other authors in the sustainability-agroecology area. Notable ones include Shiva 2009, 1993; Buck et al. 2007; Gliessman 2007, 2001, 1990; Kimbrell 2002; Li Wenhua 2001; Andersen 2000; Zimmer 2000; Savory and Butterfield 1999; Röling and Wagemakers 1998; Daily et al. 1997; Vitek and Jackson 1996; Altieri 1995; Garvovich et al. 1995; Allen 1993; Kinsey & Walters 1993; Jackson 1980; Fukuoka 1978; Berry 1977; and Albrecht 1975.

*Population, Food and Livestock*

Grasslands and rangelands globally contribute to the livelihoods of over 800 million people; they employ 1.3 billion people; and they create livelihoods for 1 billion of the world’s poor. Moreover, livestock products contribute ~ 30% of the protein of human diets (53% in industrialised nations) (Neely et al. 2009; Rowlinson et al. 2008; Gill and Smith 2008; Sousanna 2008; Steinfeld et al. 2006). With 58.5% of its 7.6 million square kilometres of land privately owned, and the vast bulk of this devoted to ruminant grazing of natural vegetation, Australia is at the forefront of extensive ruminant grazing practices (ABS 2006).

Given the projections of human population increase and the other drivers and constraints discussed in 2.1 above, it is clear that livestock must play a key role in helping to both feed
the growing human population and in the regeneration of landscapes and their functions so as to support such food production. However, while this thesis examines the contention that ecologically-based or ‘holistic’ grazing of livestock and their injection of energy and nutrients into a landscape appears to be central to a transformative-regenerative broad-acre agriculture in Australia, it is becoming clear that proponents of Conservation Agriculture do not place a high regard on the role and place of livestock in their practices: especially in developed regions like Australasia and North America where the focus is on ‘sustainable production intensification’ (Kassam et al. 2009; FAO 2008; Hobbs et al. 2007; Derpsch & Benites 2003; FAO 2002). Illustrating the low priority of livestock in Conservation Agriculture systems was the recent 5th World Congress of Conservation Agriculture in Brisbane (September 2011). Out of 267 papers and presentations, only 12 (4.5%) were focussed on livestock in agricultural systems (WCCA/FSD 2011).

In terms of ‘human-edible return’ (human-edible outputs divided by human-edible inputs), livestock make a major contribution to food security by converting those fibrous feeds not used by humans into livestock products which meet human needs (Gill and Smith 2008). In the face of an energy supply deficit post peak-oil, it appears both unlikely and ethically indefensible that an increasing component of human protein will come from industrialised pig, poultry and feedlot cattle enterprises based on high energy/high fossil fuel inputs. It would therefore appear that ecologically complementary, naturally grazed, genetically efficient ruminants on rangelands and pastures could play a key role in this area (Leng 2005).

In a discussion of the desirability or otherwise of the need for livestock in agricultural systems it is impossible not to conflate this issue with that of the meat eating debate. First, it would seem from discussion of the food crisis above that pursuing the Western philosophy of veganism and the drive to eliminate livestock from agricultural systems is both practically impossible, and, for 1.3 billion people dependent on livestock-based agriculture (the vast majority in poor, less developed countries), problematic.

Nevertheless, concerning livestock production, it is critical to differentiate between animals run on grasslands, rangelands or mixed landscapes and polycultures, and those run intensively under an industrial system of high energy, high fossil fuel inputs, and built around intensive grain-feeding in feedlots. The latter industrial system of CAFOs (Concentrated Animal Feeding Operations) is both energy intensive and energy inefficient; polluting of the
environment; cruel to animals; implicated in modern lifestyle diseases; and destructive of food quality and rural societies (Pollan 2006; Fairlie 2010; and for example Altieri 2007). In both sustainability and ethical terms, it appears difficult to justify this seventh strand of industrial agriculture.

The second, separate issue concerns livestock run on pastures, rangelands and in mixed farming and marginal situations. The apparent negative here is resultant land degradation and destruction of ecosystem services. However, as Altieri points out, ‘the problems lie not so much with the animals themselves as their use as food’, but rather poor management: ‘the ways the animals are incorporated into today’s agrosystems and food systems’ (Altieri 2007: 269).

This thesis concerns the reversion of land degradation, and as Altieri, Gliessman, Pretty and many other writers and researchers testify, balanced livestock management can be crucial to ecological health, soil health, community and human health, and food production (Altieri 2007; Gliessman 2007; Pollan 2006; Savory and Butterfield 1999; Pretty 1995a).

2.5. Innovation, Extension-Adoption, Learning, and Change

A Conundrum

It is clear from the discussion in the Sections above that agricultural practices in Australia need to radically change if Australian farmers are to meet the food security challenge in a sustainable manner. Yet despite evidence of land degradation and other deleterious environmental impacts, and despite constraints on traditional industrial agricultural practices, the development or adoption of sustainable-regenerative practices is poor. But there is a conundrum. Despite significant investment since the 19th century in research and extension by Australian agricultural organisations and government bodies, the adoption of basic practices like soil conservation (let alone agroecological practices) appears to be slow, and to occur only at the margin of farming communities. In the meantime land degradation continues apace (Black 2000; Guerin 1999; Guerin and Guerin 1994; Thompson and Scoones 1994; Reeve & Black 1993; Barr and Cary 1992; Carr 1992; Sachs 1992; Chambers and Ghildyal 1985).
As stated earlier, given that most farmers are not economically suicidal, perverse, nor wilfully destructive of the environment, the issue therefore appears to be a lack of adoption-learning and change, and thus concerns the cognitive-affective domain. That is, resolution of the conundrum resides in farmers’ heads. It is the area of learning and transformative change that therefore is central to this thesis. The second part of this chapter addresses issues in this area.

**The Process of Innovation**

There is a vast literature concerning innovation and the adoption or diffusion of ideas, inventions, technologies and practices: both more generally, and particularly in regard to agriculture. Those most relevant to this thesis include: Jennings et al. 2011; Pannell and Vanclay 2011; Christensen et al. 2006; Pannell et al. 2006; Geels 2002; Black 2000; Pretty 1995; Guerin and Guerin 1994; Thompson and Scoones 1994; Feder and Umali 1993; Barr and Cary 1992; Carr 1992; Marsh and Pannell 1988; Feder 1985; Dosi 1982; and Rogers and Shoemaker 1971.

According to Rogers, an innovation is an idea, practice or object that is perceived as new by an individual or another unit of adoption (Rogers 1995: xvi). In conventional Australian agriculture major technological innovations include the introduction of the *Cactoblastus* beetle and the *Myxomatosis* virus; of disease-resistant wheat cultivars, *Bos indicus* cattle and superior Merino sheep strains; and of subterranean clover, superphosphate and trace elements in fertilizers (Campbell 1980).

In management, where there is a plethora of research on innovation in business, innovation can apply to systems for managing organisations and people, infrastructure, product, and so on (Van de Ven 1988). But innovation can also involve major systems innovation in what has been called ‘a transition from radical to evolutionary innovation’ (Abernathy and Utterback 1988: 27; Rosenbloom and Cusumano 1988).

What is relevant to this thesis from the business world regarding systems change is the phenomenon of ‘punctuated equilibrium’: an alternation between relatively long periods of stability/equilibrium – when stable infrastructures permit only incremental adaptations – and brief periods of qualitative, metamorphic change or revolutionary upheaval (Gersick 1991,
and see Fig. 9.1 page 274). This goes beyond Shumpeter’s famous theory of innovation and economic development, where ‘creative destruction’ is the vehicle of growth (a radical type of innovation - Schumpeter 1934). Instead, workers like Abernathy and Clark more exactly describe the pattern that Thomas Kuhn in *The Structure of Scientific Revolutions* characterised for the ‘advancement’ of science (Abernathy & Clark 1988; Kuhn 1962, 1970). Gersick reveals that the phenomenon of *punctuated equilibrium* is seen at multi-levels. It occurs at the individual level (Levinson 1978); in groups (Gersick 1989); in organisations (Abernathy & Clark 1988; Tushman & Romanelli 1985); in scientific fields (Kuhn 1962); in biological sciences (Gould 1989); and in a grand theory of complex organisation of life and systems (Prigogine & Stengers 1984, and Maturana & Varela 1992 – and see Chapter 3, Section 3.4, on self-organizing systems). Of particular relevance to this thesis, this pattern is also articulated by Gunderson and Holling (2002) to describe cyclical processes of maturity, collapse and rebuilding in natural and social-ecological systems.

**The Process of Adoption-Diffusion**

For every successful innovation to be taken up there needs to be effective adoption-diffusion, or the overcoming of constraints to this (Rogers 1995). Everett Rogers defined *diffusion* as ‘the process by which an innovation is communicated through certain channels over time among members of social systems’, and where a social system is ‘a set of interrelated units that are engaged in joint problem-solving to accomplish a common goal’ (Rogers 1995: 5; 15, 23). Rogers sees the process of diffusion as including ‘both the planned and the spontaneous spread of new ideas’, and it involves ‘a kind of social change’: an alteration that ‘occurs in the structure and function of a social system’ (Rogers 1995: 5-6).

Relevant to this thesis is Rogers’ point that as diffusion involves a social process where subjectively perceived information about a new idea is communicated, then ‘the meaning of an innovation is thus gradually worked out through a process of social construction’ (Rogers 1995: xvii). Rogers sees adoption as more than a linear transfer approach (for example, a change agent informing a potential adopter), and he talks of ‘a convergence model’. This emphasises diffusion as a process of ‘information-exchange among participants in a communication process’ (Rogers 1995: xvi). As we shall see in Chapter 3, this corresponds closely with Wenger’s concept of *Communities of Practice*. 
Types of Adopters, and ‘The Chasm’

According to the Rogers model, in the diffusion of a new innovation the degree of innovativeness of the target social system can be measured (innovativeness being defined as ‘the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system’; Rogers 1995: 252). Increased innovativeness is the main objective of extension-diffusion or change agencies because it indicates overt behavioural change: which, as Rogers says, is ‘the ultimate goal of most diffusion programs, rather than just cognitive or attitudinal change’ (Rogers 1995: 252-3).

Based on much research since the 1930s, a typology of adopter categories has been delineated. Distributed over time, this exhibits a regular Gaussian curve (Rogers 1995 and 1961; Deutschmann and Fals Borda 1962; Ryan and Gross 1943), and the categories represent a unique psychographic profile: ‘a combination of psychology and demographics’ which makes their responses different from those of other groups (Moore 2002: 11; Rogers 1995). This consistency in itself hints at a common cognitive and/or affective function and distribution (relevant to this thesis and the concept of personal psychological constructs). The distribution of key adopter categories can be seen in Figure 2.1, page 37.

Further research across a range of industries and businesses has also revealed that an innovation or new idea often doesn’t progress in uptake much beyond the early market (innovators and early adopters), and that it requires different skills in extension to re-package a message so that the mainstream market will uptake (Powell 2008; Franklin 2005; Moore 2002). The gap between the two segments, where the rest of the target population watches to see what happens or is simply unaware of the innovation, is called the chasm (Moore 2002). Innovations that exhibit this interrupted adoption trail (discontinuous innovations) require people to change their current mode of behaviour. They are therefore of interest to this thesis, in which major systems and transformative change in agriculture is being studied.
**Transformative Agriculture and the Adoption Process**

In addressing the need for agricultural technologies and practices to be locally or regionally adapted and ‘fitted to place’, and the fact that agricultural systems evincing the above characteristics tend to be ‘multifunctional within landscapes and economies’, Pretty (like other authors) stresses the indivisibility of innovation and the development and implementation of sustainable regenerative landscapes (Pretty 2008: 451; see also Walker and Salt 2006: 147).

However, the problem for this thesis is that the accepted adoption-diffusion model is largely predicated on technology adoption, which raises serious questions as to its applicability to the transformation of agricultural systems. A shift to transformative-regenerative agriculture appears to involve the adoption of new and complex social-ecological approaches and understandings. A different thinking and learning appears to be associated with such changes, as also does personal transformative change in areas to do with values, beliefs, habits, customs, knowledge, world-views and even spiritual beliefs. In simple terms, such a shift in agricultural practice is *revolutionary* and comprises paradigmatic change in what is termed...
the *software* aspect (Kuhn 1962, 1970). It is not *evolutionary* (Moore 2002), nor concentrated on the *hardware* aspect (Rogers 1995; Eveland 1986; and Thompson 1967).

**Agricultural Innovation and Rural Extension and Adoption in Australia**

What sets the social space of agricultural innovation apart from traditional work on innovation diffusion is the fact that, in Australia, the overwhelming proportion of decision-makers still come from the family unit (Pannell et al. 2006; LWA 2005; Feder and Umali 1993).

The development and evolution of extension approaches to agricultural innovation in Australia broadly paralleled the increasing industrialisation of Australian agriculture from the 1860s. Progress of the latter can be traced as each of the seven defining practices of industrial agriculture were sequentially added over time (discussed in Section 2.3 above), until all coalesced after World War II. As this development in farming approaches and practices evolved, so did approaches to extension (Coutts and Roberts 2011; and Coutts et al. 2005).

The phases of this development include **Phase 1**, technology- or linear-transfer (‘top-down’) extension, where landholders were receptacles of ideas from scientists and extension agents (Coutts 1997; Davidson 1981; Reddy 1979). This was a process that can metaphorically be categorised as the *conduit* or *hypodermic* approach (Russell and Ison 2000). The rise of corporate globalisation and the dominant role in R&D (and recently in extension also) of the giant transnational petro-chemical, agribusiness, pharmaceutical and biotech companies in agriculture not only extended the old conduit/hypodermic approach, but also escalated the importance of the role of knowledge-power and its relationship to change or non-change.

**Phase 2** saw the emergence after World War II of *Farming Systems Research* and extension. This was linked to developments in computers and models of systems, and was instigated by leading international research centres (Petheram & Clark 1998). However, despite popularity amongst scientists, this approach appears to have had little impact on agricultural practice-change (Donelly et al. 2002; Petheram & Clark 1998; Coutts 1997; Vanclay 1994; Bawden and Packham 1993).
Following earlier, largely reactive and ineffective government work in such areas as soil and water conservation (Millar 2011; Campbell 1994; Bawden & Packham 1993; Chamala & Mortiss 1990), the next phase, from the 1980s, ushered in *Natural Resource Management and Environmental-Sustainable Agriculture Considerations*, including in agricultural extension. This had greater impact on the future course of agricultural extension following increased involvement, resources and extension into broader regional, catchment and national efforts by governments and Non-Government Organisations. Developments in whole farm planning, via private extension, paralleled these developments also (Millar 2011; Pannell & Vanclay 2011; Cary et al. 2001; Campbell 1994; Vanclay & Lawrence 1994) – notable examples being the Potter Farm Planning and Yeoman Keyline concepts.

A major shift in Natural Resource Management-oriented extension occurred with the advent of *Landcare* in the 1980s (see Chapter 6, section 6.5) (Millar 2011; Chamala & Mortiss 1990; Campbell 1994; Curtis & Robertson 2003; Roberts 1993; Carr 2002).

The result of all these developments by the 1990s and into the 21st century was a widespread recognition that regional delivery of Natural Resource Management programs and services appeared to be more effective than previous approaches in the adoption of new land management practices: centred around a shift to extension based on group interaction and learning (Millar 2011; Moore 2005; Chamala & Mortiss 1990); to a much greater emphasis on participative approaches and social learning; on planned capacity building of local and regional communities; and thus the learning of farmers within them (Freeman 2011; Coutts et al. 2005; Millar & Curtis 1999).

*Agricultural Extension: Soft Systems Thinking and learning*

Due to the above developments, many of the significant changes in agricultural extension from the 1980s could not have occurred without a major shift in understanding and thinking about complex systems and different forms of knowledge. Crucial in this was an understanding of the term ‘farming system’ to mean ‘the purposeful management of farming, including the economic, social and cultural determinants of this behaviour’ (Perkins et al. 2003: 35). By implication (though not widely recognised nor acknowledged) this meant farming systems should be more than merely productivist, but instead be sustainable-regenerative (both socially and ecologically).
Systems thinking approaches – a key epistemological platform of this thesis (see Chapter 3) - began to influence extension thinking and practice in the 1980s, and particularly with the further refinement of soft systems thinking (Coutts & Roberts 2011; Packham 2011; Petheram & Clark 1998; Ison et al. 1997; Checkland 1988, 1985). In regard to extension it meant a facilitation of processes of joint social learning (Röling 1992, 1990, 1985; Leeuwis 1993: 56 - cited in Vanclay 1994), and an acknowledgement that some farmers not only carry much of the knowledge integral to solving their own problems, but could even be the originators (the innovators) of the new knowledge necessary to solving the new problems (see Pannell et al. 2006; and in Pannell & Vanclay 2011; SELN 2006). Leaders in this new thinking in Australia were people like Bawden, Packham, Ison, and Russell (Packham 2011; Ison and Russell 2000; Bawden and Packham 1993).

The key issue for extension aimed at triggering change in Natural Resource Management and sustainable agriculture is that, as McLusky points out, ‘[t]he farming system is a classical soft system which includes human systems, ecological systems, and financial/economic systems’. Therefore, ‘because systems are the manifestations of the paradigms within which they exist’, then triggering change means changing paradigms (McLusky 2001: 4). And therein lies the problem: paradigms are notoriously hard to change. Not only are most extension workers unskilled at doing this, but the situation is complicated by the world-views of extension agents themselves (Andrew 2002). These factors appear to largely explain why ‘extension’ has failed to avert land degradation. Yet from my preliminary research it was clear at the same time that paradigmatic changes were beginning to occur in regenerative/transformative agriculture from the 1980s.

**Agricultural Extension: Pluralism and Capacity Building**

A broad range of extension theories, literature, methods and tools were therefore on offer by the 1990s, and were being proffered around the Australian ‘bush’: a phase described as pluralism (Coutts & Roberts 2011, after SELN 2006). Contributing to this were structural adjustments in agriculture in general, and primarily an increasing withdrawal of public-funded Research Development & Extension and a concomitant replacement of state and federal government bodies in the extension space by multi-national and agri-business services and also by private extension agencies or farm management consultants. Many of these were
agents for the powerful corporations behind industrial agriculture (Coutts & Roberts 2011; SELN 2006; Black 2000; Vanclay 1994). This pluralism then seemed to coalesce under the popular extension phrase of the 2000s, ‘capacity building’.

A key thrust out of the preceding phases of extension development was greater support of social learning processes and participatory methodologies ‘as a means to enabling practice change’ (Coutts & Roberts 2011: 23). After 2000 this culminated in the move to capacity building and community engagement, which involved a combination of different approaches or models (each springing from earlier extension approaches - Coutts & Roberts 2011; Coutts et al 2005; Macadam et al. 2004; Coutts 1997). This was strongly connected to the withdrawal of state agencies as the main agents of extension, and their increasing replacement by other providers (Coutts & Roberts 2011). This in turn led to a wide range of public/private partnerships as the private sector assumed a greater role in extension. Natural Resource Management regional bodies, like Catchment Management Authorities, began assuming greater roles and leadership in this area.

Capacity building involving adult farmers learning in rural areas, by implication, means strong engagement with communities of practice (Macadam et al. 2004). This group facilitation-empowerment model is predicated on an approach that does not dictate specific learning activities but rather, via facilitation, helps motivated groups or individuals to discover/explore their own learning needs and approaches via action learning and social learning. As we shall see in subsequent chapters, this model appears of most relevance to this thesis and its investigation into transformative change by agricultural innovators.

**Shortfalls of Contemporary Agricultural Extension in Australia**

Despite all the recent positive work in Natural Resource Management-environmental-sustainable agriculture approaches in Australia, it is widely recognised that the uptake of long-term sustainable farming systems is slow, and that land degradation, loss of biodiversity, and similar deleterious environmental impacts caused by farming practices is largely unmitigated (Barnett 2007; Black 2000; Thompson and Scoones 1994; Sachs 1992; Chambers and Ghildyal 1985; and see earlier sections this Chapter). This conundrum exists at the same time as there is increasing recognition of more complex landscape and land-use
problems and issues, and the simultaneous realisation that rural communities need new forms of information knowledge, learning and extension.

Part of the reason for the slow adoption of sustainable practices is that much of the thinking in sustainable agriculture and Natural Resource Management work is not fully freed of the implicit top-down, traditional linear ‘transfer of technology’ approach by many workers in the rural extension field, and as exemplified, for example, by Pannell & Vanclay 2011; Pannell et al. 2006; Black 2000; Kilpatrick et al. 1999; Vanclay 1994 (and see the criticism of Carr 1995). A factor in this, as Thompson and Scoones point out, is that ‘[f]armers are seen as either “adopters” or “rejectors” of technologies, but not as originators of either technical knowledge or improved practice’ (Thompson and Scoones 1994: 59).

Pretty has observed that the most strongly motivated innovative farmers are ‘self-mobilisers’. They initiate action or participate in initiations independently of external institutions so as to change systems (Pretty 1997). As we shall see in later chapters, this observation appears to more than hint at the reality that formal, institutional, directed, and/or traditional extension may have little relevance to the initial (and probably later) stages of the process of grass-roots driven, transformative change amongst agricultural innovators.

2.6. Constraints to Change

Non-adoption appears to be a multi-factorial problem (Guerin 1999). Consequently, constraints to adoption and change have been grouped by Guerin under three broad categories: (a) constraints concerning the characteristics of the innovation itself and/or the developers of the innovation; (b) the role of extension agents and the transfer process; and (c) issues concerning the land-user him/herself, such as personality, education level, and degree of motivation (Guerin 1999). It is the third factor that I believe is crucial in this examination of transformative change in agriculture. Much of the work concerning the first two factors relates largely to the traditional linear adoption model of technology transfer (Pannell & Vanclay 2011; Pannell et al. 2006; Guerin 1999; Guerin & Guerin 1994) and not to the ‘head space’ of farmers: to social, cognitive and affective factors within land-users themselves. This is not to deride the real and practical impact of the nature of innovation and technologies; of economic factors; of temporal factors (e.g., land degradation being hard to
perceive over time); or of structural factors (such as property size and cost of infrastructure investment; Barr & Cary 2000).

As Vanclay says, ‘[f]arming is a social and cultural activity. Farm management practices are physical manifestations of cultural expressions which are loaded with social meanings and significance, they are not solely technical’ (Vanclay 2011: 65). To such social constructivism are added the elements of ‘the social, political, geographical, historical and community contexts in which an individual exists’ (Andrew et al. 2005: 3). As a consequence, to fully understand the process of innovation in farming – especially in the area of transformative ecological agriculture that appears to challenge the dominant industrial paradigm – then we need to understand the social context of agriculture, the social nature of farming, and socio-cultural and socio-psychological nature of farmers (Vanclay 2011).

Evidence from segmentation studies of farmers in a particular region, and in regard to a particular land use, reveal that different types of attitudes to innovation and change are highly context specific and largely explained by socio-economic, cultural and individual factors (Barr & Cary 2000). That is, farmers are incredibly diverse; they come with different personalities, education, experience, degrees of motivation, aptitudes and learning styles; and they come with different belief systems, world-views, personal constructs and ideologies, values and fears: fears to which are attached different cognitions, emotions and feelings. The heart of the issue for this thesis, therefore, appears to be major paradigm and world-view changes among farmers.

It is because of the complex mix of factors listed above that I chose in this thesis to focus on the derivation of farmers’ personal psychological constructs; the power of personal constructs, attitudes, paradigms and world-views; and the cognitive, beyond-conscious and affective processes of farmers in relation to encountering new information, ideas, and paradigms. This is addressed in the next chapter.

Conclusions

In the face of the sustainability challenge and environmental constraints described in Section 2.1 above, and of the acknowledged deleterious impacts of industrial agriculture (Section
2.3), we know that if humanity is to confront the wicked problem of food security then agriculture has to double production but with less resources and in the face of enormous constraints.

In addition, we are confronted by a major conundrum: land degradation continues apace in Australia despite readily available knowledge and much investment over decades in traditional extension efforts aimed at avoiding such malpractice. Evidence points to the need to explore more deeply the cognitive-affective, historical and social factors behind such ongoing apparently recalcitrant behaviour. That is why this thesis specifically focuses on examining farmers’ heads: that ‘one square foot of real estate between their ears’.

Given that preliminary research revealed that the shift by farmers to regenerative agricultural practices seemed to result from some form of personal transformational process, the issue of the derivation and change of farmers’ personal psychological constructs emerged as the central question of this thesis. To undertake such a qualitative inquiry required a unique sociological-qualitative research approach and methodology. Chapters 3 and 4 will now outline this approach.
CHAPTER 3   TACKLING WICKED PROBLEMS

3.1. The Nature and Conundrums of Wicked Problems

What is meant by wicked problems in the context of this thesis are the large social-ecological problems that cannot successfully be treated with traditional linear, analytical approaches. By contrast, ‘tame’ problems may still be technically complex, but can usually be tightly defined so that a solution can be readily identified or worked through (APSC 2007; Coyne 2005; Van Bueren et al. 2003; Rittel and Webber 1973). Wicked problems are often found at the boundaries of natural and social systems (the social-ecological), and harmful social ecological impacts of modern agriculture (such as land degradation) constitute a typical wicked problem (Van Bueren et al. 2003; Dryzek 1997).

The core nature of wicked problems is that they contain multiple paradoxes, and also two further factors: (a) solutions to these problems prove highly resistant to resolution because existing traditional or accepted modes of problem-solving tend to be ineffectual; and (b), because wicked problems are generated by the societies that created them, resolution to their multiple nature requires changes in those societies. This presents the ultimate paradox, as these societies appear incapable of undertaking such change (Brown 2010a; Brown et al. 2010a; Christensen 2009; Van Bueren et al. 2003; Rittel and Webber 1973). A further problem is that embedded ‘power’ seems ubiquitous.

Also complicating matters is the diversity of views and values held by organisations, groups, and individuals involved in complex social-ecological challenges such as Australian land degradation. However, it is known that collaborative and networking strategies can sometimes be the most effective in dealing with wicked problems that have many stakeholders and amongst whom power is dispersed (Brown 2010a; Brown et al. 2010a & b). But we also know of the capacity of individuals to have substantial impact (Roberts 2000).

As Brown points out concerning Rittel and Webber’s contention that each wicked problem is uniquely grounded in place and time, ‘it is only through critical examination of this groundedness that wicked problems can be resolved’, and because ‘the source of the problem is also the basis for its resolution, an underlying paradox’ (Brown 2010a: 63).
Agriculture is grounded in not just local but wider regional social-ecological systems. It would therefore seem that if changes in agricultural practices affect the fundamental features of self-organising, sustainable agro-ecological and therefore social systems, then a grounded approach to tackling the wider massive wicked problem of the sustainability challenge seems a sensible place to begin. However, as Brown et al. indicate, ‘[a]n active imagination is a primary requirement if one has to deal with paradox, uncertainty and complexity’ and particularly if we are ‘to overcome the current cultural limitations in the way we think’ (Brown et al. 2010b: 3).

In the context of regenerative agriculture and transformative change, this thesis addresses a grounded approach by individual farmers to wicked problems (such as the degradation of land and ecosystem services), and to their use of the ‘transdisciplinary imagination’ (Brown et al. 2010a). I now describe the ontological and epistemological approach to both this thesis and how such an approach can be applied to wicked problems.

**Dealing with the World and its Complex-Dynamic Systems**

**Ontology**

Ontology concerns the study of ‘being’, the nature of existence, the structure of reality (Crotty 1998: 10). As research is connected to basic philosophical issues, it cannot be theory-neutral (Layder 1998: 22). Therefore, it is imperative to declare up front the ontological approach of this thesis.

This approach can be termed ‘Realism’: an ontological assertion that realities exist outside the mind; that these realities can be apprehended, in some cases ‘measured’, and agreed upon by different people (Crotty 1998). The ontological approach of this thesis therefore assumes that a self-organising bio-physical reality exists. However, this ‘reality’ is dependent on how humans construct meaning about it (a combination of realism and relativism). This brings us to epistemology.
Epistemology

This means ‘what it means to know’ (Crotty 1998: 6), or the validity of knowledge (Layder 1998: 22). Crotty states that epistemology ‘involves knowledge….and embodies a certain understanding of what is entailed in knowing, that is, how we know what we know’ (Crotty 1998: 8). In turn, concerning the two concepts of ontology and epistemology, Layder says: ‘the nature of reality and how we come to know it – are inextricably bound together and this has important implications for the manner in which we go about research, the sorts of research problems we pose and the questions we ask’ (Layder 1998: 23).

The epistemological approach to this thesis assumes that knowledge or meaningful reality is socially constructed, and is not some empirical objectivism waiting to be discovered. That is, in Crotty’s words, ‘[m]eanings are constructed by human beings as they engage with the world they are interpreting’ (Crotty 1998: 43). Importantly, this social construction (not creation) of reality does not say it is not real.

The relevance of a social constructionist approach to my thesis was summed by Peter Berger and Thomas Luckman. They contended that ‘reality is socially constructed and that the sociology of knowledge must analyse the process in which this occurs’ (Berger and Luckman 1966: 13). Combining the inseparable twins of ontology and epistemology, therefore, the approach of this thesis can be described as ‘the bio-social construction of reality’.

To this ontological-epistemological stance is added the theoretical perspective of critical inquiry: research that does not merely seek to understand but to also challenge, even change ‘the constructed meanings that culture bequeaths us’ (Crotty 1998: 59). Such an inquiry approach, therefore, is not ‘value free’. It has an ethical and values base to exposing such issues as inequity and power hegemonies, and thus creating spaces for change. A ‘critical inquiry’ approach allows a researcher to ask ‘is it fair, is it just, is it ethical?’ (Dyball 2010: 273). Such an approach allows the use of critical forms of research to call current ideology into question, and it implies active, transformational enquiry. As Ison points out, these new forms of inquiry replace objectivity with responsibility (Ison 2005: 24). This emphasis on the personal being embedded in the cultural is also fundamental to this thesis, because, as Miller bluntly phrased it, environmental problems caused through agricultural practices are ‘rooted in individual consciences and morality’ (Miller 1983: 133).
(Figure 3.1 depicts the macro ontological, epistemological and theoretical framework and approach to this thesis for tackling wicked problems).

**FIGURE 3.1. Scaffold of Macro Approach for Tackling Wicked Problems**

*(An Open Transdisciplinary Inquiry)*

- **Ontology**
  - HUMAN ECOLOGY PERSPECTIVE
    - (Comprising a biophysical and social-ecological ‘Reality’)
  - But the meaning of this ‘Reality’ is socially constructed

- **Epistemology**
  - A BIO-SOCIAL CONSTRUCTION OF REALITY
    - Critical Inquiry

- **Ethical**
  - A DRIVING ETHIC
    - Fairer, more just and ethical regenerative transformative agricultural systems

*Figure 3.1*

**Holism: An Epistemological Stance for Grappling with the Ontology of a Complex, Dynamic World and its Systems**

Both Plato and Aristotle intuitively grasped some of the essence of holistic thinking when, in different ways, they famously alluded to the idea that ‘the Whole is more than the sum of its parts’ (McDowell 1973; Scaltsas 1990). Holism in fact means more than this. In relation to social ecological systems, holism (from the Greek, *holos* – *all entire, total*) encompasses the idea that the component parts of such systems do not, alone, determine or explain the system’s properties (Smuts 1936). Therefore, holism is the antithesis of Cartesian ‘reductionism’: the idea/belief that a complex system can be explained by reduction to its fundamental parts.
In outlining his ideas on holism and rejecting reductionism back in the 1920s, Jan Smuts anticipated not just elements of modern physics but also modern systems thinking when he articulated that he saw the world not as substance but as flexible changing patterns. ‘Wholes have no stuff, they are arrangements’ he said. ‘Science has come round to the view that the world consists of patterns, and I construe that to be that, the world consists of wholes’ (Smuts 1952: 290).

In anticipating a fundamental principle that runs through this thesis – nature’s capacity for self-organisation towards greater complexity - Smuts took ‘natural selection’ to another, non-mechanistic level: ‘holism’. He argued that change wasn’t random or arbitrary or governed by mechanical, material necessity, but rather was an ordered striving towards unity. That is, Holism was the determining force of Nature, and matter, life and mind were ever present. ‘We are indeed one with Nature’ he stated. ‘Her genetic fibers run through all our being…’ (Smuts 1973/1926: 336). This theoretical position was similarly adopted by Lovelock, who postulated that our planet itself functions as a self-regulating, self-organizing system (Lovelock 1979, and 1988).

Nevertheless, holism or holistic thinking is by itself only one particular knowledge tradition. If a truly open approach to the construction of knowledge is to be adopted (what is called ‘collective learning or knowledge’ – and which is considered here fundamental to contending with wicked problems [see Section 3.4 on Transdisciplinarity]), then other currently understood knowledge traditions need to be considered and synthesised. Thus, while holistic thinking is seen as integral to more open inquiry, by itself it is not complete nor fully synthesising and transformative (Brown 2010a; 2008).

**Human Ecology and Holism**

Only by the 1970s did Human Ecology begin to more widely embrace physical and biological components, and then economic variables, and to work with a more multi-disciplinary perspective (Dyball 2005). As a result this inquiry area became embedded in an holistic approach which viewed human communities and populations as parts of the ecosystems of earth. This was a radical challenge to the then more homo-centric, sociological approach. Human Ecology today is formally defined by Marten as ‘the science of relationships between
living organisms and their environment’. Its perspective is ‘for problem solving….focused on interactions between human societies and the environment’ (Marten 2001: 1; xv).

The founder of the Human Ecology faculty at the Australian National University, Dr. Stephen Boyden, in 1992 summed up the core approach of Human Ecology in what he termed ‘three inescapable and closely related aspects of reality’:

‘(1) Human beings are totally dependent, for their sustenance, their health and well-being and their enjoyment of life, on the underlying set of biological systems and processes which operate in the biosphere, in its ecosystems and in their own bodies….

(2) Every human situation, at the level of individuals, small groups or whole societies, involves continual interplay between biological and cultural elements, and the outcome of this interplay is often very important for human health and well-being or for the ecosystems on which we depend.

(3) Human culture has influenced, and now increasingly influences, the biological processes on which we depend and of which we are a part….’ (Boyden 1992: 4-5).

These three elements - the basis of Boyden’s *Biohistorical* framework and his ‘integrative approach to Human Ecology’ - comprise the main structural and indissoluble ontological and epistemological warp yarns of the fabric of this thesis. To Boyden’s perspective I include Dyball’s addition: that Human Ecology also concerns processes that limit and change complex interacting social-ecological systems over time, ‘including whether or not current arrangements are sustainable’ (Dyball 2010: 273).

**A Systems Thinking Approach**

A systems approach allows us, using mental models, to grapple with the dynamics of highly complex systems: how they behave and especially change over time (Dyball 2005: 4, 8), and an area not fully addressed by earlier Human Ecology work.

The bridge to move from conceptual models of systems dynamics (built out of mathematics, engineering and cybernetics in an attempt to begin apprehending dynamic interplays) to problem-solving in the real world was ‘soft systems thinking’. This was largely pioneered by the British management scientist Peter Checkland and his ‘Soft Systems Methodology’ (Checkland 2000; Checkland and Scholes 1990; Checkland 1981; Dyball 2005; Ison et al.
1997; Meadows et al. 1972; see also Forrester 1974 and 1971; Meadows et al. 1974; and Meadows and Meadows 1973). Compared to ‘hard’, ‘soft’ implies taking into account the subjective element of human understanding and its role in identifying aspects of a situation as being ‘a system’. As Bawden explained, ‘in the “soft” approach…the systemicity is transferred from the world to the way of investigating the world’ (Bawden 1991: 2362).

When Checkland’s revised holistic thinking approach was combined with the core of a Soft Systems approach, an active research and learning cycle was able to be implemented. This related experience to ideas, so that ‘the interaction between the rhetoric and the experienced reality is the subject of conscious and continual reflection’ (Checkland 2006: A7). This clearly challenged a reductionist scientific approach and because Checkland and Scholes (1990) denied that ‘systems’ exist in real life. Instead they contend that these are powerful conceptual tools with which to understand complex processes and interactions. It is this evolving Soft Systems approach that appears to have wider applicability to social ecological wicked problems.

By the 1990s the Soft Systems approach had evolved from a merely analytical approach into an active research process that was meant to facilitate action. This thesis, in combining a critical inquiry approach with such an holistic and soft systems approach, also has as its basis a change-inducing approach resulting from rigorous analysis and active learning. Thus the recursive action-research cycle or learning cycle of Checkland has a close synergy with the Kolb experiential learning cycle (an element discussed in this thesis, see Section 3.4, page 63), and also with the work of Holling, Gunderson and peers (see, for example, Gunderson & Holling 2002). Out of this has emerged an approach known as Resilience Thinking, which applies to the way such complex-dynamic social ecological systems function and react in the face of disturbance.

**Resilience Thinking**

The school of resilience thinking primarily deals with the sustainability of social ecological systems. Of relevance to this thesis and the nature of the discourses that farmers carry in relation to land-use, climate, soil and other key components of the agricultural social ecological systems, the approach of resilience thinking addresses one of the key drivers of non-sustainable human behaviour: that some of humanity’s damaging treatment of the Earth
and its systems is derived from a basic misunderstanding; that we have misconceptions of
how the world works and so apply inappropriate farming, development and other models to it
(Walker & Salt 2006: 4).

Holling used the term *resilience* in an ecological context in 1973 so as to describe the
maximum amount of disturbance that a system could experience but still return to the same
equilibrium (Holling 1973). By 2002 Gunderson and Holling had articulated a more dynamic
theory of the principles and functions of social ecological systems in their book *Panarchy*
(Gunderson & Holling 2002: 21).

Using *Systems Thinking*, Holling et al. (2002) based their ideas on a wide spectrum of recent
work in fields ranging from developmental biology and genetics, evolutionary biology,
physics, mathematics, economics, ecology, computer science, management and other fields.
After categorising four existing and incomplete worldviews or myths (discourses) held by
people regarding how ‘nature works’, they came up with a dynamic Systems Thinking
approach that, in their view, seemed to best explain the functioning of complex-dynamic
social ecological systems, and to partly resolve key paradoxes involved. This ‘emerging’
view they called *Nature Evolving*, which, they said, is ‘evolutionary and adaptive’;
incorporating the new thinking in ‘[c]omplex systems behaviour, discontinuous change,
chaos and order, self-organisation, non-linear systems behaviour, and adaptive evolving
systems’ (Holling, Gunderson & Ludwig 2002: 14).

In the process, and to address adaptive change and learning, they used an heuristic model as
a metaphor of the adaptive cycle. As noted above, this has significant similarities to both
Kolb’s and Checkland’s recursive learning cycles (Gunderson & Holling 2002; Allison &
Hobbs 2004).

This positive platform can thus be merged with a knowledge inquiry approach that seems to
best apply to addressing wicked problems, and which rests on holistic thinking and the triple
integrated platform of ontology, epistemology and a firm ethical approach: that of
Transdisciplinarity as put forward in Brown et al. 2010b. (See Figure 3.3 page 64).
3.2. From Normal to Post-Normal Science

One cannot travel the ontological and epistemological path described above without addressing the core issues of how humans generate scientific and other knowledge, and how this relates to such issues as power, language and ideology, and also how best to approach wicked problems. That is, we need to examine what is the dominant knowledge-power nexus in modern society, and especially in agriculture.

**Thomas Kuhn and Normal Science**

Thomas Kuhn’s revolutionary book of 1962, *The Structure of Scientific Revolutions*, exposed some of the mythology surrounding ‘science’: of it being purely objective; that ‘science’ knows what the world is; and that scientific knowledge is not subject to social construction and is value free. In the process Kuhn also exposed the sociological nexus of knowledge-power, and the politics of science.

Kuhn, who defined normal science as ‘research firmly based upon one or more past scientific achievements, achievements that some particular scientific community acknowledges for a time as supplying the foundation for its further practice’ (Kuhn 1970: 10), noted that normal science ‘often suppresses fundamental novelties because they are necessarily subversive of its basic commitments’ (Kuhn 1970: 5). Implicit in normal science’s assumptions, therefore, is that the scientific community knows what the world is like: that an objective reality is out there just waiting to be discovered and described.

Kuhn also popularised the modern use of the concept of paradigm. If normal science means research based on past scientific achievements which supply the foundation of a particular scientific community’s practice, then it is both the past exemplars or ‘concrete puzzle-solutions’ as well as the sociological achievements, traditions and practices around them that constitute a scientific paradigm or ‘particular coherent traditions of scientific research’: ‘the entire constellation of beliefs, values, techniques, and so on shared by the members of a given community’ (Kuhn 1962 [1970]: 10; 1973: 175).
In terms of knowledge-power, it is through studying a paradigm that a student scientist is inducted into ‘a like-thinking’ and thus powerfully constraining ‘club’ (Kuhn 1962 [1970]: 11), as, according to Kuhn, ‘paradigms provide scientists not only with a map but also with some of the directions essential for map-making’ (Kuhn 1970: 109). However, in terms of approaching modern wicked problems, such trained conformity of thinking ‘leads…to an immense restriction of the scientist’s vision and to a considerable resistance to paradigm change’: and because ‘normal science’s’ behaviour constitutes ‘an attempt to force nature into the preformed and relatively inflexible box that the paradigm supplies’ (Kuhn 1962 [1970]: 109, 65, 211).

Kuhn went on to show how new scientific knowledge overthrows old paradigms in a process of scientific revolution: part of the repeatable pattern or phenomenon known as ‘punctuated equilibrium’ (see Chapter 2, Section 2.5 and Fig. 9.1 page 274). However, the problem with the revolutionary mode of normal science is that in the new paradigm we have another version of the same restrictive and conformist approach to science and knowledge. In terms of the concept of self-organization, we can say that a scientific revolution still leaves the ‘deep structure’ of science intact; it doesn’t dismantle it and so is not a true revolutionary change (Gersick 1991).

Aside from exposing the limitations of normal science, Kuhn raised other issues of direct relevance to this thesis. The first is his concept of incommensurability: ‘that proponents of competing paradigms are prone to misunderstanding and misinterpretation’; that they ‘talk past’ ‘one another as they find one another’s conceptual positions and policy recommendations incomprehensible or absurd’ (Bednarz 2011; Kuhn 1973).

A second issue concerns language. Kuhn stated that scientists ‘who hold incommensurable viewpoints’ (and by inference, people in other fields who hold different world-views) can ‘be thought of as members of different language communities and that their communication problems’ can ‘be analysed as problems of translation’ (Kuhn 1962 [1970]: 175). That is, they hold different lexicons, or expressed another way, the word ‘paradigm’ can mean ‘a linguistic framework’.

Taking this further in one of his last papers, Kuhn recognised that language change was ‘cognitively significant’ (Kuhn 1993: 314), and he therefore opened a link to a key platform
of this thesis: George Kelly’s Personal Construct Psychology and how we negotiate daily reality and meaning in the world by using personal constructs. In other words, Kuhn linked a paradigm’s particular lexicon to scientists’ ‘mental modules’ which permitted them to learn to recognise different kinds of physical objects and other features of their environment. This connected membership of a speech community to ‘meaning’ within the community (Kuhn 1993: 315).

Bednarz took this a further important step when stating that the confusion and conflict inherent in the incommensurability of different paradigmatic scientists (and indeed it could be said, of people in general) ‘stem from the incompatibility of the core metaphors around which the intellectual contents of paradigms are organised’ (Bednarz 2011). As we will see directly (Section 3.4, page 71), metaphors and their link to core constructs and cognitive function are central to this thesis.

**Post-Normal Science**

The co-originator of Post-Normal Science, Jerome Ravetz, stated that the ‘activity of modern natural science has transformed our knowledge and control of the world about us; but in the process it has also transformed itself; and it has created problems which natural science alone cannot solve’ (Ravetz 1971: 9). He observed that because of the ongoing growth and size of science, ‘its deepest problems have changed from the epistemological to the social’ (Ravetz 1971: 9-10), and he believed that no section of science ‘is immune from the problems of industrialization’. This was due, he said, to the ‘dangerously one-sided… technocratic view of science’, ‘which assumes “science” to be an independent, self-contained factor in the situation, needing only financial support and administrative planning to provide unlimited blessings for all’ (Ravetz 1971: 23; 21-22). In 1991 Ravetz and Silvio Funtowicz saw the ‘industrialization of science’ as meaning ‘the growth in scale and capital-intensity of research and its intimate connection with technology and political power’ (Funtowicz & Ravetz 1991: 138). They could easily have had agriculture in mind.

In anticipating thinking about solving wicked problems, Funtowicz and Ravetz stated that the ‘essential principle’ of Post-Normal Science ‘is that uncertainty and ignorance can no longer be expected to be conquered; instead, they must be managed for the common good’ (1991: 146). As Funtowicz and Ravetz saw it, the core role of Post-Normal Science is an
incorporation of ethics and values (Funtowicz & Ravetz 1991). That is, in an inversion of normal science, ‘values’ were in the ascendant, and the ‘facts’ were recognised as being ‘soft’ (Westra 1997).

However, despite the emergence of Post Normal Science, the ever-escalating appearance of bigger and more complex social-ecological wicked problems urgently called for further tools that were even more holistic, more flexible, and more embracing in their research approach to new knowledges for decision-making. One such tool that emerged was the approach of Transdisciplinarity.

3.3. Transdisciplinarity and Diverse Knowledge Cultures

I have already argued that conducting an inquiry into a wicked problem means investigating and working within social ecological systems. As Lawrence recently stated, our incapacity to deal with wicked problems ‘is related to their complexity, to the sector-based division of responsibilities in contemporary society, and to the increasingly diverse nature of the societal contexts in which people live’ (Lawrence 2010: 16). The other limiting factor is our propensity for ‘silo construction’ in traditional scientific research and professional practice (Lawrence 2010: 17).

In this thesis, transdisciplinary is taken as a principle for a unity of knowledge beyond disciplines (Nicolescu 2002). As Brown et al. state, transdisciplinary is taken ‘to be the collective understanding of an issue created by including the personal, the local and the strategic as well as specialised contributions to knowledge’, and that transdisciplinary ‘in the broad sense includes the use of imagination’ (Brown et al. 2010b: 4-5). The latter ‘is associated with creativity, insight, vision, and originality, also with memory perception and invention’, and its significance is that it ‘provides the creative spark for any inquiry into a complex system.’ As Ravetz points out, the use of imagination includes the key question ‘What-if?’ – which he saw as an essential new component of knowledge inquiry. Inclusion of the ‘What-if?’ ‘precludes the dogmatic and exclusive styles which have hitherto been dominant in science as applied to policy problems; and it lends itself to open enquiry and public participation’ (Ravetz 1997: 533). This concept of transdisciplinary goes beyond various attempts in the 20th century to connect between the knowledge silos by those still
committed to a disciplinary approach, and which had given rise to efforts in multi-
disciplinary and inter-interdisciplinary research (Brown et al. 2010a; Lawrence 2010;

A transdisciplinarity approach is holistic in the full sense of the word, because ‘a fusion of
disciplinary knowledge with other forms of know-how… creates a new hybrid which is
different from any constituent part’. Not being an automated process just resulting ‘from the
bringing together of people from different disciplines or professions’, it therefore ‘requires
an ingredient that some have called “transcendence”’ (Lawrence 2010: 19). That is,
knowledge and solutions arising from a transdisciplinarity approach are more than the sum
of the parts - and often in unexpected ways, and frequently by unforeseen mechanisms. That
is why imagination is an integral component of a transdisciplinary inquiry (Lawrence 2010;
Stokols 2006).

In its current state of development, transdisciplinarity now embodies the following
characteristics:
- collaborative, creative, higher order holistic thinking which transcends discipline
  boundaries;
- the use of the imagination;
- the explicit contribution of an ethical or moral perspective to problem resolution; and
- the generation of new knowledge and new resolutions not available in multidisciplinary
  and interdisciplinary environments (Brown et al. 2010a; Lawrence 2010; Palmer et al.
  2007; Stokols 2006).

Summary: Transdisciplinarity and the Ontology, Epistemology, and Ethics
of this Thesis

The approach of this thesis to such wicked problems as the degradation of land and
ecosystem services in Australia can be crystallised as using a transdisciplinary approach built
on an inclusive triple platform of ontology, epistemology and ethics. This comprises:

Ontology: a self-organising biophysical world constantly re-shaped by the social activities of
its dominant species, humanity; and in this case, whose apprehension is guided by an holistic
approach to Human Ecology, Soft Systems Methodology, and particularly transdisciplinary inquiry.

**Epistemology**: that this biophysical world is socially constructed, and therefore that our understanding of it is provisional and partial.

**Ethical**: derived from the theoretical perspective of Critical Inquiry; of research that does not merely seek to understand but to also challenge and even change the constructed meanings we have received and imbibed from our culture. An ethical approach therefore means the support of improvement towards a more just and sustainable socio-environmental system.

To the extent that other forms of knowledge beyond the disciplines may have direct relevance to Australian land-use and discourses and perceptions, the approach of this thesis can be termed an open transdisciplinary inquiry: ‘open’ (as opposed to ‘bounded’) meaning that specialist disciplines are not specifically privileged (Brown 2010a). (See Figure 8.2a, page 250).

### 3.4. Tools for an Open Transdisciplinary Inquiry

Given the approach of ‘open transdisciplinary inquiry’ to handling wicked problems described above, we now come to the theoretical basis of handling the wicked problems at the core of this thesis: ongoing degradation of land and ecosystem services in Australia. My pathway to this is an examination of transformative change among innovative farmers involved in regenerative agriculture.

To proceed down this path, and out of a vast field, I have utilised a few key theoretical elements. These begin with the acquisition of our view of the world, of knowledge, and the social construction of reality (George Kelly’s Personal Construct Psychology). From the remaining theoretical basis - focussed on learning, discourses, language and metaphor, knowledge and power – there is a logical progression into the core methodology of the thesis: thematic discourse analysis (Chapter 4). But all of this in turn seems to fit within the bigger picture of self-organising, emergent systems (see page 73). (Figure 3.2 depicts the theoretical and methodological tools used in the thesis to tackle wicked problems).
The Meta-Theory of George Kelly’s Personal Construct Psychology

In an attempt to understand why different social constructions of reality exist, I use the theoretical lens of George Kelly’s Personal Construct Psychology. Kelly, an early social constructionist, emphasised the creative capacity of humans ‘to represent the environment,
not merely respond to it’, and that, by so representing their environment in their own minds, 
humans can ‘place alternative constructions upon it and, indeed, do something about it if it 
doesn’t suit them’ (Kelly 1955: 8). Personal Construct Psychology thus encapsulates a theory 
of meaning via a commitment to understanding the process by which we make sense of the 
world we live in (Procter & Parry 1978).

Importantly, people’s construction systems can be communicated and widely shared: creating 
a common perception of reality, or an agreed social construction of reality. (Kelly 1955: 16, 
20). Reminiscent of thinkers like Smuts who saw patterns as integral components of the 
environment, Kelly believed that humankind’s representation of the environment was by 
being able to look at the world ‘through transparent patterns or templates’ that people created 
themselves and attempted ‘to fit over the realities of which the world is composed’ (Kelly 
1955: 8-9). This ‘fit’ may not be perfect, but it allowed humans to make sense of an often 
inchoate world: to create meaning.

Kelly called the components of this pattern-making or sense-making, ‘constructs’. These are 
‘tentatively tried on for size’, and thus ‘are ways of construing the world’ (Kelly 1955: 9). In 
other words, as Kelly emphasised, ‘man creates his own way of seeing the world in which he 
lives; the world does not create them for him. He builds constructs.’ These a person tests, 
and these ‘constructs are sometimes organized into systems, groups of constructs which 
embody subordinate and superordinate relationships’ (Kelly 1955: 12).

Kelly found that constructs are predictive tools, tested in terms of their predictive efficiency 
against what each person considers the reality of the universe. He saw the use of constructs 
in a testing, predictive sense as a highly active, energised process.

Kelly’s Personal Construct Psychology is an involved and tightly woven theory, based on the 
fundamental postulate that ‘a person’s processes are psychologically channelized by the 
ways in which he anticipates events’ (Kelly 1955: 46). Kelly said his approach was 
concerned with ‘constructive alternativism’: that there ‘are always alternative constructions 
available to choose among in dealing with the world’, and this is because ‘[w]e assume that 
all our present interpretations of the universe are subject to revision or replacement’. As a 
practising psychotherapist, Kelly’s Psychology had application because, as he summed it, 
‘[i]f we reach an understanding of how a person behaves, we discover it in the manner in
which he represents his circumstances to himself’. That is: ‘The structure we erect is what rules us’ (Kelly 1955: 15, 16, 20). Crucial to the wicked problem of land degradation and sustainable agriculture, people can come to view the same situation or ‘reality’ in entirely different ways because they have ‘constructed’ it differently. Some might even consequently resist change and adaptation in the face of seemingly powerful evidence to the contrary (Kelly 1977: 6).

Very briefly (because this will be dealt with in later chapters), Kelly found that ‘[c]onstructs are the channels in which one’s mental processes run. They are two-way streets along which one may travel to reach conclusions’ (Kelly 1955: 126). The two-way street analogy refers to the fact that Kelly found constructs (or ‘reference axes’) to be bipolar in nature: ‘that every construct was dichotomous with one pole possessing its corresponding antithesis. It is important here to understand what is perceptually negated as well as what is verbally affirmed’ (Kelly 1966a: 11). This in turn carries a strong ethical/moral component when viewed through an epistemology involving critical inquiry (and thus transdisciplinarity). Thus a Personal Construct Psychology approach embraces both relevance and responsibility: an ethical and moral dimension. This has relevance for such issues as farming practices and land degradation, and the fact that it is the person who develops and applies psychological constructs who must take responsibility for them.

This then raises a key question: what are the social and historical factors that not only shape the formation of people’s constructs, but also enable or prevent their adjustment and adaptation? Unfortunately Kelly’s theory and work did not address this domain. Indeed, as Personal Construct psychologists Procter and Parry pointed out, Kelly seemed ‘almost entirely unaware’ of such a crucial issue as the fact that the needs and concerns of the power-holding group in each type of society largely determines the dominant ideology of that society (Procter & Parry 1978: 157). In turn, this helps determine a person’s personal constructs.

The work of Michel Foucault and Thomas Kuhn has direct relevance here, and will also be used as theoretical research lenses because they address issues that link knowledge and power.
In using the term ‘learning’, I adopt the common understanding that it involves change, and that in the context of this thesis we are dealing with adult learning (or andragogy). ‘Learning’ thus involves a change in the individual reflected in behaviour as the result of experience, a process whereby behaviour is changed, shaped, or controlled (Burton 1963; Haggard 1963). That is, learning involves the acquisition of behavioural change, knowledge, skills, and attitudes.

In keeping with the ontological approach of this thesis, I adopt the holistic model of learning as outlined by Knowles et al. (2011: 23):

- the universe as an interactive developing and active organism, and humans as spontaneously active and not reactive;
- whereby diversity constitutes the unity;
- an organic, not a mechanical whole, and therefore precluding predictive and quantifiable approaches;
- and thus epistemologically and ontologically, where humans gain meaning and function from the whole in which they are embedded, and where psychological structure and function are central. All of these in turn shape a discovery approach to the nature, wholes, structures and functions of such a universe.

Knowles and colleagues identified six core learning principles of andragogy that apply to all adult learning situations (provided they are considered together with other factors present in that particular situation). These core principles comprise:

1. the learner’s need to know;
2. the learner’s self-concept;
3. the role of the learner’s experiences;
4. readiness to learn;
5. an orientation to learning; and

This has relevance to the central issue of this thesis because it is widely recognised that to enhance (or even to maintain) the resilience of social-ecological systems for coping with
environmental and social change, then we need to enhance our adaptive capacity and hence our learning. A key way to do this, as Fazey et al. state, is to develop the ability of learning ‘flexibly in a variety of ways, contexts, and circumstances’ (Fazey et al. 2007: 375). The above factors will be examined in my interviews with transformative agriculturalists.

**Experiential Learning**

Much research work has emphasised the important role of experience in learning. David Kolb highlighted the central role of this with his experiential learning theory, and based on research in psychology, philosophy, and physiology. Out of these disciplines, and out of extensive work in learning from social change in a wide range of occupations, Kolb came to see true learning as a combination of experience, perception, cognition and behaviour. Thus, says Kolb, ‘knowledge is continuously derived and tested out in the experiences of the learner’ (Kolb 1984: 27). Kolb saw learning as a cyclic journey through which the learner passes numerous times while progressing on his/her growth journey.

Kolb perceived four basic learning modes. Two are in the realm of perception: *feeling* (what Kolb calls ‘concrete experience’), and *thinking* (‘abstract conceptualization’); and two in the realm of processing: *watching* (‘reflective observation’), and *doing* (‘active experimentation’). The combination of these preferred modes of perception and processing thus form the basis of Kolb’s four learning ‘styles’: divergent, assimilative, convergent, and accommodative. Kolb argues that, while each adult learner has a preferred learning style, the most effective learning takes place when learners are pushed out of their comfort zone to work in all four predominant modes: that is, to move around the learning cycle. (See Figure 3.3a, page 64 below, and its adaptation in 3.3b for collective learning by Brown et al. 2010. Figure 3.3c is another version of a recursive cycle: this time an adaptive cycle for ecosystems).

*Participatory learning* is one form of applied experiential learning (Pretty 1995). However, critics point out that the experiential learning model doesn’t apply to all situations; that it provides for only a limited number of factors that influence learning; and that it doesn’t explain psychodynamic, social, and institutional aspects of learning (Zagorac et al. 2011). I now summarise some learning approaches of relevance to this thesis, but approaches nevertheless that build off the fundamentals of Kolb’s learning cycle.
**FIGURE 3.3.** Heuristic Action Research & Learning Models

*a) Kolb’s Experiential Learning Cycle*

*b) Model of A Collective Learning Approach*

(After Kolb 1984)

(After Brown et al. 2010)

**FIGURE 3.3c:** A Stylised Representation Of Dynamic Processes In Adaptive, Self-Organising Systems

Key:
- Fast Change
- Slow Change

‘Potential’: inherent in the accumulated resources of biomass, nutrients, and / or human capital, systems and other resources. As this accumulates (in ‘K’) it can represent an asset for future ecosystem functions; for new equilibria.

‘Connectedness’: the degree of this among controlling variables. Connectedness and stability increase as ‘capital’ (natural, human) is slowing accumulated and sequestered.

(NB: the third dimension — resilience — is not depicted here.)

(After Holling & Gunderson 2002)
Social Learning

I have adopted the transdisciplinarity perspective of Keen et al. (2005) in defining social learning. They describe social learning as ‘the collective action and reflection that occurs among different individuals and groups as they work to improve the management of human and environmental relationships’ (Keen et al 2005: 4). Keen et al. see the social learning approach as having three agendas that support collective action towards a sustainable future: (a) the creation of learning partnerships; (b) the creation of learning platforms; and (c) the creation of learning ethics.

To achieve their three proposed agendas, Keen et al. posit five core strands of activity integral to the social learning approach: (1) reflection; (2) systems orientation; (3) integration; (4) negotiation; and (5) participation. Only by utilising these five strands, say Keen and colleagues, can we cross the jurisdictional, disciplinary and social boundaries that divide us and which prevent us better addressing social-ecological wicked problems (Keen et al. 2005: 247).

Communities of Practice

This concept – as part of social learning - appears integral to the process of transformative change among innovative farmers studied in this thesis.

Jean Lave’s and particularly Etienne Wenger’s concept of communities of practice emphasise learning through social participation – a key aspect of social learning. They incorporate the concept of situated learning or learning in context into this area of communities of practice (Lave & Wenger 1991; Wenger 1998). By such a concept I mean the accepted idea that, as Eshuis and Stuiver point out, ‘[k]nowledge that is relevant to a specific context is not always readily available, but has to be constructed by giving meaning to existing knowledge’ (Eshuis and Stuiver 2005: 143). Relevant to this thesis, as Eshuis and Stuiver outlined, is the observation that such an approach can lead to a ‘change’ or a ‘shift’ in paradigms.

Bandura pointed out the critical aspect of social learning whereby individuals learn by observing others and by their social interaction in a group (such as by imitation of role models; Bandura 1977). Implicit in this is an iterative feedback between the learner and the
learner’s environment, whereby the learner is changing the environment, and these changes in turn affect the learner (Pahl-Wostl & Hare 2006).

Key to Wenger’s approach to communities of practice is that because the adult learners are ‘active participants in the practices of social communities’ then they construct ‘identities in relation to these communities’. That is, Wenger sees social participation ‘as a process of learning and knowing’ (Wenger 1998: 4-5). This means an integration of (1) meaning (learning as experience); (2) practice (learning as doing); (3) community (learning as belonging); and (4) identity (learning as becoming). (See Figure 3.4 below).

FIGURE 3.4. Modified Version of Wenger’s Social Learning Model in Communities of Practice

(After Wenger 1998)

Thus communities of practice are not only the vehicles for the evolution of practices and the inclusion of new comers, but also ‘the vehicle for the development and transformation of identities’ whereby ‘people produce meanings of their own’ (Wenger 1998: 13; 15).

In other words, communities of practice (or what can be termed ‘knowledge communities’) offer their members ways of organizing and grasping the world. These communities therefore
help define what is knowledge and truth. Its members are the bearers of knowledge (Nelson 1990; Meghani 2008). By implication then, such knowledge cannot be value-free. As Meghani sums it, ‘[h]uman epistemic enterprises, including technology-creation enterprises, are communal, value-laden projects’ (Meghani 2008: 29).

Nerbonne and Lentz encapsulated this work in relation to agriculture when they concluded that a farmer’s own knowledge system is ‘embedded in knowledge communities, in which a dynamic network of actors constructs knowledge through the process of exchanging ideas’ (Nerbonne & Lentz 2003: 67). Such a forum can enable social learning.

**Transformative Learning**

This is a different aspect of learning, but one crucial to this thesis. It is a form of experiential learning, but it occurs at the major change-end of the spectrum (and what can also be described as *emancipatory learning* – Percy 2005). I have already highlighted that learning involves change. Both my thesis and this section focus on major life-changing shifts, or paradigm and world-view change or shifts. Such significant changes are what *transformative learning* focuses on.

While there are a number of theoretical models that touch on transformational learning in adults (see Boyd 1991; Vygotsky 1978; Freire 1970), the theoretical approach that seemed best suited to my research was developed by Jack Mezirow - widely regarded as the founder of transformative learning theory. Mezirow says that transformative learning can occur in one of four ways (all of direct relevance to this thesis’s investigation of agricultural practioners): (1) by elaborating existing frames of reference; (2) by learning new frames of reference; (3) by transforming points of view; and (4) by transforming habits of mind (Mezirow 2000: 19).

To Mezirow, Transformative Learning is learning to purposively question one’s own assumptions, beliefs, feelings, and perspectives in order to grow or mature personally and intellectually (Mezirow 2000). However, his view of transformative adult learning has been criticised as being overly dependent on critical reflection at the expense of minimizing the role of feelings and thus transformation through the beyond-conscious development of thoughts and actions (see for example Taylor 2001). This in turn links to issues to do with transdisciplinarity, and will be further explored in Chapter 9.
**Relation to George Kelly’s Personal Construct Psychology**

If learning involves change, then it is clear that learning must involve a change in a person’s personal construct system. This insight is critical to transformative learning, to transformative agriculture, and to changing agricultural practices (as will be investigated from Chapter 5 onwards). Therefore, I take a constructivist’s view of learning as defined by Personal Construct psychologist Sheila Harri-Augustein, where learning ‘is best defined as the quest for personal construction and exchange of viable models of meaning to act on and within the world’ (Harri-Augustein 1977: 101). This has huge ramifications for transformative change in agriculture. This is not only because, in Harri-Augustein’s words, ‘[l]earning-to-learn depends on developing a capacity to reflect on such personal processes of construction’, but also because ‘structures of meaning need to be brought under review during certain phases in a person’s life; otherwise habitual mechanisms of construing may once more take over’ (Harri-Augustein 1977: 101).

**Knowledge and Power**

While I argue that adult learning is about change, this can also imply learning and growing in a self-actualising, transforming way. This means allowing for, adjusting to, or overcoming factors derived from one’s past history: history that initially can engender constraints to change (Maslow 1968). As such factors are a result of us being embedded in society, we need to be cognizant of the function of power: a key factor in the individual-society nexus which impacts on the individual’s capacity to learn and change. This issue of power (so central to this thesis) is intimately connected to knowledge and thus language, and can often be submerged and unrecognised.

A key factor then in relation to the issue of transformative change (learning) is the nexus between knowledge and power, and how this shapes a person’s beliefs, habits, understandings, attitudes: in other words their rationality. This nexus is therefore intimately tied up with a person’s self-identity and thus their associated personal constructs. So addressing this fills in the space that George Kelly neglected. However, while the concept of Kuhnian paradigms applies widely outside science as well as within, what is missing is an explanation of how the knowledge-power nexus works in society in general.
Michel Foucault and the Idea of Bio-power

In his later work Foucault investigated how modern ‘norms’ work in our society (what he called *normalization*), and how the members of society are socialized into that society. The mechanism for this Foucault called ‘bio-techno-power’ or *bio-power* (Foucault 1971; 1979; 1980a; 1972-1977 in Gordon 1980; 1983; and 1954-1984 in Faubion 1994).

To Foucault bio-power concerns the pervasive organisation of our society ‘under the guise of improving the welfare of the individual and the population’ (Dreyfus and Rabinow 1983: xxvi). However, Foucault not only viewed bio-power as a coherent political technology but revealed that such power is largely hidden and also largely self-imposed or accepted: that is, auto-colonized. As occurs in a Kuhnian paradigm, Foucault revealed how citizens acquiesce to those apparently holding the ‘truths’, ‘knowledge’ and ‘expertise’ in society, and thus how, as citizens, we unthinkingly allow ourselves to be controlled (through some designated experts) and to conform and behave in certain ways (Foucault 1979; Foucault 1980b).

Applying what he termed a ‘genealogical’ approach (and via thematic discourse analysis), Foucault revealed how the powerful but usually hidden forms of bio-power are able to influence the social construction of reality and thus, by inference, the reinforcement, modification or creation of personal constructs.

As with Kuhn, Foucault was analysing the process of the production of ‘truth’, and who owns and uses – and how they use - these truths. Foucault was thus making explicit the hidden practices through an exposé of the ‘background’ practices surrounding power arrangements, especially where knowledge gave privilege to those in power (Foucault’s ‘knowledge/power’).

Again as with Kuhn, Foucault’s analysis of what he called ‘micro practices’ exposed the deeper, more ideological, social and behavioural factors involved in the shaping of societal discourse. Foucault particularly focussed on those practices where knowledge and power cross. Thus a Foucauldian *discourse* and a Kuhnian *paradigm* are analogous, as both reveal how, via social construction, ‘truth’ is determined. Importantly, both reveal the ‘past as ideological’ (Foucault 1969: 12, 5; Kuhn 1962).
Discourses, Power and Language

John Dryzek succinctly summed up the essence of a discourse as ‘a shared way of apprehending the world’. He then explained that discourses ‘construct meanings and relationships, helping to define common sense and legitimate knowledge. Each discourse rests on assumptions, judgements, and contentions that provide the basic terms for analysis, debates, agreements and disagreements’ (Dryzek 1997 [2000]: 5).

For Foucault, a discourse comprises ‘a complex entity that extends into the realms of ideology, strategy, language and practice, and is shaped by the relations between power and knowledge’ (Sharp and Richardson 2001: 195). Thus Foucault saw discourses as crucial to constructing and maintaining social norms. In turn, this means that discourses shape individual identities by delimiting thoughts and actions, and that they ‘provide reasons and principles for…ways of doing things’ (Foucault 1977: 79). Discourses are therefore critical in forming personal constructs. Concerning the development of a person’s personal construct system, this occurs because society provides people with a validational experience of their personal constructs via the ideology of that society; this in turn constrains a person ‘to act in a relatively limited set of possible ways’ (Procter & Parry 1978: 163) because the process can deeply root personal constructs: even making them rigid and concretized and thus highly resistant to change.

Summing up the crucial nexus of knowledge-power and discourses, in 1986 Foucault stated that ‘in any society, there are manifold relations of power which permeate, characterize and constitute the social body, and these relations of power cannot themselves be established, consolidated nor implemented without the production, accumulation, circulation and functioning of a discourse….We are subjected to the production of truth through power and we cannot exercise power except through the production of truth’ (Foucault 1986: 229-230).

Hajer also picked up on the crucial role of discourses and language. He stated that discourses can exist ‘as multiple and competing sets of ideas and metaphors embracing both text and practice’ (Hajer 1995: 4). The concept of competing ideas and metaphors accords with George Kelly’s work on how our personal constructs operate and exist as binary oppositions.
It is these concepts of the role of discourse extending into ‘the realms of ideology, strategy, language, and practice’; of the ‘relations between power and knowledge’; and of the link to the determination of individual identity, practice, and world-views, that make a study of the discourses of modern agriculture such a powerfully and unifying theoretical lens. Hence the use of thematic discourse analysis as my main methodological approach (see Chapter 4).

Regarding bio-power, Foucault was focussed on ‘power relations’ and not ‘power’ per se. For the approach to this thesis, this implies an analysis of power relations ‘through the antagonism of strategies’ derived from ‘regimes of practice’ (Foucault 1983: 211; Epstein 2008).

**The Role of Language and Metaphor**

Aside from the clear linkage between language-metaphors and George Kelly’s Personal Construct Psychology, what is relevant to this thesis is Lakoff and Johnson’s claim that ‘our conceptual system is largely metaphorical’: that metaphors ‘structure how we perceive, how we think, and what we do’. Metaphors are thus a key to meaning ‘and perhaps the key to giving an adequate account of understanding’. This means that metaphors are not just a matter of language but, on the contrary, ‘human thought processes are largely metaphorical’ (Lakoff and Johnson 1980: ix; 3-4). A key reason is that metaphors allow us to understand and experience one kind of thing in terms of another, and also to conceptualize and apprehend abstract concepts (Glucksberg & Keysar 1990). In addition, some theorists believe that metaphors play a special role in organizing conceptual knowledge through the interaction of two different domains, and that conceptual metaphors can provide a schema-like structure for organizing information about a topic (Allbritton et al. 1995).

In terms of our cultural coherence, metaphors are fundamental because, as Lakoff and Johnson point out, the ‘most fundamental values in a culture will be coherent with the metaphorical structure of the most fundamental concepts in the culture’ (Lakoff & Johnson 1980: 22). Metaphors are thus vital because of their role as meaningful symbols (Dahlberg 2001). Therefore, analysis of their role in, for example, a thematic discourse analysis of different agricultural discourses as in this thesis, seems useful, as they are vital to an understanding of meaning; to learning in communities of practices; to communication, change, innovation and transformation; and to mythology, story, values, beliefs, discourse,
power and ideology. As Norgaard says, it is ‘through enlisting new and extending old metaphors that we communicate evolving understandings and design new institutions’ (Norgaard 1995: 125, after Lakoff & Johnson 1980).

Not only are metaphors a practical resource with which and through which we can think and act (Schotter 1993), but Ison raises a flag from which I take clear direction: that ‘[e]xploring metaphors-in-use and what they may reveal or conceal is one of many ways to explore the context of issues in the process of environmental decision making’ (Ison 2005: 30).

**Ideology, Discourse, Power and Knowledge**

In the wake of leading theorists in the field such as John Thompson with his *depth hermeneutics*, I take a critical orientation to the field of ideology, probing justness and fairness and working on the assumption, as Brasier says, that there is ‘a link between symbols and unequal social relations’ (Brasier 2002: 240). Thompson argues that there is a strong connection between ideology and inequality in social relations, and this is revealed by examining the truth value of a discourse (Thompson 1990: 54-55).

Thompson’s work reinforces that of Foucault. He says that what is crucial in understanding ideology are ‘the interrelations of meaning and power’. He argues that ‘the concept of ideology can be used to refer to the ways in which meaning serves, in particular circumstances, to establish and sustain relations of power which are systematically asymmetrical’, what he calls ‘relations of domination’. Thompson concludes that ideology is ‘meaning in the service of power’, and so ‘to study ideology is to study the ways in which meaning serves to establish and sustain relations of domination’ (Thompson 1990: 6-7; 56).

Ideologies are most relevant to agricultural practice because, as Swidler argues, ideologies can mature towards becoming ‘tradition’, and finally, ‘common sense’: to the extent where they become incrementally more firmly woven into the tapestry of social life. This can happen to the point where they are experienced as invisible or even ‘natural’ to the actor, and so where they eventually become part of the taken-for-granted world (Bawden 1991; Swidler 1986). Ideology thus directly relates to Personal Construct Psychology because, as Procter and Parry explain, ‘individual construct systems are constrained by the structure and ideology of that society’ (Procter & Parry 1978: 160).
Path-Dependence

The concept of ‘path-dependence’ began to be increasingly applied in social research from the early 1990s (see North 1990; Mahoney 2000). General descriptions of path-dependence use such notions as ‘history matters’ or that ‘the past influences the future’, and have led workers to undertake ‘path analysis’ (the examination of relationships among temporarily sequenced variables) without necessarily examining path-dependent processes of change (Mahoney 2000). This thesis is concerned with change or resistance to change in personal constructs, and the relevance of path-dependence here is that it stresses the importance of early events for later occurrences. That is, ‘history does matter’ because ‘another history … would have possibly yielded a different outcome’ (Bassanini & Dosi 1999: 1).

Sewell defined path-dependence to mean ‘that what has happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time’ (Sewell 1996: 262-3). While the concept has now expanded and is more nuanced than this, Sewell’s definition captures the essence of the concept required for this thesis. Of relevance here is the delineation of two dominant types of path-dependent sequences. The first are self-reinforcing sequences, which are ‘characterised by the formation and long-term reproduction of a given institutional pattern’ (Mahoney 2000: 508). The second type involves reactive sequences, which ‘are chains of temporally ordered and causally connected events’ (Mahoney 2000: 509; and see Abbot 1983). This would appear to have direct relevance to the embedded nature of personal constructs in farming discourses, and to the issue of change or no change.

Self-Organizing, Emergent Systems, Language, and Learning

Coming out of systems thinking and cybernetics, and affirmed by new biological and theoretical ecological work (particularly that originally by Prigogone; see for example Prigogine & Stengers 1984), is the concept of self-organizing systems. This concept is integral to the description of biological systems (including, or especially, at the ecosystem and even biosphere level). Self-organisation refers to a system that increases in complexity without any guidance or management by outside sources; this means that the dynamics of a system can tend by themselves to increase the inherent order of a system (Solé & Bascompte 2006; Crawford et al. 2005; Young and Crawford 2004; Camazines et al. 2001; Bak 1996;
Kauffman 1993; Ashby 1947). Such self-organizing systems have now been described across a wide range of areas (such as physics, chemistry, mathematics, cybernetics, human society, linguistics [such as in language acquisition], soil science, and biology).

Self-organizing systems typically but not always display emergent properties. This refers to the way complex systems and patterns arise out of a multiplicity of relatively simple interactions. Self-organisation or autopoiesis (‘self-producing’ and ‘self-defining’ - Reynolds 2005) has direct relevance to this thesis. This arises because the development and growth of an autopoietic system is solely dependent on the internal structures of the system: what Reynolds calls ‘system self-production in living systems in the biological realm’ (Reynolds 2005: 2, 4). The relevance to this thesis arises, first, because in my preliminary research the concept of self-organizing complex systems appeared integral to much of the thinking of transformative innovators in regenerative agriculture in Australia: a key principle to be tested in the research.

Second, Maturana and Varela’s concept of autopoiesis explains how the process of perception arises from the systemic operation of a living organism that is coupled to its environment – or structural coupling (Maturana & Varela 2000). As Fell explains, the ‘characteristic, circular, self-producing property of living things, attached to their environmental niche, is also their self-referring, self-defining process of perception and cognition. Put more simply, perceptions are individual ways of seeing the world, which arise from a history of cognitive connections that the individual has made with this world, especially with other people in it’ (Fell 2000: 504).

The significance of the concept of structural coupling is that at one and the same time, as Ison sums it, ‘we are both independent (maintaining our own organization as a living system) and related (coupled) to our external world. This explanation’, concludes Ison, ‘challenges the common idea that we adapt to an environment, and replaces it with the idea of organisms and environments co-evolving’ (Ison 2005: 26).

Central to Maturana’s and Varela’s theory of autopoiesis is the cybernetic property of operational closure: that with regard to our nervous system, ‘outside influences cannot directly control it, they can only trigger it to change itself, in ways determined by its own self-regulating process’ (Fell 2000: 504; Varela 1979). Concerning emergent properties,
Varela et al., in describing their cognitive-neural model, state that a cognitive system is built ‘not by starting with symbols and rules but by starting with simple components that…dynamically connect to each other in dense ways’. This therefore reveals that ‘the actual connections among ensembles of neurons change as a result of experience. In brief, these ensembles present us with a self-organizing capacity’ that gives rise to new properties (emergence) (Varela et al. 1993: 88, 85).

As will be discussed in Chapter 9, this work in the area of cognitive science has major implications for issues like adult learning and social and transformational learning; for the concept of communities of practice; for the practical application of Kelly’s Personal Construct Psychology; and for the role of language and its acquisition. Indeed, the concept of self-organizing systems is intrinsically holistic and of direct relevance to this research. This is because any practitioner attempting to understand a system is inescapably a participant in any process of systemic inquiry – part of his structural coupling. As Skolimowski observed: ‘wholeness means that all parts belong together, and that means they partake in each other. Thus from the central idea that all is connected, that each part is a part of the whole, comes the idea that each participate in the whole. Thus participation is an implicit aspect of wholeness’ – and in the end, the sum of the parts is greater than the whole (Skolimowski 1995, cited in Bawden 1991: 2366).

We will see in Chapter 9 that the acquisition of language is equally situated in a cognitive-affective self-organizing system. Indeed, according to work by Fell and others, our flow of language is constrained at all times by our flow of emotions, and vice versa: that what distinguishes us from other animals is the way our rationality and emotionality are braided together through the complex language system we have developed (Fell 2000: 505).

**The Way Ahead**

So it is with this tightly connected group of ontological, epistemological, critical and theoretical lenses that we now turn to examine the research material of this thesis. This follows an explanation of the methodological approach used in this thesis (Chapter 4).
CHAPTER 4 METHODOLOGY AND METHODS

Background

Concerning transformative change in regenerative agricultural systems, this thesis examines the question whether there is a closely integrated nexus between discourses, knowledge, power, communities of practices, and personal psychological constructs. Corollary questions follow, such as if there is such a nexus, how and why does it occur?; Is personal change a precursor to practice change, or vice versa?; and Are there specific innovation diffusion systems supporting change and transformation?

The main thesis question and its corollaries posed further questions that emerged from the theoretical base to the thesis. As discussed in Chapter 3, George Kelly’s Personal Construct Psychology provided the analytical basis for exploring how innovators (or farmers in general) form mental constructs of their personal and practice beliefs. Then, through using discourse analysis methods (interviews, observations in the field, and past and contemporary literature and media material), I wanted to test the integrity of not just Kelly’s work but also that of Thomas Kuhn’s, Michel Foucault’s and Jerome Ravetz’s in regard to the shaping of personal constructs. If there is transformative learning/change in regenerative agricultural practices, what are the implications for the alteration of personal constructs?

To answer the above questions I selected a specific methodology and appropriate research tools. Crotty defines ‘methodology’ as ‘the strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes’ (Crotty 1998: 3).

The research strategy comprised an holistic, multi-method approach which made use of a wide range of material for analysis (narratives, interviews, historical, textual and rural media material, field observation). The narrative and interview material of farming innovators and early adopters who are using a number of distinct innovative practices (see ‘case studies’, page 92) provided ethnographic-style material. Preliminary in-depth interviews with key informants enabled the development of case-studies. Further insights were gained from exploring the historical background to changes in agricultural practice. Sections 4.1 to 4.4 of
this chapter develop the conceptual and methodological logic of the thesis based on both the thesis questions and the ontological, epistemological and theoretical positions articulated in Chapters 1 to 3. Sections 4.3 and 4.4 also describe the research design and methods. Figure 3.2 (page 59) illustrates the methodological approach to this thesis.

4.1. Marrying Methodology and Transdisciplinarity

As discussed in Section 3.3, to address the sustainability challenge and associated wicked problems like the degradation of land and ecosystem services, I chose the approach of transdisciplinarity to work with innovative agriculturalists in the field. This meant use of an holistic transdisciplinary imagination which assumes a unity of knowledge beyond disciplines, and the capacity to ask the ‘what-if?’ questions. In addition to such higher order holistic thinking and use of the imagination, transdisciplinarity also assumes use of an explicit ethical or moral perspective to problem resolution, and, combining the above, a hoped for generation of new knowledge and new resolutions not available through more traditional inquiry methods.

Such an approach therefore requires careful choice and control of the methodological ‘reins’. Consequently I chose a methodology that allows application of a transdisciplinary approach and the best focus of my chosen theoretical lenses described in Chapter 3. To investigate farmers in a series of case-studies I chose an ethnographic, qualitative social inquiry approach: and one that allows a key role for personal reflection. This meant a methodology based on an interpretivist tradition that combined an adaptive theory-grounded theory approach. The data was therefore able to be interpreted in the quest for new insights and hoped-for new theory via thematic discourse analysis. But at the centre of this approach are the key elements of transdisciplinarity.

The Role of Reflection

Scientist-philosopher David Bohm, when exploring the area of human creativity, touched on the integral role of the imagination and reflection in helping to solve complex problems (Bohm 2004). The use of imagination combined with reflection is integral to my approach of transdisciplinarity because, as Fell and Russell point out, ‘once we have reflected (in our
language), we are cognitively different – our physiological coherence has changed – and our opportunities for structural coupling (and therefore the direction of our lives) have changed’ (Fell & Russell 2000: 42).

The more commonly understood sense of ‘reflexivity’ holds it to be that state of mind that allows an individual to recognise their understanding of themselves and their surroundings (Latour 2003; Lynch 2000). This has been called a ‘self-objectifying’ reflexivity (Kaufman 2010) or an active critical self objectification (Alvesson & Skoldberg 2000; Lynch 2000; Bourdieu & Wacquant 1992; Giddens 1991). It implies the capacity of being able to understand the ‘game’ itself while playing it, and ‘an awareness that our own and others’ learning and action is dynamically linked through social structures’ (Kaufman 2010: 62). But it also implies the linking of personal reflection with a variety of interpersonal communications – my focus for this study.

So while Cresswell describes ‘reflexivity’ as ‘self awareness’ (Cresswell 1998: 9), Bohm takes this to a deeper level, including a deliberate allowance for the function of the beyond-conscious. I was determined in the process of this thesis to allow such creative-reflective processes to function, and so this aspect was a deliberate overlay to the research design. This determination came from personal experience of two previous and large research journeys (in time, space and mind) similar to that required for my thesis: my work on the Australian Merino (Massy 1990; 2007) and on the political history of the Australian wool industry (Massy 2011). From these journeys (each spanning up to 8 years) I learnt that such large endeavours of exploration took time, and that this was important if one wished to perceive the bigger patterns and pieces in the puzzle, and because it provided opportunity for reflection; for the occurrence of serendipity and surprise; and for allowing my conscious and beyond-conscious mind to digest and mull-over diverse material.

Consequently I used long road-trips through Australia’s landscapes (for example, one trip for this thesis covered 5,000 kms) to provide this time for reflection while also being immersed in the very landscapes and land-use practices under contemplation.

However, while there are other dimensions to this concept of reflection or reflexivity (such as ‘reflexive modernity theory’ - Holloway 2004; Warf 2004; Wynne 1996; Beck 1994, 1992; Giddens 1994, 1981), I remained focussed on first order effects: of reflections on my own
reflection within a social ecological system, allowing the beyond-conscious to go about its business. I had already learnt that unstructured reflection allows the ‘virtuoso performance skills’ that are required ‘to daily create meaning in our lives’ (Flyvbjerg 2001; Garfinkel 2002), and where ‘unstructured’ means establishing the pre-conditions for good reflection and no more.

I knew from experience also that the beyond-conscious plays a huge role in the creative process, and so as a researcher I was prepared to open myself to a serendipitous journey and to allow time for reflection and pattern discernment. I hoped my journey would also prove one of personal transformation and learning.

4.2. A Qualitative, Multi-Method Research Approach

A Qualitative Social Inquiry Approach

As explained above, because my inquiry approach is that of transdisciplinarity rooted in a critical tradition, in this examination of change (or resistance to change) in innovative agriculturalists in Australia I chose a qualitative ethnographic-style methodology. In utilising a thematic discourse analysis approach as the key analytical tool to probe a group of synoptic case-studies, as a practicing farmer (as mentioned before) I therefore chose to be ‘an anthropologist in my own tribe’.

Such an inquiry approach implies the development of deep and rich material in a complex reality, designed to gain an understanding of the thinking (i.e., personal psychological constructs) of practicing agriculturalists. It also implies such behaviour is part of a complex social-ecological world, in which power-ideological and/or institutional factors within society play a role in determining personal constructs. While this was challenging, it became clear very early on that a qualitative, critical social inquiry approach was my best pathway to developing a rich and textured picture.

A way of capturing the difference between a qualitative research approach and the quantitative (where applied mathematical constraints are imposed) is that, as Ragin summed it, quantitative researchers tend to work with a few variables and many cases, whereas
qualitative researchers rely more on a few cases and many variables (Ragin 1987). Yet another factor pushing me towards qualitative research was my interest in writing so as to personally engage with, and communicate to, a reader using, if possible, a more literary style. As alluded to earlier, as a farmer researching in my own and other fields, a qualitative approach would allow me to communicate the immediacy of being an active learner and participant in the research and of seeing the world through the subject’s eyes (rather than merely as an austere ‘independent’, ‘outside’ researcher or ‘expert’).

Denzin and Lincoln encapsulated the approach of qualitative research as ‘multimethod in focus, involving an interpretive, naturalistic approach to its subject matter. This means that qualitative researchers study things in their natural settings, attempting to make sense of or interpret phenomena in terms of the meanings people bring to them’ (Denzin & Lincoln 1994: 2). To this I would add Cresswell’s ‘complex holistic picture’, a ‘reference to a complex narrative that takes the reader into the multiple dimensions of a problem or issue and displays it in all of its complexity’ (Cresswell 1998: 15).

Another attractive feature of qualitative research for me was that it is largely inductive: ‘induction’ being the production of facts to prove general statements, or the inferring of general law from particular instances (Concise Oxford Dictionary 1976), whereas deduction is the reverse: making inference from the general to the particular. However, as Layder contends, ‘there is no such thing as pure induction or deduction’, but rather ‘only various mixes or combinations of the two’ (Layder 1998: 111). This dual inductive-deductive approach therefore accords with his concept of Adaptive Theory.

**Grounded and Adaptive Theory**

The originators of grounded theory in the 1960s, Glaser and Strauss, in Cresswell’s words ‘held that theories should be “grounded” in data in the field, especially in the actions, interactions, and social processes of people’ (Cresswell 1998: 56; Glaser & Strauss 1967). Using this platform they saw the centrepiece of grounded theory research as being the generation of a theory closely related to the context of the phenomenon being studied. This approach is thus rooted in the interpretivist tradition (Layder 1998).
However, the insistence of grounded theorists that theoretical concepts and hypotheses ‘must emerge from the data as it is uncovered or gathered’ (Layder 1998: 17) did not fully answer my needs. To navigate through a mass of research material, plus allowing for my use of imagination and reflection, I found that, while agreeing with some of the above approach, I also needed more of a theory ‘road-map’ and compass. Layder’s adaptive theory provided this.

Layder developed his adaptive theory to challenge ‘the gap that has grown up around those who specialize in social theory on the one hand, and those who are specialists in data collection and empirical research on the other’. That is, ‘adaptive theory attempts to combine an emphasis on prior theoretical ideas and models which feed into and guide research while at the same time attending to the generation of theory from the ongoing analysis of data’ (Layder 1998: 1;19).

Crucially, this process implies iteration, adjustment, reflection and further theory and thematic development in an ongoing learning cycle: an approach encapsulating the research process of this thesis. In short, my approach, predominantly one of ‘trusting discovery’ guided by existing theory, therefore combines both grounded and adaptive theory.

So, having decided on a qualitative, grounded-adaptive theory approach, the next question was which tradition of many under that umbrella to choose?

**An Ethnographic-style Approach**

Given the thesis question and its theoretical and philosophical basis, and given both my extensive experience in the interview process and my wide network in Australian agriculture, a process of interviews with innovative farmers in different environments seemed a logical approach to provide the main source of discourse material.

To build up a more complete picture of farming innovators and early adopters and their thinking as reflected in their language, I needed also to examine some farmers who rejected changing from the dominant discourse. What also appeared essential was a wide use of discourse material: both the written words of the dominant and emerging new discourses in
agriculture, plus historical, observational, and artefact material. I therefore decided that the research tradition best suited to meet these criteria was an ethnographic-style approach.

Ethnography is described as ‘a description and interpretation of a cultural or social group or system’ and occurs where ‘the researcher examines the group’s observable and learned patterns of behaviour, customs, and ways of life’ (Cresswell 1998: 58; Harris 1968).

Clearly, I would be embedded in ethnography so as to better study farming innovation. But I needed to look not just at the one group or culture as in traditional ethnography, but a number of different farming groups or cultures connected by the common theme of agriculture. This dictated that I blended ethnography with a multiple case-study approach: what can be called an ethnographic-style case-study approach.

Multi-Method: blending ethnography with a case-study approach

Crotty, Cresswell, Denzin & Lincoln, and a number of other writers on social theory tend to allocate ethnography and case-studies into separate research traditions. However, I wanted to study particular innovative practices bounded in time across places; I wanted to study the behaviour of these culture-sharing groups and individuals. Further, I wanted to look for contextual material about the setting of the cases and also to gather extensive material from multiple sources of information to provide a deep picture of cases. I also wanted to observe, interview, and explore themes emerging from this study of human behaviour. Clearly, a combination of the two traditions would give me a fuller arsenal of tools to achieve the research object. In this context I use Cresswell’s definition of a case study as ‘an exploration of a “bounded system” or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context’ (Cresswell 1998: 61).

Ten of the twelve case-studies were unique because they proved to be variations on a theme (a regenerative-transformative agriculture), each involving different innovative agricultural practices on the broad-scale, where ruminant livestock were a key component. They were not bounded cases for comparative analysis. The source of richness for thematic analysis lay in the nuances and inter-connections, in addition to comparative differences between the related ten and the other two cases. As a consequence, I describe the ten related case-studies as ‘synoptic case-studies’ (where each is given equal weight). The main comparative contrast in
the analysis came from comparing the case-study material to that of the dominant discourse (industrial-productivist agriculture), and to a lesser extent to the transitional case (see Section 4.3 on the case-studies).

In addition to ethnography-style case-study research, the final important component in my multi-method approach was an historical-temporal element.

4.3. Combining an Ethnographic-style Case-Study Approach and an Historical Thread

Background

A key element in attempting to understand the relationships among agricultural innovation, personal constructs and change, is the ability to track the origin and spread of ideas with regard to both Western society’s attitudes to nature, and in agricultural practice in general over time.

The dominant agricultural discourse – industrial agriculture – is primarily a 20th century phenomenon, while various elements of the emerging new agricultural discourse – regenerative-transformative agriculture – have disparate elements in their origin: some pre-dating industrial agriculture. It therefore seemed logical that an historical tracking of the origin and spread of ideas that were core to the contesting discourse (and to the society in which it is embedded) could throw light on the nature of the spread of these ideas and on their impact in changing personal constructs; and consequently throw light on the evolution and diffusion of innovative practices.

Associated with this, and given that a critical inquiry approach was part of this thesis’ philosophy and methodology, it also seemed important to consider the possible role of path-dependence (discussed in Chapter 3, Section 3.4).

A road-testing, pilot case-study

As my research focussed on a thematic discourse analysis and not on direct comparisons of case-studies over a given time frame, I rejected employing what is termed the Comparative
Historical Approach (Mahoney & Rueschmeyer 2003). Instead, my approach to the historical component comprised a combination of process-tracking (in this case, following the trail of the spread of an idea or practice; see George & Bennett 2005) with what Michel Foucault termed his ‘genealogical’ approach (Dreyfus & Rabinow 1983; Foucault 1969, 1971, 1972, and later works). This combined technique was first road-tested in a pilot case-study I undertook of the recent sheep-mulesing controversy in Australia so as to trial its applicability and to gain confidence and skills in discourse analysis. The pilot case-study and its lessons confirmed that the methodology could be applied to the main thesis.

Michel Foucault’s ‘genealogical’ approach proved vital to this process. The word ‘genealogical’ associates the concept of an archaeological dig with human or social lineage. One of Foucault’s great contributions (as seen in Chapter 3) was his use of thematic discourse analysis. This meant him burrowing through historical, media and social records so as to expose the origins, evolution and often hidden functioning of what he termed bio-power and its ‘micro-practices’ in society. As expounded in Chapter 3, by this he meant the pervasive organisation of our society, but ‘under the guise of improving the welfare of the individual and the population’ (Dreyfus & Rabinow 1983: xxvi). In addition, and also relevant to this thesis, was Foucault’s diagnosis of how modern norms work in society so as to socialize its members – what he called normalization.

Foucault’s discourse analysis approach, therefore, was designed to reveal how ‘truth’ was determined in society. In terms of Western society’s attitudes to nature and of agricultural practices, belief systems and personal constructs, this has obvious relevance to the core question of this thesis. Thus it was an historical tracking of Western philosophy and ideas in regard to nature and subsequently land-use in Australia that led to Chapter 5 becoming core to this thesis.

Foucauldian bio-power and discourse analysis

Given Dryzek’s definition of a discourse as ‘a shared way of apprehending the world’, which, as it is embedded in language, ‘enables those who subscribe to it to interpret bits of information and put them together into coherent stories or accounts’ (Dryzek 1997:9), I used thematic discourse analysis so as to examine people’s narratives, actions and/or practices, and particularly the language, symbols or messages these entail (such as metaphor): and with the
aim of discovering their personal constructs. However, I broadened this approach and used a combination of other material in addition to the interview material. This included literature research, observation, historical material, artefacts, field observation, and artistic material. This approach was in the interpretivist tradition which, as Crotty described, ‘looks for culturally derived and historically situated interpretations of the social life-world’ (Crotty 1998: 67). Such a tradition has its origins in Max Weber’s concept of Verstehen or ‘understanding’, where he saw the role of social inquiry as focussing on the meanings and values of acting persons: the “understandable” action…of participating men’ (Weber 1970: 55). This also implies the illumination of ‘the intentional aspects of human behaviour’ (King, Keohan & Verba 1994: 37).

Therefore, I adopted an interpretive, thematic discourse analysis approach because I believed it was best able to address the key issue of embedded power and ideology in society and how this appears to influence the formation of personal constructs and thus discourses (and the latter’s formation and/or maintenance). This dovetails closely with some of the theoretical lenses outlined in Chapter 3. For example, a key feature of George Kelly’s approach was his discovery that constructs (‘reference axes’) were bipolar: that every construct was dichotomous, with one pole possessing its corresponding antithesis, which in turn meant that ‘every perception we have, as well as every statement we make, is no less a denial than it is an assertion’ (Kelly 1966: 10-11). This accords with the approach of thematic discourse analysis and also of Hajer’s view, whereby he ‘interprets discourses as multiple and competing sets of ideas and metaphors embracing both text and practice’ (Hajer 1995: 4).

So the contestation or contrast of different discourses seems integral to their formation and maintenance, which confirms Foucault’s view of the role of discourses as being ‘to found, justify and provide reasons and principles for….ways of doing things’ (Foucault 1977b: 79). This gets to the nitty-gritty of the issue of agricultural practices, and the idea of the normalization of society via knowledge/power. It is also the reason for my interview approach across both synoptic but also contrasting case-studies.

Therefore (as discussed in Chapter 3), while Kelly did not concentrate on the historical and societal influences shaping people’s constructs, we saw that both Thomas Kuhn (the concept of scientific paradigms) and Michel Foucault (the concept of bio-power) provide excellent platforms from which to investigate (and hopefully understand) the institutional and other
elements that link knowledge and power (including ideology) to the embedding of belief systems.

In following Foucault’s lead, I will be using both a genealogical and interpretive analytical study of agricultural practices as the basis to my thematic discourse analysis. The key steps of this focus on: (1) basic entities the discourse recognises or constructs – its ontology; (2) assumptions about what is natural in the relationship between different entities (such as competition, cooperation, hierarchies and assumed corresponding equalities); (3) agents/actors and their motives – which create the storylines (actors being individuals or collectives/institutions); and (4) key metaphors and other rhetorical devices ‘deployed to convince listeners or readers by putting a situation in a particular light’, or merely as a reflection of the underlying cognitive and belief systems being utilised (Dryzek 1997: 19; Foucault 1980b).

**A Diversity of Discourse Material**

Given the above, to understand if and how a critical analysis of power-ideology in the Kuhn-Foucault tradition works in the agricultural practice area and how attitudes to the land and practices have evolved and are maintained, we need to unravel both the social and historical roots of farming belief systems. However, this requires more than just a series of interviews with farmers.

As part of my thematic discourse analysis approach I have therefore chosen to source wider material for analysis beyond just interviews: components of which have already been alluded to. This material includes:

- Interviews and associated observations and notes taken on farm visits, or in meetings with key informants;
- A broader historical analysis of how Australian land-use attitudes and practices evolved;
- Scientific and other published material contemporaneous with the era of relevance in the study (post 1980);
- Rural press and journal clippings published during the research phase of this thesis (a time constraint imposed for reasons of bounding the research), and covering a wide range of agricultural practice discourses;
• Other material from any of the various knowledge cultures that was relevant to an holistic thematic discourse analysis of this topic. This also included attending a number of conferences related to the thesis topic; and
• Material from the leading agricultural innovation diffusion systems (again post 1980). This involved both interviews with key innovation/diffusion leaders, and my attendance at a number of courses and conferences run by such organisations, where, in addition to the spoken word, textual material was obtained.

Research Design

Bounds of the Research

For reasons of practically bounding the inquiry (time, cost, space), research was restricted to sub-tropical southern Australia – but excluding the rangelands. Southern Australia was chosen because it includes what is classified as ‘the intensive use zone’ in Australian land-use and agriculture (see Hutchinson et al. 2005 and their integration of global agro-climatic classification with the Commonwealth of Australia’s IBRA - Interim Biogeographic Regionalization for Australia [see Figure 4.1, Map 1; and see Figure 4.2, Map 2]; Morgan 2000).

Figure 4.1. Map 1: Australia’s Agro-climate Classes

(After Hutchinson et al. 2005)
There is also general recognition (see for example Lindenmayer 2007; Hutchinson et al. 2005; Gretton & Salma 1996; Heathcote 1994; Lines 1991; Powell 1988; Bolton 1981) that the most landscape degradation and ecological modification has occurred in this southern part of Australia. Therefore, regenerative-sustainable agricultural approaches are most needed in this region. The rangelands were rejected for study not just for practical reasons of time and cost constraints, but also because they are classified as residing in the ‘extensive use zone’. In addition, they involved a whole range of different ecological and management issues that in some respects are not in common with the grazing-cropping lands of the south; they also extend more into central and northern Australia (see map of study area, Figure 4.3, page 91).

A second bounding decision constraining the research, but that would enhance my leveraging of previous experience, expertise and networks, was that ruminants (primarily sheep and cattle) had to be a necessary component of the farming systems. The key reason for this came from my preliminary research, where it became clear that ‘animal impact’, and the energy and other functions consequently generated from such grazing, emerged as an integral and active component of farm and landscape regeneration.
The research was bounded within practical commercial parameters of relevance to broad-scale farmers in the southern Australian landscape. Therefore, a minimum farm operation of 1,500 LSUs (Livestock Units – for example 150 Angus cows, 1500 standard 50 kg. Merino wethers) was set as the minimum limit. This avoided atypical hobby-farm or small experimental or non-commercial operations, which had little relevance to the commercial exigencies farmers operated under. For this reason also, a Livestock Unit base was chosen instead of a farm area base, because a minimum Livestock Unit base would imply broader landscape-scale operations as opposed to high intensive operations.

Further elements in bounded design involved regional and environmental diversity (see the section on research design stratification below) and boundedness in time (see the section on time period below).

**Research Setting/Stratification**

For the same reason that a range of different case-studies were chosen (to better probe a diverse range of practices in the hope that I would increase the chance of eliciting different insights into innovation and change), I also deliberately chose to interview as many of these relevant case-study subjects as possible in as many different agro-climatic bio-regions as possible. Again, I was working on the theory that, as with different innovation practices, the challenge of different environments could throw up different solutions, different thinking, different innovations, and different behaviour in regard to such diversity.

Therefore I used the agro-ecological or climatic description approach based on Hutchinson et al. (1992 and 2005). This focuses on climatic constraints on the dynamics of plant growth, and is relevant to both native and human-managed vegetation. It therefore relates to common land-uses in Australia (see Figures 4.1 and 4.2 above, pages 87 and 88).

The IBRA bio-regional component was integral. This delineates more specific regional ecological descriptions and divisions in what is a landscape-based approach to classifying land surface. It does this using specialist ecological knowledge, which is combined with regional and continental scale data on climate, geomorphology, landform, lithology and characteristic fauna and flora (Hutchinson et al. 2005: 200; and Thackeray & Cresswell 1995). Thus the IBRA bio-regional approach complements the agro-climatic classification
approach, because, as Hutchinson et al. explain, it attempts to capture the ‘physical processes that drive ecological processes, which in turn are responsible for determining the observed pattern of biological productivity and the associated pattern of biodiversity’ (Hutchinson et al. 2005: 200).

The relevance of combining these two approaches derives from the fact that, in terms of ‘landscape function’ (a phrase I was to hear increasingly during my research), the two combined classifications ‘should reflect major differences in land-use patterns and landscape sensitivity to human impacts’ (Hutchinson et al. 2005: 211). Over and above this, the combined approach has direct relevance for some innovative farming systems that were focussed on biodiversity components, which comprised a key case-study in my research.

Another reason for attempting to probe as many bio-regions within relevant agro-climatic zones as possible was that a number - for example the unique Queensland Brigalow belt (bioregion BBS or Brigalow Belt South); the Mallee and Esperance zones and Avon Wheatbelt in Western Australia; and the Naracoorte Coastal Plain in South Australia’s south-east – experienced various forms of ecological ‘settlement’ and change from the 1950s into the 1980s (and even beyond in some bio-regions). The resultant ecological changes mirrored the pioneering phase of the mid 19th century. In terms of material for discourse analysis relevant to the inculcation of attitudes in regard to land-use and their historical antecedents, this was seen as a valuable opportunity to explore themes relevant to the thesis question.

Figure 4.3 below (page 91) reveals that interviews were conducted with subjects (farmers or key informants) operating in, or with experience and familiarity in, all six possible agro-climatic zones as bounded by the thesis. They also covered some 22 out of 26 possible bio-regions. Interviewees were chosen following research based on my own extensive knowledge of farmers across Australia; from discussions with key informants; and from an extensive review of published literature and the contemporary and recent rural media. Most interviews were of 1½ to two hours duration, often followed by a property inspection, when the digital recording continued (as often these more informal moments in the farmer’s natural territory provided valuable insights). Journal entries occurred shortly after the completion of each visit while observations were fresh.
Time Period

The overall context is European land-use in Australia since 1788, a study of which was vital to an understanding of the origin of ideas, attitudes, and personal constructs behind inappropriate land-use (see Chapter 5). This component constitutes the macro historical lens, and involved examining a wide range of historical writings and material. The next layer down involved the widespread adoption of modern industrial-productivist agriculture, which was a post World War II phenomenon.

The approach of modern industrial agriculture came to comprise the dominant discourse in Australian agriculture, and appears linked to institutional power in business, research, extension, policy, and government. This post-World War II phase, therefore, constitutes the intermediate historical lens, and enables a critical examination of knowledge-power. The next lens down is the contemporary historical lens, which concerns the contemporary emergence of a more widespread and growing transformative discourse through regenerative agricultural practices. However, while a number of such new practices evolved after 1980,
some had older origins (for example, the Yeomans-Keyline system from the 1950s), while still others (such as the soil-biological approach) had either ancient or pre-World War II origins.

Finally there was the temporal period bounded by the undertaking of the thesis itself, a period of four years. So as to bound research, this immediate historical lens was applied to my search for current discourse material through my examination of the contemporary rural media. This primarily involved examination of ‘popular’ rural newspapers such as The Land, Stock and Land, Queensland Country Life, and The Weekly Times, beginning and ending within the time frame of the thesis’ life.

**The Case-Studies**

As a result of preliminary research in the first year of the thesis, a short-list of case-studies emerged. As discussed above, these comprised a group of ten case-studies (called synoptic case-studies) as part of a newly emerging regenerative-transformative agricultural discourse. Case-studies 4 (subtle energies) and 11 (integrated productivism) emerged as warranting distinct and separate case-study status during my research in Year 2 when in the field. Brief case-study descriptions are listed below; for a more detailed explanation see Appendix 8.

**Case-Study 1 - Biological Agriculture:** A focus on the management of natural inputs, energy, and systems, and/or the addition of biological inputs (not fossil fuel-derived) to generate the active formation and maintenance of healthy, living soil so as to produce crops and pastures, including in animal production systems.

**Case-Study 2 – Holistic Grazing Management:** the use of animals as an accelerating catalyst for ecological succession in landscapes for livestock production systems, and focussed on high mob/herd density, rotation and planned rest periods.

**Case-Study 3 – Water management and soil re-hydration:** the use of human machinery or human managerial skills and energy to alter the flow of water in the landscape so as to restore the original landscape’s hydrological cycles and soil health, and to re-hydrate soil profiles in animal production systems.
Case-Study 4 – Subtle Energies (including Biodynamics): practices and healings in broad-scale animal production systems focussed on utilising subtle energies in the landscape and people, and derived from practices involving Rudolf Steiner’s biodynamics, but also other (and often ancient) sources – such as geomancy. By ‘subtle energies’ is meant ‘those energies beyond those presently acknowledged in physics’ (Tiller 1999), and refers to energy frequencies in the cosmos, earth and living organisms’ systems which cannot be measured by conventional instrumentation but which can affect organisms at a cellular level.

Case-Study 5 – Native Grassland Regeneration and Management: a specific approach expressly favouring progressive ecological succession of adapted, local native grass species as the basis to livestock production systems. A sub-component of this was the study of a small group of traditional Riverina grazing managers who are dependent on native grass ecosystems. Their approach is that of striving towards a sustainable production system, but without applying knowledge of, or working in harmony with, sustainable ecological systems. I wanted to probe the issue of ecological literacy in this group.

Case-Study 6 – Edible Shrubs in Livestock Production Systems: this involves the planned planting or regeneration of deep-rooted perennial native and/or exotic shrubs - such as saltbush (Atriplex spp) or tree-lucerne (Tagasaste) - as an integral component of livestock production systems.

Case-Study 7 – Agroforestry: the use of managed tree planting and silviculture as an indivisible and integrated component of livestock production systems.

Case-Study 8 – Managing for Biodiversity: a specific focus on planting or regenerating native tree, shrub, grassland and other species to encourage rich floral and faunal biodiversity so as to enhance livestock production systems, but also for aesthetic and other ethical or value reasons.

Case-Study 9 – Pasture-Cropping (and variants, such as No-Kill Cropping): Recently evolved cropping systems that utilise both directly-drilled grazing cereals and other species, combined with the energy and other benefits from holistic grazing management, so as to synergistically produce crops with vastly lower fossil fuel use and its derived inputs.
Case-Study 10 – Permaculture: Refined principles of the Mollison-Holmgren Permaculture approach to food and animal production. Principles are derived from the operation and organisation of diverse, stable and resilient ecological systems so as to consciously design and enhance productive agricultural ecosystems and their communities.

Case-Study 11 – Integrated Productivism: practices in transition between the very highest levels of industrial agricultural production and a more sustainable agriculture.

Case-Study 12 – Industrial Agriculture: the mainstream, dominant discourse, where the maximisation of production and profit is sought in cropping and pasture systems via intensive use of externally derived synthetic oil-based fertilizers, chemicals and energy through the use of industrial technology; and where working in harmony with ecological systems is not a high priority.

4.4. Methods

*Interviews*

Seventy nine recorded interviews were conducted over a period of 16 months across Australia. Interviewees were chosen following extensive literature and media research and wide discussion with key informants and other contacts in my agricultural network. The fact I was a farmer with a wide network not only enhanced the selection of actual case-studies and the contacting and selecting of case-study interviewees, but particularly in gaining access to them. The latter also meant the enhancement of cooperation, free dialogue and the establishment of the critical ingredient of trust and rapport during the interview process. For each case-study I attempted to interview from five to eight people, covering key innovators and leading early-adopters. In some cases this included associated leading diffusion personnel involved in extending the innovation. (See Appendix 1 for confidential list of interviewees).

The interview format followed a set but loose pattern: following my preamble, it then began with ‘*Can you please tell me your story, how you got here?’* Loosely structured dialogue then followed, completed by me referring to a laminated sheet of set questions (I found lamination was necessary after a combination of toddlers and dogs attacked my original sheets),
designed to probe any areas not covered in the previous narrative-dialogue process and which were germane to the research themes outlined above.

For every interview I carried a journal, in which I recorded key points and ideas of the conversation, both as a safety back-up in case of equipment failure, and to note ideas to pursue. At the end of each interview I attempted to ensure that within four hours or so, while impressions were still fresh, supplementary field notes were also recorded in the journal.

**Interview Transcription and Analysis**

(a) The Interview Focus: Developing Interview Transcripts

A first batch of interviews were transcribed using the program *Dragon Naturally Speaking*, and were then printed for analysis. However, to complete transcription of over 100 hours of interviews, professional outside assistance (*TopType*, Reynella, S.A.) was then used. Over 2,000 pages of typed transcript material was generated. However, I then listened to the original recordings whilst reading the transcript so that corrections could be made and nuances and the immediacy of the interviews were not lost. This process proved a further stimulus to reflection, serendipity and the stimulation of ideas and mini-theory development.

(b) The Case Focus: Generating Case-Records

Following completion of interview transcripts, associated field notes and observations were then incorporated with each interview transcript so as to integrate all relevant material. To then analyse the data, and given both my approach to the core role of personal reflection (Section 4.1) and following discussions with supervisors and previous PhD. scholars and researchers, I rejected using any electronic, ‘removed’ analysis technology or software (such as *NVIVO* programmes). Instead I chose to do the thematic discourse analysis myself. This involved first doing a scanning read of each interview, followed by a more detailed reading, during which I used a range of coloured high-light pens and normal ink pens to list and code key themes. These were focussed on language analysis (metaphor, verbs, phraseology) to ascertain discourse-idea-belief connections, but also to highlight general themes relating to practice and process-tracking of practice.
(c) The Issue Focus: Identifying Patterns and Themes

Following this aggregation process and the collation of upwards of 30 themes, and following further reflection over time, the coded material was refined down to meta themes segregated into key language-discourse groupings and into typological categories in the non-language discourse material (such as ecological, historical, ideological or knowledge-power related material). This comprised a thematic discourse analysis approach, followed by interpretive reflection. Typologies are here taken to mean ‘systematic classification of types of social phenomena as they fall within a particular category’ (Layder 1998: 73). This process helped in taking emerging themes to higher levels of abstraction so as to assist in theory-testing, theory-postulation, and theory-building. The final coded, segregated, typologised material then provided the processed data sets for the analysis and writing of the thesis.

The material was therefore ‘layered’ (Cresswell 1998): that is, once the material was analysed into themes, it was then further studied and reflected on and developed into broader, more abstract categories, and then tested against, or used to postulate, new theories. Such an inductive approach is therefore one of ‘emerging design’ (Cresswell 1998) and, of course, follows much ‘reflection’, and then ‘reflection on reflection’.

I applied two broad approaches to the analysis. To focus reflection on, and study of, the material I was first guided by the theoretical base to the thesis: George Kelly’s Personal Construct Psychology; the importance of language and metaphor to reveal discourse; Kuhn-Foucault knowledge-power; the process of innovation and diffusion; and the historical thread and path-dependence. Secondly, I used a combination of grounded and adaptive theory approaches.

Ethics Protocol

This research was approved by the ANU Human Ethics Committee, and I was granted a ‘Human Ethics Protocol - No 2009/197’ in May 2010. I also completed compulsory Research Integrity Training, under the auspices of the ANU Office of Research Integrity. Permission was therefore obtained from the ANU’s Human Ethics Committee to conduct the interviews of this study.
As part of the Ethics Protocol approval I had a standard information sheet tailored to my research work and also a consent form. At the start of each interview these and the nature of my research were discussed, and all consent forms were signed and returned. Interviewees were guaranteed complete confidentiality. On returning home after each interview I followed up with a written or emailed thank-you note. All informants’ information was kept confidential, and a key proviso of the ethics protocol was that I could not identify nor quote from any interviewees in either the thesis or subsequent publications without them having read the proposed quote and then given approval. In my thesis, interviewees were given a number code (e.g., # 16), the key to which, with names, is listed as Appendix 1 (confidentially available only to examiners and my supervisor).
CHAPTER 5  THE PERSONAL CONSTRUCTS OF
AUSTRALIAN LAND-USE

Introduction

The Prologue on page 1 at the start of this thesis raises key questions regarding Australian land-use and its place in the planet’s dilemma. The foremost of these include: Why are our personal constructs so powerful? Where have they come from? And ‘how did they evolve? The first question was addressed in Chapters 2 and 3. I begin an attempt to further answer this and the remaining questions in this chapter by undertaking a literature review of Western thought, and particularly of the momentous changes of the last five centuries. This detailed search, upon sequential reading of texts in chronological order, originally yielded 194 ‘Foundational’ personal constructs that determine contemporary behaviour, practices, value-systems, and ethics regarding Australian land-use. This full analysis is found in Appendix 2. In this condensed Chapter I have reduced these Foundational constructs to 62 of what I term ‘Key’ personal constructs (numbered in boxed squares with the prefix ‘K’ for ‘Key’). Appendix 3 reveals their derivation and cross-linkages from the 194 Foundational constructs in Appendix 2.

Along with other issues, this thesis deals with the perplexing wicked problem of the degradation of land and ecosystem services in Australia. ‘Perplexing’ because it is ongoing and has enormous direct and opportunity costs; because, in the main, while we know the causes of land degradation and many of the solutions to the problem, yet there seems little progress. And thus perplexing because, despite all our scientific and specialist knowledge and huge investments in agricultural extension and social programmes like Landcare, little progress appears to have occurred.

Clearly other factors are at play, and a key factor is the personal psychological constructs farmers carry in their heads: in that ‘one square foot of real estate’ so central to this thesis. These constructs relate to what the world is like, how it works, and the role of humans and other organisms in it: in this case regarding the land and land-use, and the economic and social-ecological systems in which such land-use is embedded. Such personal constructs in turn determine our attitudes, habits, traditions, values, ethics and world-views. These
influence how we farm and treat the land, and how we think a natural system functions. Crucially, such factors are ‘socially constructed’.

In 1970 Black stated that the complex set of attitudes, values and beliefs that people carry in relation to the land and its use are generally inherited unwittingly, are generally unquestioned, and are apt to defy analysis (Black 1970: 22). I take issue with the final part, because I believe that with some determined historical excavation we can gain an understanding of the historical origin, and thus the embedding of such attitudes, values, and beliefs. That is the intent of this chapter. Indeed, I fully concur with Wright who stated that ‘[s]ociologists must look to historically embedded and culturally shaped repertoires of capacities to understand how meaning and action are constructed’ (Wright 2005: 475).

Historian Lynn White pointed out that our ideas regarding nature, the land, and our interaction with and use of them have not only influenced human behaviour but have shaped our very landscapes. Therefore, says White, our ideas ‘have been and are parts of the ecosystems to which we belong’ (White 1967: 1203).

In the footsteps of Aldo Leopold’s famous call for an ecologically informed history (Leopold 1949), as a template for this analysis I use an holistic application of Donald Worcester’s ‘agroecological perspective’ in history. This recognises three primary levels of analysis: (1) nature (the dynamics of natural ecosystems over time); (2) the interactions and impacts of the political economy of productive systems on the environment; and (3) the impacts of human attitudes, values and belief systems (Worcester 1990; Powell 1996).

The third and last factor is integral to this thesis. Worcester alludes to ‘belief systems’ as ‘that more intangible, purely mental type of encounter in which perceptions, ideologies, ethics, laws, and myths become part of an individual’s or group’s dialogue with nature’ (Worcester 1990: 1091). As discussed in Chapter 3, central to understanding this issue (and this thesis) are language and metaphors, because if we can ascertain the origins of the dominant metaphor/s in society then we will go a long way to better understanding ourselves and the personal constructs that drive our behaviour, our practices, our value-systems and ethics, and thus how, if required, we can possibly change these.
5.1. Overthrow of the First Metaphor – the Organic - in Favour of the Mechanical (1500-1700)

Carolyn Merchant persuasively argued that between 1500 and 1700 in Western Europe an *organic* conception of the cosmos gave way to a *mechanical* model. In turn this monumental shift had profound impacts on the current beliefs determining our approach to nature and on the ruling philosophies and paradigms that govern how modern Western society functions.

Relevant to this thesis and the role of personal constructs, environmental historian Merchant also argues that our concepts of nature and women are historically derived social constructions. She asks: ‘How have people historically conceptualized nature?.. How have they behaved in relationship to that construction?’ (Merchant 1980: xvi). Her research reveals that the metaphorical shift in the way nature was conceived over the two to three centuries of the Scientific Revolution, the Enlightenment, and the rise of a market-oriented culture in early modern Europe has had a profound impact on human thought.

The metaphorical shift, says Merchant, began between the sixteenth and seventeenth centuries when ‘the image of an organic cosmos with a living female earth at its center gave way to a mechanistic world view in which nature was reconstructed as dead and passive, to be dominated and controlled by humans’. This, she says, constituted *The Death of Nature* as a living being: a sanctioning of the domination of both nature and women. It was also, she says, ‘the most significant and far-reaching effect of the Scientific Revolution’ (Merchant 1980: xvi; 125). The end result, in modern times, is that Western society no longer regards nature as a nurturing mother, nor holds her in reverence, nor treats her with respect. And neither does that society live within nature’s cycles to bind together the self, society and the cosmos.

The original organic view of nature had an inherent value system: one, says Merchant, that ‘paid recognition to the life and worth of all things, the concept of cyclical renewal, and the binding of nature into a close-knit holistic unity’. Instead this has been replaced by the destructive effects on nature and landscape of the exploitative, linear mentality of forward progress: of ‘competition, aggression and domination arising from the market economy’s *modus operandi* in nature and society’: that of ‘uncontrolled growth associated with capitalism, technology, and progress – concepts that over the last two hundred years have
been treated with reverence in Western culture’. However, these concepts have led to an accelerated ‘exploitation of both human and natural resources in the name of culture and progress’ (Merchant 1980: 268; xx; xxii).

Importantly, most ecologically sustainable indigenous cultures today and in the past seem to have held variants of the organic metaphor. The significance of the organic metaphor - of a nurturing mother across time - is that it contains strong ethical, spiritual, and ecological implications, and this is because the entire organic framework, as a conceptual system, carries an associated value system.

Constructs derived from the implantation of the Mechanical Metaphor (1500-1700)

I will now delineate the personal psychological constructs regarding nature and land-use as derived from successive historical phases, and which came from my sequential reading of the literature as cited in this chapter. These are in numbered sequence. Constructs K1 and K2 are derived from the analysis above.

CONSTRUCT K1: ‘Man’ is in control: he is outside and above, alien to nature, because ‘man’ and nature are separate.

CONSTRUCT K2: Nature, land and its resources are limitless and inexhaustible, and ‘man’ is free, and it is his duty, to be master, and to conquer, control, dominate and exploit them (man has power over nature).

The roots of an organic world-view have a long history. These origins are lost in time, but some were derived from paganism and animistic beliefs. Classical Greece and then Rome subsequently fostered the Arcadian or pastoral image of nature as benevolent, peaceful and rustic. By the Renaissance the dominant organic metaphor of nature was of a designed hierarchical order existing within the cosmos and society (Merchant 1980: 156).

What was crucial in the process of the epoch-making metaphor shift was that variations of the organic myth allowed construct-shapers during the phase of commercial and technological change to either absorb or reject key elements of the organic framework. As an example, the pastoral tradition with its implications of nature being able to be ploughed and cultivated also
meant nature’s use as a commodity and manipulation as a resource; of nature capable of being tamed and subdued for human benefit. This masculine conception of nature, part linked to Aristotelian and Platonic philosophy and the concept of passivity of matter, could then be incorporated into the new mechanical world-view, where matter and nature were seen as inert ‘dead’ atoms as constituents of a new machine-like world, one capable of manipulation. Such a view was easily and quickly adapted during the evolution of the Scientific Revolution and the market economy.

As the early modern economy began to rapidly grow (through, for example, mining, ship-building, more intensive agriculture, and so on), the shift from the organic to the mechanistic metaphor from the 16th century involved an integrated process of change and iteration between new forms of human interaction with nature. This challenged the traditional organic model and was linked to concomitant changes in society; in religious, philosophical, political and scientific thought; and to evolving modes of social organisation and new approaches to commercial interaction and conduct. Francis Bacon in particular, the so-called ‘father’ of modern science, was forthright about the use of mechanistic techniques to subdue and control nature. Scientific man’s role was to wrest secrets from nature so as to gain control over her for economic advance (Bacon 1627 [1899]).

**CONSTRUCT K3: Nature (and the soil) is like a static machine: dead and composed of inert atoms or matter, in movement in a dead cosmos. Nature is therefore subject to, and able to be broken down to, simple mechanical laws, and so can be managed, manipulated, improved and transformed. Machines exist to manipulate nature for human benefit.**

Crucial was the shift from feudalism to capitalism, when the traditional organic model of communal, organic, interdependent society (one that emphasised the whole and not the parts) was undermined and transformed by the competitiveness and acquisitiveness of a capitalist market economy. Such an economy increasingly manipulated nature with more efficient machines, gradually breaking down and then alienating humanity’s relationship with, nurturance of, and reverence for, nature. The certainty and stability of the scientific-Enlightenment mechanical world-view also transformed society and politics in mutual support of each other. Key to this was the ‘mechanic mind’ viewing nature as dead, passive
matter, thus sanctioning ‘the exploitation and manipulation of nature and its resources’ (Merchant 1980: 103).

Prior to the monumental cultural, philosophical, religious, political and scientific shifts following the Reformation and Renaissance, other powerful forces in Western culture helped lay the ground work for inculcation of the mechanistic metaphor. A key factor was Judeo-Christianity, the long dominant and reigning religious and philosophical world-view of an emerging modern Europe. Lynn White famously argued that Judeo-Christianity (except for the Franciscan tradition) not only established a dualism of man and nature, but had also ‘insisted that it is God’s will that man exploit nature for his proper ends’ (White 1967: 1206). Merchant agreed. ‘The idea of man as nature’s guardian and caretaker’, she said, ‘was a managerial interpretation of the doctrine of dominion’ (Merchant 1980: 249).

CONSTRUCT K4: ‘Man’ has dominion over nature because he is at the apex of creation, and so the earth and nature were created for him as a storehouse, and to serve him for his own gratification (i.e., it is God’s will that man exploits nature for his own ends). So ‘man’, a rational steward, is nature’s guardian and caretaker, managing her for her own best interests.
CONSTRUCT K5: Subservient, powerless, female nature is there to nurture the dominant, powerful male.
CONSTRUCT K6: ‘Man’s” role is to subdue and control nature by wresting secrets from her.

What ensured the entrenched dualism and removed objectivism of man-versus-nature was the partnering of science, philosophy, politics and religion during the phases of the scientific and commercial revolutions of the Enlightenment that culminated in the 18th century. Both society at large and the ‘fathers’ of a modern, rationalist science, economy and society shaped their philosophy within a Judeo-Christian tradition. With reductionism nature became inanimate and atomic, and any space or framework for a caring God and for the attainment of human grace were also removed, leaving in its place an intellectual arrogance towards nature (Merchant 1980; White 1967).
CONSTRUCT K7: Nature and natural objects have no feelings, soul nor mind; they are not mystical, have no religious or mythical connotations, have no enchantment, and so they can be mastered and possessed.

In concert with the Scientific Revolution was the rapid burgeoning of an emerging capitalist society. In terms of natural resources, this involved the transition from peasants controlling such resources for the purpose of subsistence to capitalist control for the purpose of profit, and thus to more specialized production for the market. Money became the form of both exchange but also of value and thus accumulation, and so forces to do with expansion and accumulation became key drivers of an emerging exploitative society. All this was achieved at the expense of the environment and village and spiritual community.

5.2. Emergence of the Dominant Modern Discourse – the Mainstream Narrative of Western Culture: Science and Technology-based Mercantile Capitalism

The rise to domination of the mechanical metaphor and of a human/nature dualism by the 18th century (part of what Plumwood calls ‘the master form of rationality of Western culture’; Plumwood 1993), has early foundations in the Western intellectual tradition, but then culminated in the denial, exclusion, and devaluation of nature. The big shift to the mechanical mind devolved from the giants of Western scientific rationalism from the 16th century through to the 18th century Enlightenment. The Cartesian development of rationalist and humanistic thought was vital. It was Descartes and fellow mechanists Mersenne and Gassendi who placed, front and centre, not just the idea that the human mind and reason were of primacy, but that nature was ineluctably alien, a terra nullius, uninhabited by ‘mind’. This thereby cemented the human (or reason)/nature dualism. Crucially, this construction of the animal/nature as mindless mechanism was along mechanistic lines.

The machine image under Descartes and his fellow philosophers invoked human (and especially male) power over nature, which, being mindless, was available for annexation and for utilitarian purposes and the gratification of human satisfaction. This was a forerunner philosophy to modern capitalism (Plumwood 1993; Merchant 2004). A moral/ethical freedom was claimed for the masculine exploitation of nature. This perception of nature as being
dead/lifeless and mechanistic would prove the foundation stone of materialist reductionism, empiricism and objectivism.

Once the mechanistic/rational view that nature was subject to law-like behaviour had emerged, then it was a logical step for a Newton, with his laws of mechanics and gravity, to describe the actions of the ‘world machine’ (Merchant 2004). The remaining piece in the intellectual construction of Enlightenment thought was to link the mechanistic ideas of Bacon, Descartes, Newton and others to that of economic and political theory so as to embed a capitalist philosophy, and one of intensified human instrumentalism in terms of nature. This entrenched the idea that nature had no value except where it was reduced as a means to human ends, as an instrument for use. This bridge was made by John Locke and Adam Smith. This view ‘of nature as terra nullius available for annexation, as empty, passive and without a value or direction of its own’ in turn led to Locke’s liberal argument, in his second treatise, for the legitimacy of private property (Plumwood 1993: 111).

Once nature was rendered lifeless, homogenous and passive, and with no agency, through the use of reason (rationality) the way was opened for the profitable appropriation of the whole sphere of nature as ‘reason’s own individual property’. Nature and indigenous people were thus an instrumental resource (Plumwood 1993: 192).

**CONSTRUCT K8:** Nature/the land is inert, un-sacred, without diversity, complexity or self-organising function, and so you can’t leave it to nature to solve problems.

This secular world view – a materialistic, growth-based capitalism – was pretty much articulated and formed by the late 17th century. It was labelled by Merchant ‘the mainstream narrative of Western culture’: ‘perhaps the most important mythology humans have developed to make sense of their relationship to the earth’ (Merchant 2004: 2).

**CONSTRUCT K9:** Reason is the supreme good, and is limitless in managing the world and reality; therefore the rational, scientific approach is the best way to gain knowledge. This is because rationality, objectivity and science (not theology, spiritual or other knowledge) explains the natural world. Thus other knowledge cultures are inferior.
CONSTRUCT K10: The cosmos, nature, society and human body are ordered systems of interchangeable atomized and mechanical parts that can be repaired or replaced from outside (the technological fix). They are able to be governed by law and discerned and predicted through deductive reasoning. They are not part of a wider organic whole.

Integral to this was a new view of property. The idea of the acquisition of private property was the gateway to enabling humanity to progress from the ‘state of nature’ into ordered civil society, and this came from a long line of philosophers and thinkers (see for example Thomas Hobbes’ Leviathan [1656] and the work of John Locke [1689; 1967a]). The latter set out ‘the conditions necessary for mercantile capitalism: the transformation of undeveloped nature through labor and private property into civilised society’ (Merchant 2004: 81). Farming (the combination of land and labour) was critical in this process. From the biblical domination and subduing of the earth we had now moved to annexing and enclosing land from the commons as owned, private property (Locke [1689] 1967b: 22).

CONSTRUCT K11: A mechanical nature, being empty, lifeless, homogenous, passive and with no agency, is thus a chattel, a utility, a factor of production (assessable only in economic terms). Being an inert consumable commodity, it is available (through ‘improvement’ by human agency, science and technology) for commercial annexation, division, exploitation and/or sale for profit-making, wealth-creation, parcelling and selling. Land values can thus be determined by factors beyond actual or potential use, and agricultural production is purely for sale to the urban market.

CONSTRUCT K12: the creation of private property with labour, leads to civilised society.

Deeply embedded also within the thinking of John Locke and his peers was the Enlightenment idea of progress. This powerful idea with long antecedents possessed great energy, along with a philosophy of action and ethical direction (Beard, in Bury 1932). The optimistic idea of progress held ‘that civilisation has moved, is moving, and will move in a desirable direction’ (predicated on an ever-increasing accretion of new knowledge about our world and environment; Bury 1932: 2). This meant that an acquisitive middle class and others saw the human race as a rational species in control of its environment for its own ends in an expanding market. This utilitarian approach therefore held that humans were ‘rational
“stewards” managing nature for its own best interests’. When attached to the discourse of post-Enlightenment industrial capitalism the idea became a ruling, deeply assumed worldview and ethic that, through the agency of reason, enabled the continual and cumulative overcoming of the domain of nature (Plumwood 1993: 16).

**CONSTRUCT K13:** Progress is good and a given (civilisation moves in a desirable direction) and is underpinned by science and an ever increasing accretion of new objective knowledge; and so one has to ‘improve’ at all costs.

Linked to Locke’s ideas, and cementing the modern concept of capitalist economics, was Adam Smith’s contribution to the evolving ‘Master’ or dominant discourse. Smith did for economics what Newton had done for science: he laid down a system of capitalist economic laws built on the triumvirate of progress, property, and polity. ‘Nature’ was the raw material for wealth creation through ‘improvement’ via predominantly masculine human agency, courtesy of science and technology (Smith [1776] 1986). In the process, the jettisoning of ethics, morals and values with regard to the earth, nature, other creatures, and other peoples continued accelerating.

**CONSTRUCT K14:** Like nature, the economy and society work according to mechanical laws.

**CONSTRUCT K15:** Enclosing land and dead, inert ‘nature’ creates property ownership and wealth; and ownership/privatisation confers absolute rights of property and gives individuals power over the land.

**CONSTRUCT K16:** There are no moral/ethical restrictions on the creation of wealth out of an inanimate, mechanical nature via human agency [labour and entrepreneurial behaviour], science and technology.

Underpinning (or coterminous with) many of the post-Enlightenment ideas, philosophies and world-views (including of reductionist science), was the philosophy of humanism. This involves a supreme faith in human reason, and an almost irrational faith in the limitless power of humans (Ehrenfeld 1978). Crucially, by implication humanism rejects the possibility, value and contribution of other knowledge cultures. Foremost of the humanist platform is its ‘faith in the children of pure reason: science and technology’ (Ehrenfeld 1978: 5-6).
Developing from the idea of human superiority, therefore, is the hubristic belief that Nature was created for us and can be controlled, thereby cementing the dichotomy of people versus Nature. In short, as Ehrenfeld concludes, ‘Humanism is at the heart of our present world culture – we share its unseen assumptions of control’ (Ehrenfeld 1978: 20).

All this appears relevant to the personal constructs of Australian farmers and consequent land-use. As Merchant summed the situation in Western Europe at the end of the 18th century just before the invasion and settlement of Australia, ‘[m]echanism rendered nature effectively dead, inert, and manipulable from without.’ The result today, concluded Merchant, is that, as the unifying model for science and society, ‘the machine has permeated and reconstructed human consciousness so totally that today we scarcely question its validity’ (Merchant 1980: 214; 193). This therefore constituted a tectonic displacement in a world-view, whereby the mechanistic metaphor had fundamentally re-ordered and restructured reality in a new way. This changed people’s personal constructs and concepts of self within the cosmos and natural world.

By the 19th century and the settlement of Australia, therefore, the mechanistic world-view had reordered personal reality around two fundamental constituents of human experience: order and power. Clocks and machines reinforced this, and the ‘death of nature’ (the removal of identification with, nurturance of, and respect for nature as a living, holistic, integrated, mother organism) all led to the removal of any ethical, societal and moral constraints in exploiting nature. Such a framework of values based on power was fully compatible with the parallel evolution of commercial capitalism. It would seem, therefore, that there was a high likelihood that such mental baggage could prove damaging when it met the Australian continent.

The relevance for Australian land-use attitudes is that it was these constructs and meanings derived from the origin stories of European settlers and their cultural and economic practices that were transported to, and continued to develop in, Australia.

Our challenge now is to identify further personal constructs that make up the cognitive bricks of these foundational beliefs, as Western society built on the above socially constructed platform of reality.
5.3. Personal Construct Formation in the New Era of Mercantile Capitalism Prior to Australian Colonisation (1700-1850)

The process of land enclosure occurred over many centuries in England and Wales, and came to a climax during the proto- and early phases of the industrial and agricultural revolutions in the 18th and 19th centuries. This led to both the destruction of the medieval peasant community (the yeoman farmer - yeomen being owner-occupying family peasant farmers: Allen 1992) and the creation of the chequer-board pattern of the modern English landscape. The process therefore had profound effects on re-forming personal constructs. These subsequently came to influence Australia and attitudes to land settlement and land-use, and to what was perceived as a *tabula rasa* island-continent. In England the shared lands were gone, in favour of individual rights (including property ownership), while the profit-drive of modern capitalism had displaced a universal agrarian life that had contained embedded meaning and the sharing of resources within a community (Kain et al. 2011; Allen 1992).

The end result of the enclosure process was a number of deeply embedded attitudes, values, beliefs and world-views that could be termed an Anglo- or Euro-centric ‘enclosure of the mind’. Critical was the commodification of both labour and land, and indeed of nature itself. The mechanism of the social allocation of land was through sale and purchase in the market place: a radical altering of material relations between human beings and the land. This was because purchase of a commodity parcel of land on the market conferred absolute rights of property over that land to the individual. This right of property was enshrined in law. Another fundamental shift was that the value of the land could sometimes be determined, in the process of exchange, without reference to its actual or potential use. In effect this led to a dependence on the life of the urban market-place, and again broke ancient ties to the land (Cosgrove 1984). In the wake of capitalist imperialism, and beginning regionally, then nationally, and finally globally, space (land and ocean) thus became integrated into the market system. This paralleled the social concentration of capital in fewer and fewer hands.

Along with the displacement of villagers and rural workers and the elimination of the yeoman farmer as part of the process of converting the UK from a rural to an urban society, the flotsam and jetsam of dispossessed and displaced rural people were forced into the bigger towns and cities. From there many came to Australia (as either convicts or free immigrants)
through the 19th century. These people from the nations of the United Kingdom and similar parts of Europe brought with them a land-hunger, and a capitalist attitude to land as being a tradable chattel and factor of production.

This land-hunger among settlers was to affect political developments in Australia, culminating in a move from opportunistic squatting aggregations to planned colonial land settlement laws in the 19th and 20th centuries that were designed to implant a smaller-acre yeoman farmer on Australian soil. Social unrest in the UK, combined with the industrial and agricultural revolutions, led not only to political radicalism but to a pining for land as a gateway to liberty and more than peasant survival. From the mid 19th century the ‘land issue’ and land ‘battles’ became a, if not ‘the’, key issue in Australian society. The new country was seen as a commodified object ready for division and sub-division. McQueen confirms how strong ‘the intensity of the desire to possess land’ was amongst these new immigrants, and how land was thus endowed with powerful ‘mythical, indeed religious qualities’ (McQueen 1970: 147). This land-myth, concluded McQueen, still flourishes in the Australian psyche today, and was founded and flourished ‘upon a tripod of forces: peasant faith in land, utopianism, and an abundance of untilled acres’ (McQueen 1970: 147-148).

**CONSTRUCT K17:** Owning land promises the good life, liberty, and equality, and delivers optimism, a sense of power and security.

**CONSTRUCT K18:** Land must be unlocked and made available to all in Western society.

### 5.4. Personal Construct Formation at the Collision of Western Europe and the New Land, Indigenous People, and Biota of Australia (1788-1900)

**Overview**

It is no coincidence that the Enlightenment and scientific, industrial and agricultural revolutions coincided with the next wave of global imperial conquest by leading European Christian nations, the foremost being Britain. These nations came to see the entire globe as a hunting-ground ready for annexation so they could exploit its resources (both natural,
material and human) to feed the fires of industrialization, financial and population growth, and the overall expansion of their economies and factories.

**FIGURE 5.1. The Death of Nature & The Shift to the Mechanical Mind**

This process in itself entailed a cluster of implicit and explicit values, world-views and attitudes discussed above. There was also a confident belief in Christian superiority over ‘primitive’ people. Underpinning this, as Cosgrove stated, was an ‘imperial moral imperative…to bring all humanity to the level of civilisation enjoyed by those furthest advanced’ (Cosgrove 2001: 22; 199).

**CONSTRUCT K19: Because all resources (natural, material, human) are exploitable, and because a Christian people are at the apex of civilisation (superior to ‘primitive’ people), such uncivilised, primitive native peoples can be conquered and exploited.**
Derived from the above imperialist, capitalist and Anglo-European centrist world-view, the new lands of Australia came to be regarded as an exploitable resource; as a capitalist factor of production. Given the vastness of the land, forests and grasslands, a dominant attitude thus emerged: one of limitless resources.

**CONSTRUCT K20:** Pioneers and settlers/farmers are heroic and independent, and farmers can do with the land, nature and its peoples what they want because every individual has the right to pursue his own interests.

**CONSTRUCT K21:** Good/best farmers/settlers are progressive, and land/nature development and profit-making from this is good and necessary. They maximise productivity growth, production, the extraction of ‘value’, performance, efficiency, returns, profits, asset values, wealth and status from natural resources.

Following the early phase of pioneering, European settlers and politics became caught up in a second phase of land settlement: the post-1850s ‘battle for the land’. This comprised a battle between squatters and settlers, given that ongoing Aboriginal dispossession and frontier warfare was an assumed inexorable and finite process (Reynolds 1987). This involved other concomitant attitudes/personal constructs. For example, for the vast majority of its modern post-invasion history, Australia not only remained a colonial supplier of raw materials, but wool was king, with the umbilicus to England and Europe (Massy 1990; 2007; 2011). To produce this material, extensive Australian grasslands and natural resources were needed. A key ‘factor’ of production of competitiveness during this critical phase (1840-1890) was the ‘free’ or cheap price of land derived from the construct of *Terra Nullius* and consequent Aboriginal dispossession. Exploitation of the landscape for cropping, timber extraction and such followed, as the natural resources appeared limitless.

**An Alien Landscape to the Anglo-European Eye**

In addition to the above attitudes carried by the pioneers and settlers, the new land and landscape (along with its variable climate, water courses and the biota itself) were strange and alien to the Anglo-European mind. This in turn elicited or solidified other attitudes and constructs regarding the new land: constructs that nevertheless enabled ‘successful’ settlement (Crosby 1986).
Eric Rolls famously stated that ‘it was beyond human achievement to assess’ the new land of *Terra Australis* correctly: that it ‘was more a new planet than a new continent’ (Rolls 1994: 26). Consequently, due to successive waves of new immigrants right through the 19th, 20th and now the 21st centuries who regularly brought their Anglo-European (and later Asian, ‘Eastern’, and African) frames and constructs, any attempts at a more antipodean mental acclimatisation were constantly diluted. Australian settlers seemed in denial (and certainly with no feeling of belonging) as they persisted with their ‘homeland’ constructs. These included expectations of a reliable climate, and thus a consequent conducting of farming practices as if the soils also were just as resilient, humid and rich as those in Europe. Also, due to their feelings of alienation in the ‘strange’ land, they consequently sought to introduce familiar vegetation and/or animals (rabbits, foxes, starlings, skylarks and so on) as epitomised by the role and widespread nature of ‘Acclimatisation’ societies right into the late 20th century. Or else they made repeated attempts to introduce ‘improved’ pastures and crops suitable to such an expected European-like climate and soils, and to neglect (indeed to write-out of reality and so exclude) Australian native grasses: the very species adapted to Australia’s variable climates and poor, low nutrient status soils. (Productivity Commission 2009; Stipa 2012).

**CONSTRUCT K22**: The Australian climate is abnormal, un-European, and seasons will soon return to ‘normal’ or ‘average’; this also assumes low evaporation rates and high humidity, as in Europe.

**CONSTRUCT K23**: Droughts are abnormal aberrations, and Australia behaves according to four European-like seasons. Droughts therefore can be ‘fought’ and ‘beaten’.

**CONSTRUCT K24**: The alien land has to be dispassionately tamed and moulded, ‘civilised’ and ‘improved’, and domestic animals and plants need to be introduced.

**CONSTRUCT K25**: Australian Nature is ‘the enemy’, its plants and animals are ‘pests’; Australian native grasses and vegetation are inferior, and so the Australian landscape needs to be ‘improved’, tidied-up, made orderly – using superior European grasses, crops, and domesticated animals according to an European ideal.

**CONSTRUCT K26**: Australian soils are like those in England/Europe: humid and rich, and so can be treated the same.
The changeable climate and environment proved a particular challenge. Nothing seemed regular or reliable, season to season or year to year. Despite this, a European concept of four predictable seasons was assumed from Australia, notwithstanding the huge variety of climates and life cycles of plants and animals out of kilter with such a rigid construct.

Adding to the confusion, and due to Australia’s unfamiliar flora, fauna, landscape and climate (as Heathcote pointed out), incorrect European terms were applied in classifying or describing species; in describing Australia’s strange watercourses; or even in describing the weather (Heathcote 1972).

CONSTRUCT K27: The rivers, streams and rivulets are abnormal, un-European, and will soon flow regularly again.


Similar constructs of denial can be seen in attempts to ‘improve’ the Australian landscape: seen in the dominance of European/exotic species in domestic and public gardens, and of maladapted European/exotic tree species across Australia’s rural landscapes through to the present.

Implicit in the desire to ‘improve’ Australian landscapes was a drive to ‘tidiness’. With the encroachment of industrial agriculture later in the 19th century and the move to mono-cultural industrialised farming, these constructs of ‘tidiness’ and orderliness reflected ‘control’ over nature. The converse belief in Australia and elsewhere was that undomesticated nature was untidy and disorderly.

CONSTRUCT K29: Nature/the land is untidy/unruly and needs taming/ordering, tidying-up, and so needs domestication via colonising and cultivation.

Perhaps best typifying the difficulty of changing and adapting constructs to match the new, alien land (and with far-reaching consequences) was the struggle to come to terms with the regularity of drought as an inescapable feature of the Australian land and climate. It was foreign to the Anglo-European mind. In both land management and government policy on drought until into the 21st century there seemed a collective denial of this being a major and
regularly occurring element in the Australian environment. As George Seddon summed it, ‘[d]rought is a problem of perception, applied when Nature has failed to meet our expectations’ (Seddon 1997: 221).

Moreover, as Eric Rolls succinctly observed, while droughts ‘are an essential part of the cycle…it was never intended that soil should be bare during every drought’ (Rolls 1994: 32). Because the damaging effect of laying bare the soil is still not widely understood today, we regularly see both the baring of ground during recurring droughts and also in the annual agricultural management cycle.

| CONSTRUCT K30: It is ‘normal’ for the ground to be bared in a drought, because rain and normal seasons will soon return, and the land always bounces back (is resilient). |

Also, the European mind never seemed to come to terms with another unique climatic aspect of Australia: the high evaporation rate. Ninety per cent of Australia’s annual precipitation returns to the atmosphere by evaporation and transpiration because of evaporation rates higher than expected for such latitudes (Smith & Finlayson 1988).

**The Social Construction of Landscape**

A key reason for the Australian land and climate appearing alien to Anglo-European settlers has to do with the social construction and perception of landscapes. While the imperial Western nations gained ‘control’ of the world via the map and associated organisation of the imagination (plus of cultural worlds and of identity via a signification of space and territory; see Appendix 6 for this discussion), importantly such a signification and social construction also occurred for the landscape itself. That is, colonists and settlers brought a socially-constructed, cognitive view of what landscape was - of what reality was and should be - and this was no less powerful and pervasive as a signification of space and territory than was the map. This was because such cognitive, socially-constructed representations and expectations of a landscape had agency, as they also influenced the shaping of understanding and further action in the new landscapes.
These representations and expectations came about through previous cultural immersion and then through the representation of landscape in literature and art. In turn, the culturally constructed significance of landscape shaped the way land was materially appropriated and used; it shaped the relationships between society and the land. As Cosgrove pointed out, this is because ‘the landscape idea represents a way of seeing’ because humans socially construct a landscape ‘according to a set of beliefs about the way the world should be’, and thus this ‘construction of truth’ is both moral and powerfully ideologically charged (Cosgrove 1984: 1, 8). Therefore, a key reason behind many inappropriate land-use constructs persisting for so long and powerfully in Australia is the influence of the capitalist transition on the mental baggage (the constructs) that early settlers carried into Australia’s *tabula rasa* landscapes.

Depictions of landscape, and our interpretation of physical landscapes, are thus layered with meaning. In art the origins of landscape in the Renaissance humanist tradition became, as Cosgrove pointed out, ‘the view of the outsider, a term of order and control, whether this control is technical, political or intellectual’ (Cosgrove 1984: 36). This is graphically demonstrated in 19th century Australian art. Early works, as typified by Joseph Lycett’s view in 1826 of Alexander Riley’s *Raby* farm, reveal the process of pioneering: of carving out European agrarian order in an alien, forested, inchoate wilderness. Access to land, privately owned or controlled, and its shaping to an European ideal was the central feature of Australia’s new social formation. Actively constructing symbolic, iconographic space according to a landscape ideal was conjoined to the imposition of order imposed by the rectangular grid and straight lines – the enclosure instruments – of the surveyor. Riley’s farm was the epitome of yeoman capitalism: land accumulated as private property to achieve wealth and status. (See Figure 5.2, page 117). This makes a startling contrast to an European-Australian adapted view, as expressed by Fred Williams (Figure 5.3, page 117). More stark again is the contrast of Figure 5.2 to an indigenous view (see Clifford Possum Tjapaltjarri, Figure 5.4, page 118).
FIGURE 5.2.

‘Raby, Alexander Riley’s Farm. 1826’  
by Joseph Lycett. National Library of Australia, Canberra

Figure 5.2

FIGURE 5.3.

‘After the Bushfire’ 1968, by Fred Williams  
National Gallery of Victoria, Melbourne.

Figure 5.3
Virtually unavoidable, the result was that the socially constructed personal constructs that Anglo-European settlers brought to Australia rendered the new continent alien and incomprehensible. This destroyed any hope of an intimacy, enchantment or identification with (let alone understanding of) the new land. In turn this placed the settlers in a position to be free to exploit, and to farm with no comprehension of landscape function within, the new and complex landscape.

**A Belief in Racial Superiority**

The utilitarian acquisitiveness of post-Enlightenment mercantilism and modern industrial capitalism, manifested in imperial conquest of the new lands, was founded on a secular humanism. This, as Cosgrove expressed it, depended ‘upon the process of “othering” those over whom supremacy is exercised’ (Cosgrove 2001: 17). Crucially, Cosgrove links this to the issue discussed above: that of the alien nature of the new land of Australia. That is, to
hold an ‘imperial spatiality of center and frontier’, then the conquering people need to ‘figure’ ‘a landscape of self and home by othering people and places’ (Cosgrove 2001: 17).

Aiding these humanist ideas, as seen earlier, was belief in a Christian superiority over ‘primitive’ peoples. Later in the 19th and into the 20th centuries, Darwin’s theory of evolution (in the hands of neo-Darwinists) provided a ‘rationale for the colonial displacement of people and transformation of environment by a superior race’ (Frawley 1994: 61). Thus expansion of empire over other people was dependent on them being perceived as uncivilized beings. In regard to agrarian land-use, this in turn meant a rejection of an indigenous, long-term, complex, ecological ‘forever’ mind-set in relation to the land.

**Attitudes to Nature, the Soil, and Natural Systems**

Along with attitudes to the Australian Aborigine and landscape, perhaps most damaging of all the Anglo-Euro constructs that became embedded in Australian farming (and for reasons outlined previously), was the collection of constructs relating to Australia’s natural systems and biota. These were seen as one vast exploitable resource. Successive waves of settlers reinforced this; technological control of the landscape reinforced this; ‘progressive’ land settlement policies reinforced this; Australia’s ever increasing urbanisation reinforced this; and so did the subsequent national development and governance of Australia. In such a colonisation, as Dahlberg pointed out, the increase and scale of social institutions of governance, labour and specialisation meant a speeding up of ‘the gradual physical and cultural separation of individuals and societies from nature’ (Dahlberg 2001: 139).

Key constructs emerging from this divorcement include:

- **The inexhaustibility** of the new, ‘empty’ country, its limitless plains, forests, water and natural resources (see Rolls 1969; Marshall 1966; Lines 1991).
- In a period well before any knowledge of ecology, let alone of complex natural systems and their self-organising capacity, the soil and its natural systems were regarded as both **indestructible, inert** (non-living), and **humid**. Inappropriate farming and grazing techniques were thus applied – and are still applied – resulting in devastating and ongoing land degradation across the continent.
- **Ongoing inappropriate responses to the realities of Australia’s climate** to the present day (Strange & Bashford 2008; Robin 2007; Powell 1988; Frawley 1994; Douglas 1977). Thus Australia’s soils and natural systems were and are regarded as ‘indestructible’ and ‘inexhaustible’, especially on the return of ‘normal’ seasons.

- **Water was seen as inexhaustible**, and like the inappropriate responses to drought, the perverse nomenclature given to ‘rivers’, ‘streams’ and ‘rivulets’ meant these were expected to be running, not ephemerally dry. This had long-lasting legacies: from excessive irrigation development, to profligate waste of free-flowing bores from the Great Artesian Basin, and to the modern construct of green lawns in suburban and rural area alike: a denial of Australian reality in what is an attempt to replicate a ‘little England’ or Northern Europe.

| CONSTRUCT K31: | The soil and land is indestructible (‘bomb-proof’), an inert (non-living) storage-bin of plant nutrients, lifeless, inexhaustible, resilient – and so can be mined because it is a ‘machine’. |
| CONSTRUCT K32: | Droughts are beneficial because they rest the soil. |
| CONSTRUCT K33: | Water is inexhaustible, but any run-off is ‘wasted’. |

### 5.5. Land-Use Constructs Emerging from the Successive Phases of Anglo-European Settlement in Australia

**Overview**

We have seen that on encountering (and interacting with) the new Australian continent and its peoples, successive waves of Anglo-European colonists and settlers found that their portmanteau of Euro-centric constructs now both solidified and morphed. Importantly, these constructs also came to undergird land-use policies as Australia was progressively settled.

What is germane to this thesis is that ideas, constructs and world-views are conveyed by language and example (practice). Language and its symbols and metaphors, in its conveyance of ideology (in both text and practice), was integral to the entire process of settling and then farming Australia. Furthermore, all were directly linked to ‘power’: either of the individual, the corporation, the state, or a mix of these. Consequently I have delineated six phases of
farming development and thus agricultural discourse (see Chapter 3, Section 3.4. on the role of discourses). A discourse view allows us to further tease out both the apparent and hidden constructs that continue to drive Australian land-use.

The six major agricultural land-use phases (and their associated discourses) all date from historical technical and/or philosophical shifts in economic land-use. Within these there is considerable overlap and also continuity of key constructs, which act like deep and powerful tap-roots. These continue growing upwards into a trunk and branching out, but are still at the core of much behaviour and attitudes. Each discourse also unquestioningly carried on, built on, shaped, and changed mental constructs inherited from the preceding phase. Strong belief systems like ‘developmentalism’ (‘focused on economic growth and the instrumental valuation of the environment as “resources”’ – Frawley 1994: 60) and ‘progress’ flowed across time and through all these.

(i) The Pioneering Discourse: Imperial Conquest and its Constructs (1788 on)

This saw nature as alien but limitless, and pioneers operated in what they believed was a robust and resilient environment. The preceding analysis reveals how the pioneering phase had a huge impact on embedding personal constructs in Australian land management. As Waterhouse summed it, pioneering was also a conservative 19th century foundation myth which ‘promoted the notion that all those who first lived and worked on the frontier – squatters, selectors, and itinerant workers – were possessed of a common purpose, that is, to tame the land and guarantee the prosperity of succeeding generations’ (Waterhouse 2008: 75).

With these attitudes went a fierce independence, founded on the belief that the owners could do with the land what they wished: that they were indeed kings of their own grass, forest and cultivated landed castles. This came from the construct of ‘possessive individualism’: that every individual had the right to seek his own interests’ (Waterhouse 2008).

(ii) The Settlement Discourse: ‘Enclosure’ and its Constructs (1850 onwards)

Here, nature was seen as comprising available spoils to be divided. Underpinning this discourse phase was land settlement that followed the pioneering-squatting phase: that
process which provided ‘the means whereby rural Australia became tethered to the Empire’ (Atkinson 2008: 13).

**CONSTRUCT K34: Australia’s land and resources are for the production of cheap raw materials for export.**

The main political issue of the 19th century in colonial Australia – the ‘unlock the lands’ movement - involved converting the purloined holdings of squatters’ across the *Terra Nullius of Australia Felix* into legally titled, surveyed and owned blocks of land. The object of various colonial land Acts from 1861 was to open colonial ‘wastelands’ (‘Crown Land’) to selection by small farmers without much capital (the yeoman ideal of a self-sufficient farming people of peasant proprietors). The result was the establishment of a huge raft of settlers for both grazing and mixed farming, especially in the next discourse phase: that of industrial monocultural wheat production (Karr 1974; Powell 1970; Buxton 1967; Roberts 1924).

The land settlement phase after 1850 attracted free settlers, emancipated convicts, and settlers from the gold-rush era onwards; that very group who carried deeply embedded constructs, including an avaricious ‘land-hunger’ and a belief in the yeoman farming ideal.

To the above constructs others were added, and derived from the peculiar Australian settlement experience. From the 1860s (and particularly from 1880 with the advent of wire fencing) shepherding (involving the daily movement of sheep) began to be rapidly phased out in pastoral Australia. Fencing constituted the real ‘enclosure’ of the Australian landscape, and it had devastating consequences. Fluid, adaptive and regular movement of stock to available fresh feed and the needs of the landscape (shepherding) were replaced by the static practice of ‘set stocking’: of locking sheep and cattle in paddocks – invariably too long for the ecological health of the country. Part of this over-grazing also (besides the exploitative use of a ‘haystack’ of built-up natural capital over many years) was a belief by early pastoralists that grazing improved the pastures (Condon 2002).

**CONSTRUCT K35: Set-stocking is good, is traditional, and is easily managed, while grazing with sheep and cattle improves the pastures.**
In time, land degradation (resulting from over-grazing because of set-stocking) was not just blamed on over-grazing, but on soil compaction and damage due to hitherto foreign cloven, hard hooves.

Underpinning the above constructs (but linked to them) was the emergence of an agrarian tradition. The agrarian tradition or rural myth is a universal one (dating back at least to late 18th century France; see Appendix 4), whereby agrarian and rural communities develop a feeling of ‘specialness’ or separateness that seeks to assert their values and the perceived virtues of an agrarian way of life. This led to the development of a powerful mythology of the Australian countryside. Thus the ‘agrarian myth’ held that agriculture is ‘special’, ‘unique’, or ‘privileged’: that it is the core of a society’s wealth and thus deserving of special treatment, and that farmers are not just ‘the salt of the earth’, but that workers in other occupations are parasites (particularly those in the city) (Graham 1966).

The agrarian tradition and other associated constructs became further embedded as a result of the second phase of ‘closer’ settlement and ‘unlocking the lands’ in the early 20th century. From 1908 there was a succession of land settlement schemes: ‘closer settlement’ pre-World War I, then ‘soldier settlement’, ‘empire settlement’ and more ‘closer’ settlement between the two world wars; then soldier settlement again after World War II. There then occurred ongoing closer settlement and ‘unlocking of lands’ well into the late 20th century (see Appendix 5). Underpinning these schemes was the core philosophy of the agrarian myth: in Ken Fry’s words, ‘that Australia’s vast land resources could best be utilised by small farmers
who could produce a surplus for export to the United Kingdom’ (Fry 1985: 29) and later to the United States, Japan, and China.

These settlement schemes had two major impacts relevant to this thesis. First, given the repeated influxes of initially predominantly urban-derived, British settlers, there was little chance of the development of an adapted, sustainable-regenerative ethic to the new Australian land and climate. Consequently, constructs originating from Anglo-Europe and the pioneering phase, and inimical to preventing land degradation, were reinforced. Second, all these settlement schemes largely proved to be failures for a majority of individual farmers and their families, their communities, and the land. On page 127 of this Chapter I describe Australia’s Mallee and similar dust-bowl disasters of the 1930s that paralleled the Great Plains dust-bowl and ‘black blizzards’ disasters in America.

**CONSTRUCT K39: Settlers’ living areas (in acres) are to be predicated on ‘normal’ English-European living areas for yeoman farmers.**

One of the detrimental impacts of 20th century land legislation was that it fostered not just ‘enclosure’ and sub-division of big estates and ‘virgin’ land, but in many cases served to perpetuate pioneering and clearing of vegetation across the Australian landscape (and thus perpetuated farmers’ constructs). Linked to this were three key issues regarding land tenure that revealed both the power of Anglo-European derived constructs in regard to Australia’s land, its climate and its ecological system, but then in turn served to reinforce inappropriate constructs regarding land use: (a) damaging provisions within legislation; (b) leasehold provisions; and (c) the concept of ‘freehold title’ itself – all discussed in Appendix 5.

As Rolls pointed out, a key factor behind damaging legislative provisions in the 19th century as colonial governments moved to ‘unlock the lands’ was that no one in or outside of the legislatures appeared to understand the nature of Australian ecosystems, let alone the limits of land-use. ‘Bad land laws’ thus caused widespread destruction through either allotting too small a living area (causing overstocking and over-working of the soil), or preventing graziers spelling country (Rolls 1994: 26).
CONSTRUCT K40: Land degradation (including salinity) in planned settlement areas is the government's/bank’s fault.

In some land settlement legislation in the 20th century, a key provision to attaining ownership of land was a legal requirement to annually clear minimum areas or percentages of virgin vegetation (see Appendix 5). Leaseholds were a problem also; their short-term nature and other provisions encouraged a short-term, exploitative attitude to the land. Perversely, as Australia’s common law in regard to land ownership evolved in the 20th century (and in conjunction with other counter-productive legislation or legislative inaction in statute law), legal aspects of freehold tenure also did not encourage or enforce a sustainable, long-term approach to land use. This perpetuated previous damaging constructs to do with land-use; this time ‘state’ induced (see Appendix 5).

CONSTRUCT K41: Tenancy is a stepping-stone to ownership, and rented land can be worked hard.

As is discussed in detail in Appendix 5, key aspects of the counter-productive nature of the Australian legal system and evolved freehold title were: (a) the enshrinement of privatisation and individual rights, and the owner’s virtual uncontrolled use as he saw fit of that land (including a link to ‘developmentalism’); (b) a consequent omission of the concept of obligation and shame in regard to land-use; (c) the inculcation of the ethic of divorcement from the land and the de-sacrilisation from, or disenchantment with, nature; and (d) due to the extension of the concept of presumptive entitlements, an exploitative ethic perpetuated under what was effectively an open access regime.

CONSTRUCT K42: There is no onus on obligation or shame in Australian common law, so farmers can do as they wish.

CONSTRUCT K43: Soil conservation is optional.

A result of this combination of poorly designed legislation, rampant ‘developmentalism’, and developments (or non-developments) in both common and statute law was that pioneering-like vegetation clearing, closer settlement and other pioneering-like behaviour occurred on a
wide scale in the late 20th century and even into the 21st century. It can indeed be said we still are settling this country (see Dovers 2000: 12).

(iii) The Industrial Discourse and its Constructs (1880s on)

Here, nature was seen as available for exploitation, control, and production. The advent of fossil fuel use, modern industrial technology, and Australia’s incorporation into a global industrial and financial economy had profound impacts on Australia’s environment and land-use attitudes (constructs). This served also to reinforce existing constructs.

As the ‘monocultural wool vision’ became partner in a two-step with monocultural wheat lands (Robin 2007), the opening of new lands coincided with new technology, such as ploughs and combine harvesters. In places like South Australia’s semi-arid Mid North it was this technology-spawned optimism, in conjunction with inappropriate land tenure regulations and false land-use constructs, that led to subsequent environmental and social disasters as epitomised by the debacle over Goyder’s Line of rainfall (Heathcote 1972; Meinig 1961).

**CONSTRUCT K44:** The rain follows the plough, because constant ploughing and tilling both improves the soil and traps more moisture.

**CONSTRUCT K45:** Habitual practices and monocultures are best.

The constructs behind a European approach to ploughing and tilling were fundamental to soil damage and land degradation in Australia, and because the low rates of formation of Australian soils meant they were effectively a non-renewable resource (Heathcote & Mabbutt 1988). Harte thus labelled Australian farming practices for a rain-fed agriculture in dry Australia ‘soil mining’, and these hinged around bare-fallowing which was aimed at storing subsoil moisture (Harte 1982). Thus it was not just the ploughing (and soil inversion/destruction of any soil biology and humus, with accelerated bacterial breakdown of soil organic matter and humus) but the constant tilling that proved just as disastrous (Condon 2002). Consequently, multiple disasters followed at the end of the 19th century and into the 1930s
Figure 5.5 below demonstrates the aggregation of constructs behind these developments and agricultural practices. Bundled together, pioneering exploitative constructs such as ‘limitless resources’ and ‘domination of nature’ led to soil mining up to 1900, but with nutrient exhaustion. After this came the various evolving technologies of industrial agriculture to compensate for mined nutrients, with the application of modern fertilizers. What is chilling is that the same approach (mining to exhaustion, then corrective input behaviour) occurred at the end of the 20\textsuperscript{th} century in cropping, for example, the newly settled country of the north and south Brigalow belts in Queensland and NSW, and in the black soil of the native grasslands of northern NSW’s Darling Riverine Plains.

**FIGURE 5.5. The Fruits of the Personal Constructs of Exploitation and Pioneering: Trends in Wheat Yields since 1870.**

![Graph showing trends in wheat yields since 1870.](image)

*(After Donald 1982; Hamblin & Kyneur 1993)*

Perhaps the clearest illustration of false constructs in this industrial phase causing massive ecological damage were the parallel environmental disasters of the dust-bowls in the USA’s Great Plains and in Australia’s Mallee. Parallel, because each was caused by the same mental, physical, economic and temporal factors. These comprised:

(i) occupation by land-hungry settlers as a result of respective but flawed national or state land-use policies that were designed to establish yeoman farmers on the soil;
(ii) such farmers bringing farming constructs inappropriate to the climatic and physical environment they settled; and thus (iii) a combination of widely adopted but inappropriate and damaging management, ploughing and tillage techniques after 1900 that became known as ‘dry-farming’ (Heathcote 1983).

On top of these factors then came the final factor: the combined effects of a string of drought and high wind years in concert with the 1929 collapse in commodity prices. The only way out for farmers in both regions was to work the land harder (for example with constant cropping cycles) so as to extract more returns to meet mortgage interest payments. The result was ecological destruction of soils and ‘huge transfers of financial capital from one country to another and their repayment by drawing on soil capital’ (Jacks & Whyte 1939: 210; 217).

This experience, in different ways, occurred elsewhere in Australia in the 20th century. Much of Western Australia’s mono-cultural ‘wheat lands’ (the very name reveals the monoscape) saw widespread soil salinity following excessive vegetation clearing: a disaster so well captured in John Kinsella’s collection of poems titled the Silo (Kinsella 1995).

The twin disasters of the Great Plains and Australia’s Mallee in the 1930s reveal the true power of deep, historically-derived personal constructs. As part of the committee reporting on the American disaster in 1936, Cooke listed eleven ‘attitudes of mind’ that he says were characteristic of the prairie settler, but which proved inappropriate (Cooke 1936). On citing Cooke’s work in 1939, Jacks and Whyte said these ‘attitudes of mind’ indicated ‘limitless optimism and the deceptive sense of power that comes from wealth too easily won’ (Jacks & Whyte 1939: 292). Cooke could well have substituted the word ‘Mallee’ for ‘Prairies’, because his suggested eleven ‘attitudes of mind’ or constructs comprised:

1. that man conquers nature;
2. that natural resources are inexhaustible;
3. that habitual practices are best;
4. that what is good for the individual is good for everybody;
5. that an owner may do with his property as he likes;
6. that expanding markets will continue indefinitely;
7. that free competition coordinates industry and agriculture;
8. that land values will increase indefinitely;
9. that tenancy is a stepping-stone to ownership;
10. that a factory farm is generally desirable; and
11. that the individual must make his own adjustments to calamity.

CONSTRUCT K46: Expanding markets and land values will continue indefinitely.
CONSTRUCT K47: Free competition coordinates industry and agriculture.
CONSTRUCT K48: A factory farm is desirable.

Most of these ‘attitudes’ serve as powerful personal constructs applicable to not just the Australian situation in the 19th and 20th centuries, but even today. As Jacks and Whyte concluded: ‘[t]hese attitudes of mind have determined the development of the prairies and brought them to their present condition. They are the natural attitudes to adopt towards an extremely productive, lifeless natural resource, as the soil was supposed to be’ (Jacks & Whyte 1939: 292).

(iv) The Scientific Discourse and its Constructs (1930s on).

Here, nature was seen as being available for dissection, technological control, and development. It was not until just before World War II that the fruits of modern science began to be widely applied in Australian agriculture. Founded on a post-Enlightenment, rationalist, objectivist or ‘positivist’ tradition, this world-view brought its own bundle of powerful mental constructs, particularly as it had become wedded to a ruling capitalist-industrial ethic. This scientific approach, when applied to Australia, was in the humanist tradition of applied science; one ‘which sees data in the light of their contribution to human well being’ (Heathcote 1994: 255). To all those imported constructs discussed in the preceding sections, a few more could now be added.

CONSTRUCT K49: Nature and land can be quantified, and data is only useful if it contributes to human well-being. This allows farmers to treat land like a factory – maximising yields per given time, area and input.

With the domination of industrial agricultural practice in Western nations immediately pre- and then post-World War II (including in Australia), there came the instigation of the seven
key elements that define industrial agriculture: intensive tillage; monocultures; application of synthetic fertilizers; irrigation; chemical pest and weed control; manipulation of plant and animal genomes; and factory farming of animals. Implicit in these practices are earlier constructs: the hubris of having mastery over, and control of, nature, and thus a separation from identifying with and having empathy with, nature; a cultural techno-centrism; and the power of reductionist thinking. The latter was expressed in the mounting unsustainability of monocultural farming, which, aside from the paradoxical problems it created, had a propensity to lead to not just ecologically vulnerable ‘monoscapes’ but to, a ‘monoculture of the mind’ (of ‘enclosed’ minds, meaning an exclusion of other knowledge cultures and systems; Shiva 1993).

Seminal to the origin of modern industrial agriculture was the early 19th century work of the German chemist Justus von Liebig and his balance-sheet theory of plant nutrition: that ‘[t]he crops on a field diminish or increase in exact proportion to the diminution or increases of the mineral substances conveyed to it in manure [read ‘fertilizer’]’ (cited in Kellog 1938: 879; von Liebig 1840). This reductionist view led to soil being considered, in Kellog’s words, ‘a more or less static storage bin of plant nutrients’ (Kellog 1938: 880). Repressed or ignored, therefore, was any recognition of the dynamic nature of the relationship between the soil and plant, and especially of the vitally important understanding that healthy soil is like a living organism, underpinned by a huge microbial population synergistically interacting with plants in a complex-dynamic system.

**CONSTRUCT K50: Soil is a static, inert storage bin/bucket of plant nutrients, and so to make plants grow you just have to add some nutrients and man-made fertilizers.**

In turn, combined with mechanisation and industrialisation, the reductionist mind encouraged industrial agriculture to be founded on standardization and simplicity: what Michael Pollan calls ‘a blind man’s accounting’, and an approach that ‘fostered the wholesale reimagining of soil (and with it agriculture) from a living system to a kind of machine’ (Pollan 2006: 201; 147). The advent of the ‘machine age’; of bigger, better and faster technology; and of the replacement of men as cultivators by machines (Jacks & Whyte 1939: 281), led to the de-personalisation and further disenchantment of nature. Reductionism had not just reduced vast
complexity to N, P and K, but to the extent where, by the mid to late 20th century, in Pollan’s words, ‘the farmer turns to chemical pesticides to fix his broken machine’ (Pollan 2006:148).

**CONSTRUCT K51:** Because knowledge and information can be extracted from the natural world, problems can be analysed into parts that can be manipulated (because sense data are discrete), and so events that can be described can be controlled.

Building on the pioneering-settler tradition, modern agricultural chemistry meant that Australia’s old, oligotrophic soils could now be mined with seeming impunity. That is, when they ‘hit the wall’ fertilizer could be added; they could be ‘enriched’, ‘improved’, or irrigated and ‘encouraged’ to yield plants and production. This was backed by federal, state, and university research and extension investments, as science had become utilitarian.

**CONSTRUCT K52:** Technology, fertilizers and chemicals, plus big machines, will fix Australia’s poor, exploited and/or degraded soils. This nullifies land scarcity (and thus the threat of land degradation).

In the 19th century and the advent of industrial ploughing, the ‘good farmer’ syndrome (a social construction of regional and peer pressure) became manifested in ‘good ploughing performance’ and a following of the ploughing and tillage practices described previously, thereby reinforcing concomitant constructs. Ploughing competitions from the mid 19th century inculcated ‘good farming’ practices and constructs in the European tradition (see Jenkins 1975).

**CONSTRUCT K53:** The ‘good farmer’ ploughs, turns over the soil, tills, and fertilizes in neat rectangular or square fields. The ‘good/best’ modern farmer uses big machines, ‘improved’ animals and pastures, monoculture crops, synthetic fertilizers, and he sprays chemicals. **CONSTRUCT K54:** Technology and science are all powerful and can solve any problems.
In this next phase the ‘good farmer’ syndrome meant adopting the technologies and practices of scientific agriculture: the machines, monocultures, fertilizers and eventually the chemicals of the practice. Building off the initial Euro-centric reaction to an alien Australia, modern scientific plant breeding in Australia led to the construct that the ‘good’, ‘best’, or ‘improved’ species were introduced ones. The parallel mirror construct was that native grass and plant species were inferior. In time, as the power nexus of modern agriculture gained almost total ascendancy, the desirable ‘improved’ species (including Genetically Modified – GM - crops) came predominantly from the trans-national companies – especially from North America.

**CONSTRUCT K55: Modern technology allows farmers to ‘fight’ and ‘beat’ droughts, and farmers need help to do this.**

(v) **The Economic Utilitarian Discourse (1950s on)**

Here, nature was seen as an economic tool for monetary extraction, and for maximising production and profit. This phase was the forerunner to modern economic rationalism. It gathered speed in the post-World War II growth phase of the world economy; of the stable Menzies years in Australia; and of the emerging agricultural fruits from scientific research (yielding huge productivity gains in cropping and grazing from pasture improvement, ‘improved’ legumes, trace elements, myxomatosis and so on). This discourse phase was also tightly hitched to the ongoing ethic of ‘developmentalism’.

To the economic utilitarian, land use decisions were largely based on economic criteria only, and focussed on the farm’s productive capacity and its economic returns (Mariola 2005: 209). This view holds that agriculture is purely a business venture, ‘a means of production reducible to basic inputs and outputs’, and whose sole purpose was raising food (and fibre): that agriculture ‘exists simply to satisfy the alimentary needs of a largely non-agricultural population’ (Mariola 2005: 209-210). The economic utilitarian philosophy also imbibed a fundamental premise of neoclassical economic theory: that economics is amoral and thereby able to discount externalities and the future (Hamilton 1994). This meant that economic factors were given predominant (even sole) consideration in determining the use or value ascribed to a particular commodity. From this in turn then flows utmost faith in technology: that this factor can ‘mitigate the difficulties imposed on us by natural scarcity’ (Mariola 2005:
This in turn dispels the concept of ‘land scarcity’ (and by implication the threat of land degradation), because technology (and other inputs) can solve all problems: that, in short, with the help of mechanized machines, irrigation and petrochemicals, technology is a substitute for land (Crosson 1984).

**CONSTRUCT K56: All land-use decisions need to be based on economic criteria.**

It was economic utilitarianism, especially after the commodity crisis and drought of the 1960s in conjunction with the rising influence and power of the rural accountant and the agricultural consultant, that ushered in the era of the productivist, professional farmer. Australia’s rural landscapes increasingly became ‘techne-scapes’, parcelled (‘enclosed’) like factory units. Aiding all this was what Wendell Berry calls the ‘disease of the modern character’, ‘specialisation’: of farms allocated mono-cultural uniformity - the very antithesis of a diverse, complex nature, and ‘a dull, tight uniformity, not only ignorant of other possibilities but scared of them, and vengeful in its ignorance’ (Berry 1977: 19; 180).

**CONSTRUCT K57: Natural diversity and complexity on the farm, being undesirable, untidy, alien, the ‘enemy’, incomprehensible, and uncontrollable, is a threat. Thus deep down, mysterious nature is feared/the enemy and can be overcome by vengeful domination.**

**CONSTRUCT K58: To maximise farming productivity, nature must be rendered neutral, malleable, because it is the enemy and a machine capable of moulding into monocultures.**

**CONSTRUCT K59: The good/best farmer is a specialist, a reductionist in his role and skills (not holistic).**

Robin contends this economic utilitarian phase in Australia was a product of a combination of the Protestant work ethic and the post-war migrant work ethic, which invoked a ‘progressive rhetoric’ including being ‘enemies to an inimical nature’ (Robin 2007: 209). Even where farmers in the Landcare discourse saw a ‘healthy’ landscape as being a ‘productive’ landscape, a close integration of production and conservation goals meant the land was not really seen in ecological terms (Lockie 1997: 37).

**CONSTRUCT K60: One has to ‘improve’ at all costs.**
Combined with increasing urbanisation and a large post-war immigration, the productivity drive (linked to scientific-industrial agriculture) only further accentuated the widening separation of individuals (in this case farmers) and their society from nature. Technologies were regarded as ‘neutral’, ruling out the values and complexity of local, individual, holistic, spiritual or indigenous knowledge and complex systems. Moreover, what Pretty calls ‘one of the tragedies of modern industrialised agriculture’ is the loss of natural diversity in the landscape (Pretty 2002: 29). With this goes an inability of modern farmers to conceive of, or understand, a farming landscape healthy with natural diversity.

Douglas exposed how the industrial constructs behind our thinking became strongly socialized into individuals because they were embedded in industrial institutions (Douglas 1986); this links to Shiva’s ‘Monocultures of the Mind’ (Shiva 1993).

**CONSTRUCT K62: Industrial ‘institutionalism’ means diversity and complexity in social-ecological systems is bad and a threat.**

It was out of the new economic utilitarianism that the modern ‘experts’ of ‘economists’ and ‘technologists’ have arisen. This phase in turn became a foundation platform for the final discourse of techno-chemical productivism and economic rationalism from the 1980s.

**(vi) The Techno-Chemical, Productivist, Economic Rationalist discourse (1980s on)**

Here, nature was seen as being ‘denatured’ and so a resource for maximising production and profit, and for complete control via modern technology and chemicals. In this current phase, the thinking, philosophy and mental constructs of preceding phases became enmeshed as modern industrial capitalism became globalised. Agriculture became dominated not just by global capital and commodity markets but by the giants of global capitalism: the transnational petro- and agricultural-chemical, pharmaceutical, biotech, food processing, and
commodity trading organisations. This development in turn coincided with political developments in Australia and elsewhere, seen in the rise of economic rationalism and neoliberalism (Dahlberg 2001; Kelly 1994; Muetzelfeldt 1992; Pusey 1991). Consequently, in the hands of economic rationalists and globalists the amoral tendencies of economics became entrenched; externalities were rendered invisible; nature, the land, the soil was ever more a resource – a factor of production – open to exploitation, a tool for the maximisation of production via a precise manipulation of inputs and outputs. Farming as a ‘business’, driven by the ‘bottom line’, became further entrenched; with biotech one could now play God; technological ‘advancement’ and power seemed open-ended, able to conquer any problem; politics was influenced or corrupted accordingly (Friedman 1999; Hamilton 1994).

In Australian agriculture the constructs of pioneering, of separation and alienation from the land, of exploitation, of the neutrality of nature, of the inertness of soils, of productivism, of techno-centrism, and of bottom-line driven farming were not only deepened but also enlarged. This made the challenge of understanding, let alone embracing, alternate and contesting personal constructs ever harder – and indeed for many, well nigh impossible.

The dominance of the reductionist, techno-scientific and economic rationalist mind and its excision of other knowledge cultures further exacerbated the de-sacrilisation of nature, the simplification of the complex and diverse. And this was paralleled by the simplification of a previously rich language, redolent with symbol and metaphor as a way of comprehending earlier diversity and complexity. Regarding a complex reality, Yi-Fu Tuan observed that science, ‘by contrast, strives to remove the possibility of multiple readings’ (Tuan 1974: 141).

Conclusions

The fore-going historical analysis of land-use attitudes reveals that modern farming constructs are deep and multi-layered, and that they go to the core philosophical, religious and world-view foundations of our society. It seems likely, therefore, that undertaking ‘education’, extension, and even social learning theory and practice targeted at farmers and their farming communities has regularly failed because of the cognitive power of the personal constructs of farmers. What is at issue here, therefore, are deeply held beliefs, attitudes and world-views, some (even many) not fully realised or understood by the farmers themselves.
There appears to have been an inability of successive waves of Anglo-European settlers to come to terms with the bio-physical and different other nuances of Australia: of little time to adapt, adjust, and to begin to think, as Libby Robin says, ‘like a Banded Stilt’ (adaptive, flexible, light on the land, accommodating; Robin 2007).

Carroll has observed that physically arriving, clearing, building, and farming a new land ‘is much easier than the psychological settling of the country’ (Carroll 1982: vii). This was because the Anglo-European construction of Australian landscapes and their land-use reflected ‘unmet expectations rather than inherent properties of the continent’ (Lefroy 2002). That this behaviour still occurs would appear to be because powerful personal constructs in regard to nature and land-use have prevented Australian farmers (and society in general) acclimatising and settling into the country and becoming one with their environment.

Bill Gammage says of non-Aborigines in Australia that we are ‘still newcomers, still in wilderness’, taking more and leaving the future less, not feeling ‘at home’, still to ‘become Australian’ (Gammage 2011: 321; 323). Poignantly, in 2009 Aboriginal singer Neil Murray summed the situation when he said: ‘A lot of Australians haven’t arrived yet’ (Murray 2009).

What the analysis of constructs undertaken in this chapter illustrates is the powerful role of path-dependence and historical ‘lock-in’. As described in Chapter 3 (page 73), this is where historical sequences and contingent events have set into motion institutional, attitudinal, and behavioural patterns which have deterministic properties.

Historical ‘lock-in’ in the context of this discussion refers to the situation where deeply held attitudes, values or world-views (personal constructs), and also elements like land settlement or tenure legislation and/or the instruments of policy, either reinforce existing deleterious environmental behaviour and attitudes or else exclude other options (such as a shift in practice and/or behaviour to a milieu involving ‘obligation’ and ‘shame’). This can occur even in the face of knowledge that current practices might be damaging. Crucial is *behavioural lock-in*, which can mean ‘irreversibility due to learning and habituation’ (David 1985).

To explore the question of inappropriate land-use and other philosophical constructs in this chapter, I focussed on metaphor. At heart of the issue (to use a metaphor) is the fundamental
metaphorical shift in Western European thought from the 16th century, from the organic to the mechanical: the latter now so deeply entrenched in the Western mind it has become the lock-stone of Western thinking. This dominant metaphor regards nature and the organism as a machine, with associated mechanistic and power language: a metaphor ‘which binds together the cosmos, society and the self into a single cultural reality’ or world-view (Merchant 1980: xxii).

This metaphorical shift in turn is largely responsible for not just the global environmental and economic crises, but, in relation to my thesis, for the often destructive way we treat nature and the land.

In this chapter I have begun to address the key questions raised at the start of this thesis and this chapter: ‘Why are our personal constructs so powerful?’ ‘Where have they come from?’ and, ‘How did they evolve?’ The historical analysis enabled me to distil sixty-two ‘Key’ or underlying personal constructs that were grounded in the mechanical-metaphor of the Western European mind (prefixed with a ‘K’ for ‘Key’).

The 62 ‘Key’ constructs thus provide the raw data for subsequent discourse analysis in Chapters 6 to 8, where I can now use these as an inverted mirror to identify, examine and understand what are the psychological drivers behind our land-use practices: both old, traditional and dominant, and new, regenerative and transforming. This should then provide a platform for change and possible transformation.

Chapter 6 will now address the contemporary dominant discourse of industrial agriculture.
CHAPTER 6 THE DOMINANT INDUSTRIAL AGRICULTURAL DISCOURSE: A Thematic Discourse Analysis

Introduction

The excavation into how Western thinking and behaviour (and thus farming practices) are governed by society’s collective metaphor-mind conducted in Chapter 5, was a first step in revealing how personal psychological constructs in relation to land-use are formed. This included addressing such questions as: Why are such constructs so powerful?; What are their origins?; and thus a part answer as to why harmful land-use practices have been so hard to change? In the process I also addressed one of the basic ontological questions of this thesis: ‘If reality is socially constructed, then how DO we socially construct it?’

However, with the combination of the sustainability challenge and mounting constraints on increasing agricultural production to meet the associated food security challenge, there is urgency to answer the next logical question: how can we more rapidly change the collective, driving ‘mechanical’ metaphor of our society to one less harmful to an environment that sustains us and which needs to underpin a long-term sustainable-regenerative agriculture?

I will address this question via a two-pronged discourse analysis approach: (1) an examination of the modern industrial agricultural discourse so I can attempt to get at the core drivers of this (the current chapter); and (2) a parallel discourse analysis of transformative agriculturalists to find out how and why they changed, and whether a metaphor shift was at the heart of this (Chapter 7).

We saw in Chapter 3 (Section 3.4, page 70) that discourses, like paradigms, are a shared way of apprehending the world; that they are intimately linked to language and metaphor, ideology, strategy, and practice; that they help define common sense, legitimate knowledge, and social ‘norms’; but that, as Foucault revealed, they are influenced by relations between knowledge and power and so can shape individual identities by delimiting thoughts and actions. Discourses thus ‘provide reasons and principles for…ways of doing things’ (Foucault
1977: 79). In regard to this thesis discourses are thus central in forming the personal constructs of farmers because, as Procter and Parry explained (1978: 163), they can constrain a person ‘to act in a relatively limited set of possible ways’ by deeply rooting personal constructs, even making them rigid and concretized and so highly resistant to change.

While the historical thematic analysis in Chapter 5 yielded an eclectic collection of 62 ‘Key’ land-use personal constructs rooted in the mechanical metaphor, these constructs nevertheless comprise diverse, raw, cognitive construct material. By applying George Kelly’s Personal Construct Psychology in this Chapter, I will now attempt to distil the dominant or superordinate constructs of farmers regarding Australian land-use. This will allow us to understand the psychological drivers behind the dominant discourse. This involves a three-step process:

**Step 1.** A re-ordering of the 62 Key personal constructs revealed in Chapter 5 into thematic groupings;

**Step 2.** Following a discussion of the relevance of George Kelly’s Personal Construct Psychology (Section 6.2), I will then road-test the 62 key personal constructs via a thematic discourse analysis of a range of contemporary discourse material (Sections 6.3 to 6.5); and

**Step 3.** From steps 1 and 2, I will then distil the key driving constructs – in Kelly’s terminology the ‘superordinate constructs’ – of Australian land-use (Section 6.6).

### 6.1. Key Constructs Relating to Australian Land-Use from the Thematic Historical Analysis in Chapter 5

The 62 key constructs distilled in Chapter 5 (and originating in turn from 196 foundational constructs (see Appendix 2) provide the raw material for a thematic discourse analysis. This is because the building blocks of our beliefs are personal constructs. However, because many of the 62 key constructs emerged at different times and from different origins, there are many cross-overs, parallels, and close synchronies between and within many of them. In this section I have therefore reorganized them, irrespective of any time sequence. I then found these fitted under four main themes which appear to drive the dominant values, beliefs and world-views in regard to nature, landscape, and land-use in Australia. These are grouped in
their four sections below. In brackets I signal the number of foundational constructs behind each ‘key’ construct (the analysis for which is found in Appendix 3).

**Theme 1: To Dominate Nature; Anti-Nature; Simple Nature.**

**K1.** ‘Man’ is in control: he is outside and above, alien to nature, because ‘man’ and nature are separate. (37 Foundational constructs).

**K4.** ‘Man’ has dominion over nature because he is at the apex of creation, and so the earth and nature was created for him, as a storehouse, and to serve him for his own gratification (i.e. it is God’s will that man exploits nature for his own ends). So ‘man’, a rational steward, is nature’s guardian and caretaker, managing her for her own best interests. (48 Foundational constructs).

**K2.** Nature, land and its resources are limitless and inexhaustible, and ‘man’ is free; it is his duty to be master and to conquer, control, dominate and exploit them (man has power over nature). (61 Foundational constructs).

**K3.** Nature (and the soil) is like a static machine: dead and composed of inert atoms or matter, in movement in a dead cosmos. Nature is therefore subject to, and able to be broken down to, simple mechanical laws, and so can be managed, manipulated, improved and transformed, and machines exist to manipulate nature for human benefit. (72 Foundational constructs).

**K5.** Subservient, powerless, female nature is there to nurture the dominant, powerful male. (20 Foundational constructs).

**K6.** ‘Man’s’ role is to subdue and control nature by wrestling secrets from her. (52 Foundational constructs).

**K7.** Nature and natural objects have no feelings, soul nor mind; they are not mystical, have no religious or mythical connotations, have no enchantment, and so they can be mastered and possessed. (64 Foundational constructs).
K19. Because all resources (natural, material, human) are exploitable, and because a Christian people are at the apex of civilisation (superior to ‘primitive’ people), then uncivilised, primitive native peoples can be conquered and exploited. (22 Foundational constructs).

K8. Nature/the land is inert, un-sacred, without diversity, complexity or self-organizing function, and so you can’t leave it to nature to solve problems.
(38 Foundational constructs).

K29. Nature/the land is untidy/unruly and needs taming/ordering, tidying-up, and so needs domestication via colonising, cultivation, and monocultures.
(40 Foundational constructs).

K57. Natural diversity and complexity on the farm, being undesirable, untidy, alien, the ‘enemy’, incomprehensible, and uncontrollable, is a threat. Thus deep down, mysterious nature is feared/the enemy and can be overcome by vengeful domination. (42 Foundational constructs).

K31. The soil and land is indestructible (‘bomb-proof’), inert (non-living), lifeless, inexhaustible, resilient, and so it can be mined because it is a ‘machine’.
(59 Foundational constructs).

K35. Set-stocking is good, is traditional, and is easily managed, while grazing with sheep and cattle improves the pastures. (18 Foundational constructs).

K37. Cloven hooves cause soil compaction and damage. (1 Foundational construct).

K44. The rain follows the plough, because constant ploughing and tilling both improves the soil and traps more moisture. (25 Foundational constructs).

K45. Habitual practices and monocultures are best. (42 Foundational constructs).

K50. Soil is a static, inert storage bin/bucket of plant nutrients, and so to make plants grow you just have to add some nutrients and man-made fertilizers.
Theme 2: Mal-Adaptation to the Australian Environment, and Agrarianism.

K20. Pioneers and settlers/farmers are heroic and independent, and farmers can do with the land, nature and its peoples what they want because every individual has the right to pursue his own interests. (50 Foundational constructs).

K22. The Australian climate is abnormal, un-European, and seasons will soon return to ‘normal’ or ‘average’; this also assumes low evaporation rates and high humidity, as in Europe. (31 Foundational constructs).

K23. Droughts are abnormal aberrations, and Australia behaves according to four European-like seasons. Droughts therefore can be ‘fought’ and ‘beaten’. (33 Foundational constructs).

K27. The rivers, streams and rivulets are abnormal, un-European, and will soon flow regularly again. (16 Foundational constructs).


K24. The alien land has to be dispassionately tamed and moulded, ‘civilised’ and ‘improved’, and domestic animals and plants need to be introduced. (63 Foundational constructs).

K25. Australian Nature is ‘the enemy’, its plants and animals are ‘pests’; Australian native grasses and vegetation are inferior, and so the Australian landscape needs to be ‘improved’, tidied-up, made orderly – using superior European grasses, crops, and domesticated animals according to an European ideal. (61 Foundational constructs).

K33. Water is inexhaustible, but any run-off is ‘wasted’. (20 Foundational constructs).

K26. Australian soils are like those in England/Europe: humid and rich, and so can be treated the same. (45 Foundational constructs).
K30. It is ‘normal’ for the ground to be bare in a drought, because normal rain and seasons will soon return, and the land always bounces back (is resilient). (36 Foundational constructs).

K32. Droughts are beneficial because they rest the soil. (13 Foundational constructs).

K39. Settlers’ living areas are to be predicated on ‘normal’ English-European living areas for yeoman farmers. (40 Foundational constructs).

K40. Land degradation (including salinity) in planned settlement areas is the government’s/bank’s fault. (16 Foundational constructs).

**Theme 3: Economic Utilitarianism-Rationalism**

K14. Like nature, the economy and society work according to mechanical laws. (40 Foundational constructs).

K11. A mechanical nature, being empty, lifeless, homogenous, passive and with no agency, is thus a chattel, a utility, a factor of production (assessable only in economic terms). Being an inert consumable commodity it is available (through ‘improvement’ by human agency, science and technology) for commercial annexation, division, exploitation and/or sale for profit-making, wealth-creation, parcelling and selling. Land values can thus be determined by factors beyond actual or potential use, and agricultural production is for sale to the urban market. (95 Foundational constructs).

K12. The creation of private property with labour leads to civilised society. (32 Foundational constructs).

K15. Enclosing land and dead, inert ‘nature’ creates property ownership and wealth; and ownership/privatisation confers absolute rights of property and gives individuals power over the land. (71 Foundational constructs).

K16. There are no moral/ethical restrictions on the creation of wealth out of an
inanimate, mechanical nature via human agency [labour and entrepreneurial behaviour],
science and technology. (90 Foundational constructs).

K21. ‘Good/best’ farmers/settlers are progressive, and land/nature development and profit-
making from this is good and necessary. They maximise productivity growth, production, the
maximum extraction of ‘value’, performance, efficiency, returns, profits, asset values, wealth
and status from natural resources. (75 Foundational constructs).

K17. Owning land promises the good life, liberty, equality, and delivers optimism,
a sense of power and security. (37 Foundational constructs).

K18. Land must be unlocked and made available to all. (31 Foundational constructs).

K38. Farmers, who engender moral vitality and infuse life into the rest of society, are special,
honourable, manly, self-reliant, self-sufficient, courageous, have moral integrity, are
hospitable and independent. They are thus deserving of privileges; and so Yeoman farmers
can best use Australia’s vast land resources. (20 Foundational constructs).

K41. Tenancy is a stepping-stone to ownership, and rented land can be worked hard.
(26 Foundational constructs).

K46. Expanding markets and land values will continue indefinitely.
(21 Foundational constructs).

K56. All land-use decisions need to be based on economic criteria.
(49 Foundational constructs).

K47. Free competition coordinates industry and agriculture. (19 Foundational constructs).

K48. A factory farm is desirable. (47 Foundational constructs).

K42. There is no onus on obligation or shame in Australian common law, so farmers can do
as they wish. (55 Foundational constructs).
K43. Soil conservation is optional. (30 Foundational constructs).

K36. The land/nature/the environment is an exploitable, monetary resource for profit-making. Thus any ‘surplus’ grass is ‘wasted’. (62 Foundational constructs).

K61. Agriculture is purely a business, a means of production reducible to inputs and outputs; thus a healthy landscape is a ‘productive’ landscape, not an ecological entity or part of a complex system. (72 Foundational constructs).

K60. One has to ‘improve’ at all costs. (50 Foundational constructs).

K34. Australia’s land and resources are for the profitable production of cheap raw materials for export. (37 Foundational constructs).

**Theme 4: Techno- and Scientific-Centrism**

K9. Reason is the supreme good, and is limitless in managing the world and reality; therefore the rational, scientific approach is the best way to gain knowledge. This is because rationality, objectivity and science (not theology, spiritual or other knowledges) explains the natural world. Thus other knowledge cultures are inferior. (31 Foundational constructs).

K13. Progress is good and a given (civilisation moves in a desirable direction) and is underpinned by science and an ever increasing accretion of new objective knowledge; and so one has to ‘improve’ at all costs. (63 Foundational constructs).

K10. The cosmos, nature, society and human body are ordered systems of interchangeable atomized and mechanical parts that can be repaired or replaced from outside (the technological fix). They are able to be governed by law and discerned and predicted through deductive reasoning. They are not part of a wider organic whole. (68 Foundational constructs).
K53. The ‘good’ farmer ploughs, turns over the soil, tills, and fertilizers in neat rectangular fields. The ‘good’/’best’ modern farmer uses big machines, ‘improved’ pastures and animals, monocultural crops, synthetic fertilizers, and he sprays chemicals.
(69 Foundational constructs).

K51. Because knowledge and information can be extracted from the natural world, problems can be analysed into parts that can be manipulated (as sense data are discrete), and so events that can be described can be controlled. (42 Foundational constructs).

K54. Technology and science are all powerful and can solve any problems.
(69 Foundational constructs).

K49. Nature and land can be quantified, and data is only useful if it contributes to human well-being. This allows farmers to treat land like a factory – maximising yields per given time, area and input. (77 Foundational constructs).

K58. To maximise farming productivity, nature must be rendered neutral, malleable, because it is the enemy and a machine capable of being moulded into monocultures. (79 Foundational constructs).

K55. Modern technology allows farmers to ‘fight’, ‘beat’ droughts, and farmers need help to do this. (20 Foundational constructs).

K52. Technology, fertilizers and chemicals, plus big machines, will fix Australia’s poor, exploited and/or degraded soils. This nullifies land scarcity (and thus the threat of land degradation). (48 Foundational constructs).

K59. The good/best farmer is a specialist, a reductionist in his role and skills (not holistic).
(34 Foundational constructs).

F62. Industrial ‘institutionalism’ means diversity and complexity in social-ecological systems is bad and a threat. (34 Foundational constructs).
6.2. Practical Relevance of George Kelly’s Personal Construct Psychology

As discussed in Section 3.4, George Kelly was able to unravel the cognitive workings of people to articulate an holistic and meta theory of psychology. This Personal Construct Psychology revealed that people evolve their own construction systems which allow them to effectively cope with the world. It is thus a field of subjective meaning. Kelly therefore found personal constructs to be predictive tools, regularly tested (in a highly energised process) in terms of their predictive efficiency ‘against the reality’ around them. Because reality is socially constructed it is interpreted differently between one person and the next. For example, this accounts for the existence of polar opposite differences regarding land-use practices among farmers. That was why Kelly called his theory ‘constructive alternativism’: that there ‘are always alternative constructions available to choose among in dealing with the world’. It was also why he said ‘we should regard knowledge as ‘successive approximations’ (Kelly 1955: 15). This point is crucial because Kelly as a practicing psychologist realised that he could understand how and why a person behaved by ‘the manner in which he represents his circumstances to himself’, or, as he summed it: ‘The structure we erect is what rules us’ (Kelly 1955: 16, 20).

Directly relevant to this thesis, Bannister pointed out that for George Kelly the central question for psychology was: ‘how do people develop, share, and use their personal theories?’ given that each of us does live in a unique personal world where ‘we interpret differently the events we do experience’. This, says Bannister, is because two people look through different ‘goggles’ at the same situation, and so they ‘respond to the same situation in different ways’ (Bannister 2003: 34).

Also discussed in Section 3.4, Kelly’s tightly woven theory was structured around one fundamental postulate, that ‘a person’s processes are psychologically channelized by the ways in which he anticipates events’. From this came eleven subsidiary corollaries. Five of these corollaries have direct relevance to the discussion in this chapter as we seek to distil a short list of major structural or ‘superordinate’ constructs that drive the dominant discourse in Australian agricultural land-use.
2. **Individuality Corollary**: persons differ from each other in their construction of events. This means they have different approaches to anticipating the same events: to construing reality. Or, as Kelly expressed it, ‘individuals can be found living out their existence next door to each other but in altogether different subjective worlds’ (Kelly 1955: 56).

3. **Organizational Corollary**: each person characteristically evolves, for his convenience in anticipating events, a construction system embracing ordinal relationships between constructs (see Sections below). Here ‘ordinal’ means that one construct ‘may subsume another as one of its elements’.

4. **Dichotomy Corollary**: a person’s construction system is composed of a finite number of dichotomous constructs (see Sections below).

5. **Choice Corollary** (connected to 4 above): a person chooses for himself that alternative in a dichotomised construct through which he anticipates the greater possibility for extension and definition of his system.

7. **Experience Corollary**: a person’s construct system varies as he successfully construes his replication of events. A person’s daily negotiation of life is therefore a sequence of validation of his constructs, and, in the case of ‘sane’, grounded people, new constructions occur if something unexpected happens. Experience is therefore a process of reconstruing, and this is what comprises learning. As Kelly explained, the challenge of learning is asking ‘how does the subject phrase the experience, what recurrent themes does he hear, what movements does he define, and what validations of his predictions does he reap?’ (Kelly 1955: 77).

10. **Commonality Corollary**: to the extent that one person employs a construction of experience which is similar to that employed by another, his psychological processes are similar to that employed by another. Thus the combination of Corollaries 7 and 10 explains how people trained/embedded in a particular paradigm (such as in a scientific discipline) all tend to ‘sing off the same hymn sheet’. It also explains what we have ‘in common’ in a society.
Fundamental to Kelly’s definition of the Organizational Corollary above is his contention that ‘[n]ot only do men differ in their construction of events, but they also differ in the ways they organise their construction of events’. Kelly’s use of the word ‘evolves’ in his definition signifies that a person’s construction system doesn’t stand still, while by ‘construction system’ he means ‘a grouping of elements in which incompatibilities and inconsistencies have been minimised’. That construct which subsumes another, and especially many others, is a superordinate construct – and the subsumed is a subordinate construct. Therefore, in Kelly’s words, ‘man systematizes his constructs by concretely arranging them in hierarchies and by abstracting them further’. In other words, a person’s construction system is composed of complementary superordinate and subordinate relationships; the latter determined by the governing superordinates, which, as Kelly concluded, are free ‘to invoke new arrangements among the systems which are subordinate to them’. This is how learning and change occurs. (Kelly 1955: 56, 57, 58, 78).

Summarising this crucial concept, Bannister explained that constructs ‘are ordered, arranged and linked…not lying about like dominoes in a bucket’. That is, a person’s constructs are organised like a scaffold, with the main structural supports being the superordinate personal constructs, and attached to them are less crucial and more adjustable and flexible subordinate constructs (Bannister 2003: 35). The entire scaffold, supports, cladding, walls and roof comprises an individual’s personal construct system. A personal construct system therefore means that each of our constructs is embedded in a personal context of meaning defined in part by its relationships of implication with other constructs (Hinkle 1965).

Of relevance to later chapters are core constructs. These are the constructs that comprise our structure for understanding and predicting ourselves. ‘Core construing’ therefore helps us to anticipate our own behaviour, and especially how we relate to others and how we survive in the world (McWilliams 2003). Thus if there is a possibility of change in our self-image, because we hold so tightly to the products of our core construing then such emotions as threat, fear, guilt, shame, anxiety and hostility can be easily aroused.

What is important about the Organizational Corollary to this thesis is that it directly impinges both on the rigidity of a person’s belief system and also on the capacity of that person to
change. If a person is amenable to modify their more flexible subordinate constructs (that is, to revise them because their predictive constructed hypothesis of an event didn’t match their experience), then they will be open to adjusting the more fundamental aspects of their belief system, their superordinate constructs. But if the person’s construct organisational system is rigid and unbending then he/she is less likely to be able to change and also more likely to be defensive and even angry or aggressive due to the threat and consequent anxiety posed by a challenge to their whole construct organisational system: in other words, by a challenge to their very construction of reality and their paradigm/s. As Kelly quipped, ‘[s]ome individuals can get badly worked up over the protection of their exclusive rights to construe particular facts’. That is, ‘they don’t want to be caught with their constructs down’ (Kelly 1955: 10, 14).

This process of learning and change was encapsulated by Kelly: ‘One does not learn certain things merely from the nature of the stimuli which play upon him; he learns only what his framework is designed to permit him to see in the stimuli’ (Kelly 1955: 79).

If we examine both the 62 key constructs distilled in Chapter 5 (and reordered in Section 6.1 above), and also their derived origin from the 196 foundational constructs in Appendices 2 and 3, then we see that for most of the 62 there is a derivation or connection to other key and foundational constructs. For example, K1 (“man” is in control, outside and above nature) has linkages to 37 foundational constructs. If we then examine the analysis in Section 6.5 of the thematic discourse analysis of the rural media/text material, then we note that while coming under four general themes, each piece of material can be classified under one (sometimes two) dominant or key construct. Moreover, all of them have derivations from, or connections to, many of the other 62 key constructs. What is also clear is that some key constructs (for example K1, K4 and K8) are common to nearly each analysed piece of material. It is this core commonality that has led to the distillation in Section 6.6 of twenty superordinate constructs. That is, these twenty appear to be the fundamental support structures in the scaffold of personal constructs relating to Australian land-use.

To illustrate the cross-linkages of many of the key personal constructs, take for example the signifier ‘drought’. We see that this triggers immediate constructs to do with the perceived abnormality of Australia’s climate, that droughts are aberrations and things will soon return to ‘normal’ (construct K23). Behind this also are Anglo-European constructs of normality; that Australia has four seasons (K23); that our rivers, streams and ‘rivulets’ are ‘abnormal’
that water is inexhaustible (K27, K33); and even expectations to do with our landscape needing reshaping to an European familiarity (K25). Connected also is the key construct regarding the assumption that our soils are humid and rich as in Europe (K26), and thus that European (‘introduced’, ‘improved’) crops and grasses are superior and Australian native grasses ‘inferior’ (K25). There is then a further connection flowing from the combination of ‘drought’ and ‘soil’ constructs to what is ‘normal’ management in a drought: how the soils and landscape can be bared and denuded but will recover because ‘normal’ seasons will return and because the soil is resilient and indestructible (K30), and that droughts are beneficial because they ‘rest the soil’ (K32).

Using this example, and regarding such things as drought and land-use policy in Australia, it is clear that once a layered scaffold of constructs begins to evolve then the interrelationships between discourse, power and personal constructs become enormously significant.

Similar cross-linkages of other signifiers like ‘soil’, ‘dirt’, ‘ground’, ‘land’, and ‘nature’ can easily be made, revealing both the power and scaffolded inter-connectedness of the key constructs (both superordinate and subordinate) that determine attitudes, values and practices regarding land-use, and all because of deeply embedded personal constructs.

Relevance of Kelly’s Dichotomy and Choice Corollaries

The second key element relevant to the constructs distilled out of the thematic historical analysis of Chapter 5 concerns the cognitive propensity of humans to organise reality in binary oppositions in regard to their constructs. As seen in Chapter 3, George Kelly found when analysing and articulating his Personal Construct Psychology that constructs (‘reference axes’) are bipolar in nature: that every construct was dichotomous, where one pole possesses its corresponding antithesis (its antinomy). This means that each individual relies on a unique repertory of bipolar personal constructs. Kelly, in seeing constructs as channelling our thinking, described them as two-way streets, governed by controls on our lives both within and external to us. What affirmed Kelly of the bipolar nature of constructs was his observation that every perception and statement made is also a denial of its ‘other’: that this approach is black and white. In a way, therefore, the world of a construct is analogous to the Yin and Yang, the Chinese idea of two complementary but opposite principles in making an essential whole. Take for example the construct of ‘masculinity’. In Kelly’s words, this ‘is
predicated upon a companion notion of femininity, and it is the two antinomies together which constitute the basis of the construct’ (Kelly 1955: 60).

With regard to this thesis and the issue of different discourses concerning land-use, what is vitally important about a construct is not just what it affirms, but also what it negates. Clearly, when viewed in the context of the ethical component to this thesis’s ontological approach (and sympathetic with that of critical inquiry and transdisciplinarity), any negation or affirmation of a value, attitude, belief or world-view (and a construct) carries a strong ethical/moral component. We know also from Fransella (2003) that it is the superordinate constructs that generally have values/ethical/moral connotations, and so the dichotomy corollary goes to the heart of the most powerful drivers behind our social construction of reality.

Independent of Kelly, Yi-Fu Tuan pondered deeply on our environmental perceptions, attitudes and values. In recognising humanity’s unique capacity for an ‘abstract language of signs and symbols’, and the way ‘humans have constructed mental worlds to mediate between themselves and external reality’, Tuan also recognised that the human mind has a propensity to organise ‘phenomena not only into segments but to arrange them in opposite pairs’ - what he called ‘binary oppositions’ (Tuan 1974: 13; 16). Opposite meanings are thus assigned each pair: for example, in the biological and social (life-death; male-female; we-they); the geographical (land-water, mountain-valley, north-south, centre-periphery); and the cosmological (heaven-earth, high-low, light-darkness). Tuan argues that these antinomies ‘of biological and social experience are then transposed to the enveloping physical reality’ (Tuan 1974: 16).

Each of the 62 key constructs extracted in Chapter 5 (and for that matter each of the foundational constructs behind them) has its antinomy; and importantly, so does each of the twenty superordinate constructs distilled in Section 6.6. For a traditional or ‘productivist’ farmer, many of the antinomies to the constructs he uses, when expressed in opposite ecological terms, are simply unthinkable (as will be seen in Chapter 7). This illustrates both the power of deeply embedded, historically derived constructs and also the power of paradigms and discourses.
Finally, the importance of the *Choice Corollary* (which implies each person is constrained to choose between the dichotomous poles of a construct) is that a person, having made a decision on predictions derived from his anticipations, then builds his life upon one or other of the alternatives represented in each of the dichotomies of his constructs. As we have seen, these phenomena and their relation to Australian land-use have had major consequences for land degradation. This is because a construct ‘governs what the man does, not what the object does’; that ‘when a man makes a choice what he does is align himself in terms of his constructs’; that ‘men change things by changing themselves first, and they accomplish their objectives, if at all, only by paying the price of altering them’; and that ‘men make choices of their own acts’ whereby ‘alternatives are distinguished by their own constructs’ (Kelly 1966b: 11). Clearly, the results of such choices can therefore be either positive or negative in relation to land and ecosystem health.

What is relevant from the above discussion is that, after road-testing the 62 key constructs distilled in Section 6.1 above against contemporary rural media material (Section 6.5), and following further discussion and analysis, in section 6.6 I was able to then distil twenty superordinate constructs regarding Australian land-use within the dominant agricultural discourse. This is where Kelly’s *dichotomy corollary* becomes crucial. The antinomies of the twenty superordinate constructs of industrial agriculture (the dominant discourse) potentially comprise the backbone of the new transformative discourse to be analysed in Chapter 7. That is, the 62 key constructs and the twenty superordinate constructs of the dominant discourse will serve as an hypothetical reverse mirror for an analysis of the new discourse of regenerative-transformative agriculture.

Equally relevant to the core subject of this thesis – changing land-use behaviour and constructs – is another aspect of Kelly’s *Organisational Corollary*. Of this Kelly says: ‘Man’s thinking is not completely fluid; it is channelized. If he wants to think about something he must follow the network of channels he has laid down for himself, and only by recombining old channels can he create new ones. These channels structure his thinking and limit his access to the ideas of others’ [my emphasis in italics]. We see these channels existing in the form of constructs’ (Kelly 1955: 61).

So it is the recombining and creation of new channels that comprises learning (or change). We will see in Chapters 8 and 9 the relevance of this in regard to transformational change.

Addressing the issue of non-change or non-adoption of sustainable practices in agriculture is central to this thesis. Underlying the tracking of the process of resistance to (or constraints on) change has been an implied but as yet unarticulated and un-examined major issue: the role of power in society in embedding knowledge cultures (whether they be individual, family, community or specialist-institutional). It is clear the dominant form of agriculture – the industrial – is laden with power. This devolves from the globe’s largest multi-nationals, and from the very highest levels of politics and governance down through federal and state administrative, research and extension institutions to on-the-ground agronomists and consultants. So it is to this critical area of knowledge-power and change or resistance-to-change that we now turn.

Having identified 62 key constructs determining Australian agricultural land-use in Chapter 5 (all embedded within the ‘mechanical’ mind), it is imperative that we more closely scrutinise these in the context of discourse and language (key analytical tools of this thesis).

Chapter 3 (section 3.4, page 68) showed that there is a strong nexus between knowledge and power. This is well illustrated by how inculcation in a paradigm defines for an individual what is valid knowledge or ‘truth’, who is authoritative or trusted in its expression, and how this can control, shape and constrain those working within a paradigm. In the context of the social construction of reality, those in power clearly have a major influence in defining what is ‘reality’, and in the shaping of a person’s beliefs, habits, understandings, attitudes, practices: in a word, their constructs.

A second element of the shaping of personal constructs drawn out in Chapter 3 (Section 3.4, page 69), was Foucault’s concepts of bio-power and normalization: how members of a society are socialised into that society through imbibing the pervasive ‘norms’ of that society. That is, as in a paradigm, citizens acquiesce to those holding the ‘truths’ and knowledge in a society. Thus for farmers living within a community and distinct rural ‘district’ of tried, proven and accepted regional practice, it is easy to see how an existent,
dominant, traditional, habitual world-view and attendant constructs to do with land-use and farming can be deeply inculcated.

This melding of thinkers on discourse, language, the role of communities of practice, and Personal Construct Psychology has major implications for this thesis and the process of learning, change or resistance to change in relation to attitudes - and especially those concerning nature and the land.

The analysis in Chapter 5 of the switch from the organic to the mechanical metaphor in Western society (and thus the identification of 62 land-use constructs) confirms the recognition by Foucault and others that discourses are historically evolved, and that they therefore directly help determine our personal constructs. That is, because discourses are integral to the social construction of reality, then such realities are constructed, ‘imaginary’, contested, and situated in specific historical circumstances (Norton 2006: 18). This ties in closely with the modern concept of path-dependence (of historical ‘lock-ins’).

Appendix 6 explores in greater detail three examples of how such historically-derived constructs of reality occur, and as only briefly touched on in Chapter 5. In Appendix 6 can therefore be seen a thematic discourse analysis of the historically-derived areas of personal constructs covering the areas of (1) the social construction of the map and cartography; (2) the social construction of landscape; and (3) construct derivations in the pioneering-settlement phase in Australia.

To illustrate both the role of power and discourse, and then the resultant deep and powerful nature of constructs shaped by the factors described above, I will now undertake a thematic discourse analysis of contemporary material. This is because the influential role of Foucauldian bio-power and normalization (and of Kuhnian paradigm entrenchment) is not just apparent in the past (see Chapter 5; Appendix 6) but is ongoing in the present.

6.4. Thematic Discourse Analysis of Contemporary Factors in the Embedding of Personal Constructs Relating to Australian Land-Use

In this Section I examine four instances of the contemporary process.
1. Power, Discourse and the Social Construction of Reality Regarding Land-Use: Derived from an inherent Paradox in Landcare

The strength of deeply embedded constructs from contemporary phases of Australian land-use (with their concomitant discourses) is well illustrated by the social movement of Landcare: the national and federally supported network of community-based Landcare groups, each focussed on tackling both local and national land degradation issues with the aim of ensuring the sustainability of agriculture and rural communities. If ever a national movement emerged that had the potential to instigate transformative change and a shift to a new ecological agriculture, then on the surface it would appear Landcare had that potential. Yet, as Chapter 8 reveals in terms of the derivatives of transformational change in agriculture, this appears not to have occurred. The discussion below demonstrates that unchanged and deeply held personal constructs regarding Australian land-use most likely is what proved the major constraint to change.

Begun informally at the state level in the 1980s, and following a joint initiative by the National Farmers Federation and Australian Conservation Federation, the National Landcare Programme was formally initiated and funded by the Federal Government in 1989 with the declaration by the Prime Minister that the 1990s would be the ‘Decade of Landcare’. Socially, Landcare appears an enormous success given that by the mid 1990s there were already 2,500 Landcare groups across Australia (and some 4,000 by 2012), with an alleged representation from 30% of commercial farming operations in Australia (Mues et al. 1998; Lockie and Vanclay 1997; DAFF 2012). On the surface also, in terms of ‘on the ground’ work, Landcare appears a success: the administering body, the federal Department of Agriculture, Fisheries and Forestry claiming that the army of Landcare volunteers ‘has changed the face of Australia’s rural and urban landscapes’, via ‘planting millions of trees, shrubs and grasses’; and including repairing and rehabilitating riparian zones and coastal dunes, restoring water quality, and protecting remnant vegetation (DAFF 2012). Much positive environmental work is certainly evident Australia-wide.

However, as detailed in Chapter 5 and Appendix 5, due to both retarded land-use legislation at the state and Federal level, and to deeply embedded attitudes towards nature and its resources (including to individual rights), in the 1980s through to the 21st century ongoing
vegetation clearing on a mammoth scale occurred in most states. Between 1980 and 2001, for example, over 2.039 million hectares of native vegetation were cleared annually across Australia (conservative estimates; Productivity Commission 2004: xxvii). Haworth points out that much of the recent land clearing (woodland and/or native grasses) was ‘not just a residual Queensland or frontier phenomenon’. Land degradation problems, he says, are not just due to historical malpractice but ‘are continuously being initiated by the ongoing process of opening up new lands’ (Haworth 1997: 168). He cites wide-scale clearing in the long-established pastoral district of the New England Tablelands up to 1995, and the fact that clearing licenses in the NSW Western Division between 1984 and 1990 were granted over 640,000 ha.

In revealing the power of deeply-embedded constructs, Haworth cites the long-settled and established agricultural regions of northern NSW, ‘all of which contain active Landcare groups’. For example, in ‘the sensitive’ upper catchment areas of the Tablelands, Haworth says ‘it is hard to fit this recent burst of clearing…into the professed sustainability ethic of many of the local landowners as expressed through Landcare groups and public statements of farmers’ organisations’. The result, says Haworth, has been ‘30 million trees per year destroyed in NSW, close to a third of a billion as that State’s contribution to the Decade of Landcare’ (Haworth 1997: 169-170).

Clearly, in Haworth’s opinion, there is confusion between ‘sustainable agriculture’ and ‘ecological sustainability’. This, I believe, is not due to any semantic differences over the definition of ‘sustainability’, but to deeply held land-use constructs: constructs constantly reinforced by a legislative lock-in and subsequent behaviours, and, as Lockie points out below, the hidden power effects of the Landcare discourse. Therefore, as Haworth concludes, ‘[t]he question that the participants of Landcare may not wish to address is not that of sustainable agriculture, but the broader issue of sustainable land use, and the even broader one of the ecological sustainability of our species’ (Haworth 1997: 172). The deeply-held, powerful, and historically embedded constructs that would seem to drive such perplexing behaviour include many of the key constructs listed in Section 6.1.

From a discourse analysis perspective, Lockie reveals how the Landcare discourse (what he calls an ‘empowerment discourse’) tends ‘to remove responsibility for land degradation from individual land users’. He traces how ‘care for the land is explicitly linked with each
individual’s own practice’ (the independence, individuality constructs). Then, highlighting van der Ploeg’s work on farming styles and how farming is an ‘intrinsically social practice’, Lockie emphasises how socially constructed notions of a ‘good farmer’ influences what are seen to be good farming practices, and how, regarding such farming styles, there is an ‘emergence of patterns within and between agricultural districts’ (Lockie 1997: 32-37; van der Ploeg 1993). Crucially, Lockie points out that ‘for farmers generally a healthy landscape is a productive landscape’, and this leads ‘to a close integration of production and conservation goals’. It is this conflation that has been incorporated by farmers into much of the Landcare ethic (Lockie 1997: 37). Lockie thus reveals that ‘good farming practice’ is reified by Landcare which, as a new signifier that allows farmers to participate in environmental discourses, has even linked chemically-based so-called ‘Conservation Agriculture’ with good farming practice. As such, the Landcare discourse has enabled farmers to counteract ‘trends in conservation discourses towards interpreting the emphasis placed by farmers on productive landscapes as inherently exploitative’ (Lockie 1997: 39).

At present, therefore, Landcare seems to be all things to all people: having meaning for some farmers coming from the dominant discourse of industrial-productivist agriculture, who are nevertheless sympathetic to tree planting, erosion amelioration and other non-paradigm threatening activities; for others coming from the emerging discourse of ecological-transformative agriculture, Landcare means something entirely different. As Lockie emphasises (and in terms of the function of discourses), this is a clear demonstration of the relationship ‘between meaning and power’, where power ‘is as dependent on the ability of “actors to win the struggles that take place over the attribution of specific social meanings to particular events, actions and ideas”…as on more obvious forms of coercion’ (Lockie 1988: 244; and citing Long 1992).

Lockie goes on to discuss how the ‘empowerment’ element now embedded in the Landcare discourse is also expressed in the ideal of environmental care across a wide constituency including, says Lockie, in ‘a great number of people and groups who did not previously, and perhaps still do not, identify themselves as environmentalists or conservationists’ (Lockie 1997: 33). That is, says Lockie, the ‘signifier’ “Landcare” ‘has provided a powerful discursive tool to ride the groundswell of environmental concern that emerged in Australia over the last decade’ (i.e., mid-1980s to mid-1990s). It is this power discourse element that has allowed farmers to exercise unchanged constructs in land-clearing; it explains why
Landcare has attracted markedly little controversy and has allowed pillars of an economic rationalist state and society – key players in the corporate sector – to attach the desirable Landcare signifier to their products and to gain ‘cheap environmental credibility’ (Lockie 1997; 1998: 245). In short, differences over the signifier of Landcare (and even over what are the characteristics of healthy landscapes and the most desirable social practices to undertake them) has allowed the sanctification of the intensification of industrial farming practices (Greider & Garkovich 1994; Lockie 1996).

Confused behaviour and thinking around Landcare underlines the power of historically-embedded personal constructs. This is illustrated by the issue I raised in Chapter 1 (Section 1.2, pages 5-6) of what I call the ‘vegie garden’ or Landcare paradox: that, regarding behaviour concerning Landcare and farmers’ home vegetable gardens, farmers seemed capable of holding two different personal constructs at the same time.

This observation and behaviour was supported by this study’s interviews. For example, Interviewee # 25 (female) found Landcare of little relevance: ‘They wanted to fence a tiny patch, but ignored the rest of the landscape…It was overgrazed and dead, no vitality…They were too focussed on the small bits, not thinking big enough…not addressing the whole soil, water, air concept…the whole biodiversity of a system…they should have focussed on systems rather than a patch of trees…It wasn’t congruent with what was going on with the rest of the landscape.’

Interviewee # 30 (male): ‘Landcare was not much influence…there’s this sort of silo mentality: “that’s Landcare, this is farming.”’

Interviewee # 17 (male): ‘Landcare only exists through the poor practices of Australian farming.’

In short, the Landcare signifier appears more to have tweaked and selectively reinforced deeply-held existing personal constructs that had come from historical and contemporary power-laden discourses. Besides some widespread biophilic awakenings, the Landcare movement doesn’t appear to have led to transformative change in Australian land-use through the avenue of over-throwing old, or implanting new, personal constructs.
2. Drought and Australian Government Policy and Legislative Impacts

In Section 6.2 and the discussion of the interconnection of key constructs in the context of George Kelly’s work, I discussed the signifier of ‘drought’ and its deep cognitive impacts on land-user personal constructs in Australia. We saw that many key constructs – largely derived from mal-adaptation of the European mind to Australia – lie behind the dominant view of industrial agriculture regarding drought. For example, Australia’s climate is ‘abnormal’, K23; our water courses are ‘abnormal’, K27, K33; our landscape is ‘abnormal’, K25; our soils are ‘abnormal’, K26; our native grasses are inferior, K25.

What is crucial is that these maladapted Anglo-European personal constructs surrounding the ‘drought’ signifier have then linked across in an interactive fashion into the area of government policy and legislation and/or regulation, thus embodying elements of Foucauldian power and discourse. For example, the key constructs regarding ‘normality’ in the Australian land and climate clearly influenced the ‘closer’, ‘soldier’ and ‘empire’ settlement schemes that either placed yeoman farmers on farms too small (given the nature of the oligotrophic soils and dry climate), or else on irrigation blocks (again with inadequate acreages and infrastructure; see key constructs K45, K39, K32, K38, K41, K46, and K56). These government-imposed, legislatively-backed actions proved to be some of Australia’s worst social and ecological disasters. This pioneering of new country and its flawed assumptions about the climate, soils, Australian land, nature and landscape functions, in turn linked into other key constructs concerning inappropriate assumptions about ‘nature’, the Australian environment, and ‘man’ controlling nature (as outlined in Section 6.1, beginning with K1). Subsequent Federal and state drought policies then linked into the above key constructs, particularly about the abnormality of droughts and the hubristic view that they could be ‘beaten’ (K55), with linkages to ‘man’ and his technologies being able to solve all problems over nature (K20, K10 and others). Furthermore, much of the farmer-derived emotionalism regarding drought policy and the legislated support for farmers in drought appears to have elements of agrarianism in it, an approach which holds that farmers are special and so deserving of government help (K20, K15, K38, and others) (Productivity Commission 2009).
In my field work I discovered an extraordinary example of Foucauldian bio-power and normalization that was working at the very heart of farming communities: in a primary school. The school in question was situated in a small cropping and grazing community in the Central West of New South Wales. It comprised 30 children from Kindergarten to Year 6 (ages 6 to 12). Almost all the children came from local farming families, of whom the majority were mixed farmers (cropping and grazing enterprises).

I ascertained that, through an initiative of the head teacher, almost every pupil in the school was enthusiastically involved in playing an interactive computer game called *Farming Simulator*. This is marketed by *Excalibur Publishing Ltd.* in the United Kingdom, and is promoted through the United Kingdom and Germany, and, being on the *world wide web*, internationally. In Australia pupils can purchase the game for $29.90 as an *I-Tune App.* for their individual or home computer, or they can transpose it to an *Ipod* for $2.99. My informants had children at the school and told me even six year-olds were immersed in, and captivated by, the game. My informants thought the game and concept were desirable. (See Figure 6.1, page 162).

Using interactive video and stills pictures and graphics, students can engage in a real-time game of industrial agriculture farming. For example, this can occur over weeks as a crop is prepared (chemically sprayed, planted, sprayed again many times for weed and insect control), and then harvested. With real-time ‘profits’ from their activities, players can then go to the farming ‘shop’ for more equipment: to purchase, for example, a $120,000 spray-rig. All items in the ‘shop’ (tractors, trucks, spray-rigs, harvest bins and so on) have been licensed for use in the game from the leading manufacturers of European (especially German) agricultural equipment (for ‘authenticity’s sake’ according to promotion material on the website). These particularly feature the iconic green machines of *Deutz Fahr*, but also other brands such as *Krone, Horsh, Pöttingen*, and *Vogel and Noot*. Part of the interactive management is regular consultation with the local agronomist for his recommendations on what (and how many) chemicals and their volumes to use; what ‘certified’ seeds to buy, and similar industrial agriculture decisions.
Promotion on the *Games* website stated that the latest *Farming Simulator Edition* ‘is a must have for every agriculture and technical simulations fan’, while an *IT Review* said the game ‘does a decent job of presenting a hands-on farming experience with a management overview’; that you can enjoy ‘seeing your empire thrive’; that ‘farm fans…will get off on driving the various different and increasingly sophisticated lumps of heavy machinery around’; and so ‘if you’ve always dreamed of managing and working a farm, complete with your own array of tractors, combines, sprayers, ploughs, roton tedders, cultivators and so forth, now’s your chance’. This is but a small sample of pages of similar advertising rhetoric (http://www.excalibur-publishing.co.uk/fairingsim2011.htm; accessed 14.08.2012).

In effect, the game is a strong example of bio-power and normalization: of how the influence of the global giants of productivist industrial agriculture can reach out to affect the youngest minds and embrace them into, and imbue them with, the mores, thinking and values of a dominant farming paradigm. This represents a clear case of a deep-embedding of a discourse...
(subtle, unseen, but also self-imposed) in the very youngest in society: of the function of knowledge-power at its most transparent. As J.M. Servan noted (quoted in my Frontispiece), thus ‘on the soft fibres of the brain is founded the unshakable base of the soundest of Empires’.

4. The Evidence of Interview Material

Abundant evidence was found (in both the testimonies of case study #12, industrial-productivist agriculture, and the remaining eleven agricultural case-studies) that the twin processes of Kuhnian paradigm entrenchment and Foucauldian bio-power and normalization play fundamental roles in embedding the dominant paradigm of industrial agriculture. With this goes a deep inculcation and acceptance of the dominant, traditional, and habitual via a consequent embedding of the mechanical metaphor and its concomitant personal psychological constructs. That is, farmers are socialised into the dominant discourse’s practices by imbibing its pervasive norms. As Procter and Parry indicated (1977: 157-160), the individual construct systems of farmers are both shaped and constrained by the strictures and ideology of their society.

(a) Education, Training, Bio-power and Paradigm Entrenchment

The familiar accepted and traditional techniques and pathways of paradigm entrenchment and its subtle reinforcement in industrial agriculture were supported by a wide range of interviewees across all case-studies. Sources of training and information cited included: diplomas or degrees in traditional agriculture and agricultural science; working for an agro-chemical R&D company; receiving newsletters from the MacKinnon Project (Melbourne University), private consultants (such as Holmes & Sackett), or from farmer groups or research organisations (e.g., The Kondinin Group’s Farming Ahead, the Grain Research and Development Corporation’s Top Crop or Ground Cover, the NSW or Victorian Grassland Societies); subscribing to reductionist scientific journals (e.g., Australian Journal of Agricultural Research; Australian Journal of Experimental Agriculture).

Significant influence was and is wielded by leading agricultural scientists (e.g., at the CSIRO; Charles Sturt University, such as the Fred Morley Centre in Wagga; the University of N.S.W.; the Waite Institute [Adelaide]; Melbourne University; various State Departments of
Agriculture; the University of W.A.; the Tasmanian Institute of Agricultural Research), and particularly by private consultants, crop agronomists, and especially agro-chemical, fertilizer and seed company suppliers and representatives: the latter via personal visits, field-days, newsletters, and literature. Such relationships can have strong elements of dependence about them. Due to this power and influence, the cognitive shift in the last three decades to high-input chemical agriculture and big computerised machinery is reflected in the ubiquitous nature of machinery, chemical and other agricultural product, American-style brand advertisement caps and other clothing worn by modern-day farmers.

Examples of the above mechanisms include:

**Interviewee # 64** (male, trained in Vet. Science Sydney University): ‘I was better trained…and got into the scientific literature…The smart ones will say: “No, if you read the text books, if you read the literature, you’re right on track…it’s a simple model” [note the train metaphor ‘on track’].

**Interviewee # 51** (male), now a Permaculture-oriented transformative agriculturalist, said: ‘I went to Tocal Ag. College – all productivity-based, on kilos per hectare; and that’s how we’ve been educated.’

(b) The Power of Industrial Agriculture

**Interviewee # 67** (male) on reasons for the loss of older organic ecological knowledge: ‘There’s been no research done on those…because the research has been chemistry-driven…what’s been the push to sell. That’s the whole track.’

**Interviewee # 51** (male): ‘At the end of the day agronomists want to sell you product, otherwise they’ve got no job… They’re trained to do that, it’s not their fault …They don’t like selling wire [for non chemically-based holistic grazing management]… …but not the straight-jacket for me.’

It is noticeable that a number of the key innovators in transformative agriculture (and particularly those who have left major research organisations) were subsequently severely ostracised, vilified, and constantly criticised. In turn this has made them ‘prickly’ and over-sensitive or defensive.
An important example of the power of a dominant discourse is the history behind the ignoring of Australian native grasses by the R&D community. One reason, as argued by a number of transformative agriculturalists, is not only are they not part of a Western industrial Euro-centric model, but that their management requires an ecological, regenerative approach as opposed to one involving high inputs of chemicals, fertilizers and regular re-seeding of exotic species. The power of this paradigm was illustrated in a survey of farms in the Central, Southern and Monaro Tablelands of NSW in 1991-92 examining native grass management: areas where native grasses contributed an average of 40% to grazing production. Overall, compared to knowledge of weeds and ‘introduced’ or exotic species, the knowledge of, and identification of, native plant species was judged and measured to be ‘poor’ – with 14% not able to identify even one native grass species (Garden et al. 2000).

Interviewee # 30 (female), a native plant botanist and holistic grazing manager who did Botany at the University of Adelaide: ‘I learnt nothing at uni. about native grasses…They know nothing…and everyone laughed at Alan Savory, everyone at uni. said “No, that’s absolute nonsense”…As far as the botanists were concerned he was just crazy…To get the WWF money [World Wildlife Fund monies for trials and extension on native grasses in the early 2000s] I wasn’t allowed to talk to anyone about HM [Holistic Management]…they really tied my hands…And some of my local community think I’m a complete nutter…My daughter-in-law used to work for the Stock Journal…and she did a trial with the ABC, and the first thing they told her was “go find that crazy woman that talks about grasses in the Mid-North”.’

(c) Active Contestation from the Dominant Paradigm

Interviewee # 68 (male), a leading industrial-productivist farmer, expressing his views on biological and biodynamic farming: ‘I haven’t got any time for that at all…it sets my teeth on edge…bloody biodynamics…In one of those magazines…she said “It’s about the spirituality of farming”…I just went ballistic…there’s no science in that. There’s no production base for that. It just doesn’t stack up. It doesn’t work under trials…I suspect a lot of the common sense of science has flown out the window.’
Interviewee # 64 (male), also a leading industrial-productivist farmer, expressing his views on holistic grazing management and pasture-cropping: ‘I haven’t seen their numbers, but I’m sceptical… that the benefits they claim could outweigh the disadvantages. There is evangelism going on…They haven’t shone up that well…see my paper on Evidence-Based Agriculture with ‘XX’ [industrial agricultural scientist]…It doesn’t add up…We don’t think their claims are justifiable…and use of hocus pocus products – snake-oil products…Don’t deal with shonks…’

…We take a formal and disciplined approach to soil health…to systems agriculture…I take a standard text book approach…It’s just your classic scientist’s view of how soil works…I get angry with this stuff…I just take the view, well, if people want to fuck around with rubbish they can, you know.’

[Note: What is revealing about a number of similar interviews is the degree of emotional reaction to the challenge of their strongly held beliefs: to their personal constructs. As discussed in Section 6.2 above concerning the relevance of Kelly’s ‘organizational corollary’ and core constructs, George Kelly said this is the typical reaction when either superordinate or core constructs are challenged, and which constitutes a threat to our understanding and prediction of ourselves].

(d) A Different Transformative Agriculture Perspective

Many transformative agriculturalists expressed concern and insight into the role of bio-power and paradigm entrenchment. Metaphors were insightful:

Interviewee # 52 (male), in talking about a traditional neighbour who kept clearing trees, said: ‘That was his brief.’

Interviewee # 38 (female), who made a switch from traditional industrial cropping to a complex holistic system with livestock, used the metaphor of a wild-west posse: ‘When we were riding with just being conventional…’

Interviewee # 62 (a business-trained transformative agriculturalist and leading pasture-cropper, talking about his role as an educator in transformative agriculture): ‘You could nearly draw a line down the page everywhere I go…It was the guys who’d done a science background or went to Orange Ag. [College]…couldn’t handle the challenge…It’s silos, they
can’t handle it…You’ll lose a lot of them out of the course and this is a problem with Ag. Science generally, they can’t handle holistic management…holistic thinking. They keep coming back to the reductionist, and it’s failing agriculture.’

Interviewee #52 (male) bemoaned the fact that when he sought to make a turn from industrial agriculture, ‘those next few years were quite difficult because, having been part of what was the “best practice” agriculture at the time…and into heavy chemical use, and making a decision to turn your back on it, there’s nowhere you can turn for help…and the local ag. supply place, CRT, calls biological farmers and products “Muck and misery…Snake-Oil”…and when we asked the local Department of Ag. agronomist…about alternative fertilizers, she said “It’s more than my job’s worth to talk about that stuff”.’

Interviewee #56 (husband), in describing the entrenchment of ‘traditional farming systems’ on the north-eastern NSW-Queensland border, said: ‘Convention would dictate how they went about it.’ His wife was more explicit: ‘Someone said that Australian farmers are intuitive with their land. I totally disagree…they’re not. They are totally disconnected from their land and they rely on someone else to tell them what to do…My conspiracy theory? It’s originally from the multinationals. There is a culture in the pure farming systems [i.e., no livestock component]…there is a complete capitulation of responsibility…You give over the responsibility of decision-making to agronomists, and now we’ve got marketing consultants…and with agronomists etc., it gets back to scientific training…’ (Husband): ‘It’s a culture…You want to put stress on a framer? Ask him why he should go and spray that paddock… “Oh well, the agronomist told me.”…People are very, very comfortable not to make decisions.’

This corroborates the work of leading sustainable agriculture thinkers which reveals how the industrial agricultural discourse engenders in farmers a reliance on others and thus a disempowerment, as a whole community of farmers can be rendered unable to make independent decisions (Berry 1977; Jackson 1980, 2010; Röling and Jiggins 1998). The latter workers describe how farmers can become trapped on a treadmill of innovation when trying to keep up with the mainstream market in industrial agriculture. This whole process appears to be another manifestation of Foucauldian bio-power.
(e) Evidence-Based Agriculture

Interviewee #63 (male), an industrial productivist, in criticising the current alleged lack of evidence (both biophysical and economic) for pasture-cropping, cites Charles Sturt University scientist Jim Virgona’s propagation of the concept ‘Evidence-Based Agriculture’. Virgona, says interviewee #63, has based his work ‘on the evidence-based medicine type principles…and then he’s gone through and identified what the problems are with agriculture and how there’s a lot of smoke and mirrors.’

This concept is emerging as a major defence tactic against the mounting encroachment of transformative agriculture. As indicated by Interviewee #63, it is a template deeply embedded in a reductionist scientific and specialist approach to knowledge that is directly copied from tactics mounted by big pharmaceutical companies and associated medical interests against the alternative health movement and which goes under the rubric ‘evidence-based medicine’ (see, for example, Sackett et al. 1996; Davidoff et al. 1995; Guyatt et al. 1992).

(f) Unwritten Ground Rules (UGRs)

Interviewee #56 (male), who has changed from a traditional, high-input chemical productivist cropping approach to being an holistic grazer-pasture-cropper and subtle energy user, perceptively analysed barriers to adoption and the defence tactics of the dominant paradigm. He cited a booklet by a Gold Coast business consultant, Steve Simpson, titled Unwritten Ground Rules. Says Interviewee #56: ‘It’s about “This is the way we do things around here – the unwritten rules that influence behaviour – the external influences”. So it’s a lack of knowledge and understanding …It’s impacted by a lack of education and awareness, but it’s also influenced by the unwritten ground rules of society, plus bad science out there – they don’t teach the biological stuff of Christine Jones, Elaine Ingham etcetera…Kids at uni., they’re taught the same stuff as thirty years ago – I don’t understand that. Now there can only be two reasons: (1) that there is a counter-argument scientifically against the science Christine is describing, i.e. her teaching of the liquid carbon pathway – that it doesn’t exist; or (2) there’s a massive cover-up or lack of acknowledgement…So I can’t fathom the lack of attention…and I put that down to the unwritten ground rules, and it goes to Thomas Kuhn’s
paradigm theory. It’s a psychological barrier that prevents the power-brokers and decision-makers from allowing other thought patterns to be entertained.’

This interviewee raises a crucial issue, and indeed insightfully conflates Kuhnian paradigm entrenchment with the usually hidden effects of Foucauldian bio-power and normalization: how members of a society are socialised into that society through imbibing the pervasive ‘norms’ of that society. Foucault saw this as both a coherent political technology but also one where power is both largely hidden and also largely self-imposed or accepted. This encapsulates the way farmers are taken into and immersed in a dominant or traditional practice, and how scientists, agronomists, farmers, agro-product salesmen, consultants and others can be caught in a paradigm and acquiesce to those either holding the ‘truths’ and knowledge in a society, or become invisibly influenced by such mechanisms as the Unwritten Ground Rules of society.

The little recognised concept of Unwritten Ground Rules (UGRs) comes out of ‘Organisational Management’ and was articulated by Ron Cacioppe and Steve Simpson from the late 1990s (see Cacioppe 1998, and Simpson 1997). Simpson and Cacioppe, in discussing UGRs in the business organisational context, say that ‘UGRs define acceptable and expected work behaviour. They are the expectations and norms that are usually unspoken and unwritten, that influence behaviour and attitudes of members of a group…’ (Simpson & Cacioppe 2001: 396).

(g) Thesis Interview Material Revealing the Language and Constructs from Industrial Agriculture

While the twelfth case-study – that of industrial-productivist agriculturalists - was only a small group representing the dominant discourse, nevertheless their language and metaphor use was distinctive in revealing different constructs compared to transformative agriculturalists. This echoes the language seen in Sections (a) to (d) above, where industrial, mechanical, martial, technical, quantitative, aggressive language, metaphors, and thinking were in evidence.

Interviewee # 6 (male): ‘I will crash-graze the paddock…I’ll flog it out; it’s had a hammering, but I’ll take-down that paddock to 600 kilos…HM [Holistic Management] could
turn around and bite us because we need super [superphosphate] here…It’s a productive place.’

**Interviewee # 68:** He espoused a reductionist view of sustainable agriculture, which for him meant ‘the measurable indicators are not decreasing. e.g. soil fertility and pH; soil structure’.

For **Interviewee # 63** sustainable agriculture was judged only in the financial context.

There was also much use of the cybernetic concept of farming model or systems agriculture. Another frequent theme was confidence that technology would come along and solve any future problems, and that chemicals were safe (reminiscent of the pre-Silent Spring era).

**Interviewee #68** (male): ‘I’m not worried about pouring chemicals on the ground…science shows that these chemicals are broken down.’

**Interviewee #64** (male): ‘We are a technology-driven business…we view ourselves as commodity producers, and the strategy for a commodity producer is to keep dropping your cost in production, and the way to do that is by applying technology.’

This interviewee was also aware that industrial agriculture created problems, but took a curative approach to it: ‘Yes, the sort of system we run, of sub-clover and lots of phosphorous. It’s acidifying, but if you’re going to maintain the system…you have to apply lime every ten years or whatever…it’s got a measurable return.’

And regarding ‘Peak-oil’, ‘Peak-phosphorous’, and impending scarce resources, he stated: ‘I don’t have answers, but I have faith in human ingenuity…I’m an old free-marketer’.

For **Interviewee #63** (male), more holistic concerns were not high on the agenda:

‘Biodiversity at a farm scale is irrelevant; it may be important on a landscape scale’; and

‘Sense of place is not important – people get chained to their bit of land.’

Consistent language use in this case-study included: inefficiency, efficient, efficiencies, benchmarking, economies of scale, triple bottom line, low cost per kilo of output, production base, productivity per hectare, ‘improved’/introduced pasture species, Midas or systems modelling, systems agriculture, farming models, sprayed the lot out, full inputs/outputs, land as ‘productive units’, evidence-based agriculture; technology-driven; commodity producer; net present value; economies of scale; investor horizons; IRRs (internal rates of return);
quantifying the benefits; probabilities of distribution; optimum strategy, nett P, adding N; and similar language.


To explore and test both the role of Foucauldian ‘bio-power’ and ‘normalization’, and some of the constructs involved in modern Australian agriculture as outlined in Chapter 5 and distilled in Section 6.1 above, over the course of the three years of research I perused and then analysed mainly advertising but also written material (text) from the printed weekly rural media and also from rural supply company product promotions. Regarding advertising, I worked on the assumption that the powerful trans-national companies marketing their products had done thorough research on the personal constructs of Australian and American farmers, as these would be the psychological buttons they intended to press. The material appears to confirm this. It also confirms Thompson’s observation that ideology is ‘meaning in the service of power’, and how ideologies can mature into ‘tradition’ and ‘common sense’ (Thompson 1990: 56; and Swidler 1986).

There are 38 examples in total, but I will only illustrate 13 in this chapter (the remainder are found in Appendix 7). The examples illustrate the nature and power of personal constructs, their historical origin, their language, and thus the discourses behind them. Under each visual I highlight the main construct/s the material appears to be eliciting, and examples of the language used. In all cases there is an extensive linkage to other constructs, and across other themes. Significantly, it became clear from the analyses in Sections 6.1 and 6.4 above, when combined with the examples below, that the constructs of the dominant discourse of agricultural Australian land-use fall into four distinct sub-languages or sub-discourses. The examples are grouped under these four sub-discourses.

Sub-Discourse 1: ‘To Dominate nature; anti-nature; simple nature’.
Construct K1: ‘man is in control, outside and above nature’; K53: the good farmer ploughs etc. and sprays chemicals’

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The good farmer – young and modern (most have USA-style ‘product caps – note the half-hidden *Bayer* brand; with sunglasses usually perched on top); he can create a ‘dazzling’, ‘clean’, neat, hygienic and pure landscape – just like the ‘Omo’ lady on TV with her sparkling laundry. Verbs: ‘clean-up’, ‘harness’.

![Image: Precept 300 EC advertisement](image_url)
Example 3: ‘The Ultimate Killing Machine’ (Full back cover *The Land 1/3/2012*).

Construct K1 – man in control, power over nature; and K25 – nature is ‘the enemy’.

Martial, aggressive, masculine language is to the fore. ‘Roundup Attack’; ‘weed’s worst nightmare’; ‘no weed is safe, even the toughest, hard to kill weeds’; ‘unique weed targeting technology, more powerful…smarter…new patented penetrator…the kill is faster and more effective…Trust your killer instinct’. (Note the smiling face on the ‘Roundup’ drum).

Figure 6.3
Example 4: ‘Taming the Wild’ – the modern pioneer  *(The Land 14/4/2011: p.64).*

Construct K1 – man is in control; K20 – pioneer farmers are heroic and independent, and can do with the land what they want.

Still ‘Taming the wild’, but with modern technology.

![Taming the Wild](image)

**Figure 6.4**


Construct K3, K50 – soil is a static, inert storage bin of plant nutrients; the soil/land is a static machine.

This goes directly to Von Liebig’s original theory, and the metaphor is that soil is like a battery, you can ‘charge it’, or ‘unlock’ it to ‘immediately’ deliver ‘continuing sources’ of nutrients for ‘better’ soils, pastures, and ‘living, healthily balanced soils’. This in turn ‘delivers’ ‘optimum’ performance, ‘plant-available nutrients’ using ‘analytical services’. The irony is that this reductionist metaphor is being used by one of the alternative ‘natural’ product suppliers, revealing the power of the ‘input’ construct.

![Charge your soils](image)

**Figure 6.5**
Sub-Discourse 2: Mal-Adaptation to the Australian Environment, and Agrarianism

Example 14: ‘It’s War’ (Agriculture Today, September 2010, cover).
Construct K25 – Australian nature is the enemy, its plants and animals pests.
‘War has been declared’ on locusts, ‘the worst locust outbreak etc.’ With a photo of the grotesque enemy. Active use of martial language and imagery.

Figure 6.6

Example 15: ‘Man Against Wild’ – The Locust Invasion (Stock & Land 7/10/10, p.4).
Construct K25 – as above in example 14. Aggressive, martial language. Nature is the enemy; pioneering still; perplexed farmer with his spray product cap on.

Figure 6.7

Construct K25 – as above in examples 14, 15.

Nature is the enemy; use of martial language - the enemy is attacking, so hit the dirt because there is incoming fire (‘incoming heavy mite pressure’); so the armaments response is to ‘target them’ with ‘high strength formulation’ chemical so as to ‘attack’ red legged earth-mites and ‘other pests’; which you can apply ‘to your bare earth where it binds to the soil and kills them’; Talstar ‘has the flexibility to control a wide variety of pests’; never ‘been more affordable’, and ‘see your Crop Care dealer’ – a caring dealer, like a car salesman.
Sub-Discourse 3: Economic Utilitarianism/Economic Rationalism

Construct K 11 – as in example 23 above.
Sprayrigs are called ‘Goldacres’: that is, spraying nature creates wealth.
Example 25: ‘Wrap up the Season’  (The Land 30/9/2010).

Construct K11 – as in example 24 above.

The land/nature, being a chattel, a utility, factor of production and commodity, is available for controlling, profit-making and for ‘parcelling’, storing and selling.

Figure 6.10
Sub-Discourse 4: Science and Technology Rules
(Technocentricism/Scientific-centricism )


Construct K54 – a good/’best’ farmer uses big machines…; K20 – pioneers/farmers are heroic and independent…

‘A new piece of machinery is like a new toy; ‘we are just like kids in the sandpit, we just wanted to buy another toy’; but one to deliver ‘potential yield increases’.

Figure 6.11
Example 31: Learning the Language of PA [Precision Agriculture]  \textit{(The Land 1/3/2012, p.64)}.

Construct K54 – technology and science are all powerful; and K13 – progress is underpinned by science.

This illustrates a key point to emerge from the thematic discourse analysis: that distinct languages are used by the sub-discourses of the industrial agriculture. In this case we see a direct pedagogic attempt to inculcate the lexicon of PA. This is illustrated by the introduction: ‘To get started in precision agriculture (PA) you have to first learn the “lingo”, which can be as confusing as making sense of computer-generated yield, biomass and topography maps. Below are some of the common words and terms you will encounter on the journey into the expanding and exciting world of PA’.

Then listed, with explanation, are 31 words/terms of the ‘lingo’ that any keen PA practitioner ‘has to learn’. Note also the happy farmer/technology users in their high-tech cabins.

![Figure 6.12](image-url)
Example 34: ‘Take your yield to the MAX’ (Landmark Seed Portfolio Autumn 2010, p.11). Construct K54 – technology and science are all powerful; and K3 – the soil/land is a machine.

Note the aggressive, muscular arm of the Roundup man-herbicide bucket, and note the speedo dial for ‘revving’ up the land (in tidy neat monocultures), and the arm of the rev-counter dial being a spray-rig wing.

![Image of a yield maximization advertisement]

Figure 6.13

Example 38: Next Boost: Designer Soil (The Land 1/3/2012, p.37).

Construct K13 – progress is underpinned by science; and K3 – the soil/land is a machine.

Soil microbes are ‘the key to new productivity breakthroughs for agriculture’; ‘biophysicist xxx forecasted a time when knowledge of how soil microbes work will lead to “designer soils”’; ‘farmers will be able to harness microbes to design soils that deliver productivity outcomes, like water use efficiency or more efficient nutrient delivery; ‘we don’t have in-crop measures’; ‘new molecular tools’; ‘internationally scientists were modifying the long-held view of soil as a bucket, readily topped up with a nutrient cocktail when depleted’ (an attempt to capture the ecological high ground).

![Image of a news article about designer soil]

Figure 6.14
This material supported earlier analysis in this chapter and in Chapter 5, enabling me to distil some twenty superordinate constructs that appear to be the prime drivers of Australian land-use under the dominant agricultural discourse (Section 6.6 below).

6.6. Distillation of Superordinate Personal Constructs Relating to Australian Land-Use under the Dominant Agricultural Discourse

From the thematic discourse analysis in Sections 6.3 to 6.5 above, and as discussed in Section 6.2 (Kelly’s *Organizational Corollary*), there are strong connections between a small number of major driving constructs and many other constructs. It became clear when analysing the various elements in this chapter that a few dominating constructs appear to be driving all the others. These in turn are connected to subsidiary personal constructs. The dominant constructs are clearly the superordinate constructs – the main structural supports of a construct system. They also appear to be the key cognitive drivers of the dominant land-use discourse in Australia. With some condensing and many hours of sequential distillation and analysis, I was able to distil these (from the 62 key constructs) to twenty superordinate constructs. These were clearly grouped under four sub-discourses, as enunciated in Section 6.5 above. These twenty superordinate constructs will provide the basis (by acting as a reflexive mirror) for a thematic discourse analysis of the emerging discourse of transformational agriculture in Chapter 7.

What is relevant here for discussion in the rest of this thesis is George Kelly’s point, under his *Dichotomy Corollary*, that the differences implied in a construct are just as relevant as the likenesses: that ‘the contrasting end of a construct is both relevant and necessary to the meaning of the construct’.

Sub-Discourse 1. ‘Man’ Dominates Nature: Constructs relating to Nature, and the Australian Land, Climate, Soils and Biota

1. ‘Man’ has control and power over a subservient, powerless land/nature; he is outside and above nature.
2. Nature, land and its resources (including water) are limitless, and ‘man’ is free to conquer, control, dominant and exploit them, as they are there to serve his purposes.
3. Nature and natural objects have no feelings, soul nor mind; they are not mystical, have no religious nor mythical connotations; they have no enchantment. Therefore they can be mastered and possessed.

4. Nature/the land is inert, un-sacred, and without diversity, complexity or self-organising functions; it is like a static machine: subject to, and able to broken down to, simple mechanical laws for easy manipulation.

5. The soil and land is indestructible. The machine-like soil is an inert (non-living) storage-bin/a bucket of plant nutrients: lifeless, inexhaustible, resilient, and so able to be mined, manipulated, ‘improved’.

6. Australia’s soils and climate are like those of England/north-west Europe/north-east USA: humid and rich, and so they can be treated the same.

7. Droughts are abnormal aberrations, and Australia expects to experience four European-like seasons. ‘Average’ seasons are the same as ‘normal’; and droughts can be fought/beaten.

8. Nature is ‘the enemy’, its plants and animals are ‘pests’.

9. Australian native grasses and vegetation are inferior and ‘unimproved’, and so the Australian landscape and farms need to be ‘improved’ (with ‘introduced’, ‘improved’, ‘superior’ crops, grasses and animals), and developed, tidied-up.

**Sub-Discourse 2. Agrarianism: Constructs Relating to Farmers and their Land**

10. Farmers are heroic and independent; they can make best use of Australia’s land resources.

11. Enclosing land and dead, inert ‘nature’ creates property ownership and wealth. Such ownership/privatisation confers absolute rights of property and gives individuals power over the land. Therefore farmers, ‘developers’, ‘improvers’ and others can do with the land what they want because every individual has the right to pursue his own interests.

12. There are no moral/ethical restrictions on the creation of wealth out of an inanimate, mechanical nature via human agency [labour and entrepreneurial behaviour], science and technology.

13. The ‘good’ farmer, via the use of modern machinery, ploughs, turns over the soil, tills, fertilizes and sprays chemicals.
Sub-Discourse 3. Economic Utilitarianism-Rationalism:

Constructs to do with Economics

14. The land/nature is a chattel, a utility, a factor of production. They are inert, consumable commodities, and so are available through ‘improvement’ by human agency, science and technology, for annexation, division, exploitation and/or sale for commercial use and profit.

15. ‘Good’ farmers are progressive, so development of the land for profit-making is good and necessary. Thus a healthy landscape is a productive landscape.

16. The land, ‘nature’, farming and every land-use decision should be determined/judged by economic criteria and the profit motive.

Sub-Discourse 4. Science and Technology Rules: Constructs Relating to Science and Technology

17. The cosmos, nature, society and human body are ordered systems of interchangeable atomized and mechanical parts that can be repaired or replaced from outside (the technological fix). They are able to be governed by law and discerned and predicted through deductive reasoning. They are not part of a wider organic whole. Thus good/best farmers are specialists: reductionist, not holistic, in their role and skills.

18. Progress is underpinned by science, and other knowledge cultures have less relevance.

19. Efficient farms should be run like factories; the land is a factor of production and machine-like, and so inputs, outputs, yields and efficiency should be measured; monocultures are best for this.

20. Technology and science are all powerful and can solve any problems, and so ‘good’/’modern’/’best’ farmers use big machines, ‘improved’ plants and animals, monoculture crops and chemicals.

Conclusions

Building on the distillation of 62 personal constructs from the history of Western thought and Australia’s agricultural phases (Chapter 5), and which are embedded in the mechanical mind or metaphor, I have put in context in this chapter the relevance of George Kelly’s Personal
Construct Psychology. This meant a demonstration of the power of this meta psychological theory to explain why land-users behave in a certain manner and why they resist change. Through a thematic discourse analysis of different material I then demonstrated the importance of the role of a discourse, and in particular of the knowledge-power nexus in embedding the industrial agricultural discourse in Australian land-use practices.

This enabled me to demonstrate that there is a small group of 20 superordinate constructs that act as the fundamental structural supports and drivers of the dominant industrial agriculture discourse. Moreover, these superordinate constructs were grouped under four sub-discourses. This now enables us to turn to the emerging discourse of regenerative-transformative agriculture.

From the work of George Kelly (1955) and others, it appears that humans organize reality and thus their personal constructs in binary oppositions: that our personal constructs are dichotomous, with each pole possessing its corresponding antithesis (its antinomy); or, as Kelly noted, that this black-and-white approach means that every perception, belief, and statement (every construct) made is also a denial of its ‘other’. In the context of the different agricultural discourses that underlie this thesis, this also means that equally important to what is confirmed in a construct is what it negates. Such negation in turn means either a negation or affirmation of values, attitudes, beliefs, and/or world-views. This therefore means that constructs carry strong ethical-moral components.

With this in mind, and building off the distillation of 20 superordinate constructs of the dominant industrial agricultural discourse (of the mechanical mind-metaphor), we can now turn in Chapter 7 to examining the newly emerging discourse of regenerative-transformative agriculture. From thematic discourse analysis particularly of interview material (and thus language and metaphors) with transformative agriculturalists, the intention is to discern the dominant driving metaphor and the superordinate constructs of this discourse. With such material in hand we can then go to the heart of the matter by asking: ‘What are the mechanisms behind transformative change?’ (Chapter 8), and, ‘Can we apply this to accelerate transformative change so as to meet the ‘eco-challenge?’ (Chapters 9 and 10).
CHAPTER 7 THE EMERGING TRANSFORMATIVE AGRICULTURAL DISCOURSE (THE NEW-ORGANIC): A Thematic Discourse Analysis

Introduction

As enunciated in Chapter 1, the starting place for this thesis is our species’ key distinguishing feature: our use of language. In earlier chapters we have seen that we humans largely think and communicate in metaphors (picturable, rationally visible, publicly discussable and debatable analogies), and that this thinking comprises building blocks of personal psychological constructs that we constantly test and/or modify as we negotiate daily experience. We also saw that our metaphorical thinking links deep into our neural networks and so to our personal constructs, where they touch us at subterranean or beyond-conscious, emotional and aesthetic levels. This is how our experience and understanding of the world is reconfigured.

That is why this thesis’ central question regarding transformative change in regenerative agricultural systems asks: ‘Is there a closely integrated nexus between discourses, knowledge, power, communities of practices, and personal psychological constructs?’ Core to my research work in this thesis is use of thematic discourse analysis of language and metaphor because these reveal our cognitive function and thus our implicit world-views, attitudes, and values: i.e., our personal constructs.

Thematic discourse analysis of different material from the dominant industrial agricultural discourse in Chapters 5 and 6 revealed its deep embedding in the mechanical metaphor. This analysis also enabled me to discern 20 drivers or superordinate personal constructs that appear to comprise the main structural supports of the personal construct systems operating within the dominant industrial discourse of agriculturalists. These personal constructs, and the way they are organized and grouped under four sub-discourses, were revealed by their distinct languages: their verbs, adverbs, nouns, adjectives, and metaphors.
We now need to examine the alter ego to the dominant agricultural discourse: that of the emerging regenerative-transformative agricultural discourse. We know from earlier discussion of George Kelly’s work (Chapters 3 and 6) that our personal constructs are dichotomous: that they are organized in binary oppositions, which also means that every perception, belief and statement is a denial of its ‘other’. Kelly observed that ‘[m]uch of our language, as well as of our everyday thinking, implies contrast which it does not explicitly state. Our speech would be more meaningless otherwise’, and this is because the differences implied in a construct are just as relevant as the likenesses. Kelly thus considers the contrasting end of a construct to be both relevant and necessary to the meaning of the construct (Kelly 1955: 62-63).

This chapter involves more thematic discourse analysis, but this time of material concerning the ‘Yang’ to the dominant discourse’s ‘Yin’. The intent is to discover what are the values, beliefs, and constructs behind this ‘other’ discourse, and whether it also has a group of superordinate constructs that drive it. I will also try and ascertain if the newly emerging discourse has its own driving metaphor.

7.1. Source Material for Thematic Discourse Analysis: The Twelve Case-Studies

As explained in Chapter 4 (Methodology), key primary material for this thesis comprised 79 interviews across twelve case-studies. But as illustrated in Chapters 5, 6, and this chapter, supporting material is also derived from other relevant discourse material. The twelfth case-study was that of industrial agriculture, dealt with in Chapter 6. A number of the leading proponent-practitioners of this approach were interviewed so as to provide their counter-perspective and to gain a further insight into personal constructs and language. Ten case-studies, comprising a group of synoptic studies, were the core of the research, as part of the emerging regenerative-transformative agricultural discourse. These were outlined in Chapter 4 and are fully described in Appendix 8.

Out of my field research I also discovered a transitional discourse, what I call ‘integrated productivism’ (case-study # 11 – see section below for explanation). But I began with case-study # 1, biological agriculture (soil), because healthy soil is not only integral to preventing
land degradation but is also the key biological state that underpins both transformative agriculture and all other of the nine contesting, regenerative agricultural practices (plus case-study # 11). However, common to all the case-studies was use of grazing ruminant animals (sheep and cattle). This is because evidence continues to mount that to develop long-term, sustainable (let alone regenerative) agricultural systems based around healthy soils in broad-acre agriculture then an active ruminant animal component appears essential in nearly all cases.

**Case-Study # 11: Integrated Productivism (Livestock and Cropping)**

This is an emerging transitional practice that involves an ecological turn in industrial productivism. We know the use of animals to enhance soil fertility and health (especially in a crop rotation cycle) has been known for millennia. But the use of ruminant animals specifically as a way of natural nutrient recycling and fertilizing has been seen as incompatible with modern cropping systems, though at best in less intensive operations sheep may be occasionally used for stubble and weed ‘control’.

As **Interviewee # 56** (male) stated: ‘Convention would dictate…the exclusive arrangement, that livestock are kept out of the farming region…the conventional focus is towards a high-input, zero tillage, controlled traffic, variable-rate technology…and involves high inputs of synthetic fertilizers.’ Such systems also have repeated, shallow-rooted annual crops on often shallow and not necessarily intrinsically rich soils.

However, in the course of my research it became clear that in a few regions, and within specific industrial practices, a number of industrial agriculture cropping operators at the very top end of professional management (with combined high productivity) had begun to hit some major ecological problems as a result of their intensive practices. Consequently they have sought more balanced ecological amelioration approaches through the use of livestock within their cropping systems (Paulet 2011; Warburton 2011; Bradley 2010).

By *integrated productivism* I mean a practice in transition between the very highest levels of industrial agricultural production and a more sustainable agriculture. **Interviewee # 66** (male) calls this approach ‘walking the middle road’: between high input, high production and low inputs (organics etc.). **Interviewee #67** (male) labels their intensive cropping approach
‘broadacre horticulture’, where ‘we need to use ecology and not chemistry…We’ve forgotten how to use ecology. We’ve lost a skill base…Everything old is new again.’

Overall, and especially as exemplified in northern Tasmania, this case-study appears to be a major evolution in the turn to a sustainable ecological agriculture, but without much of the revolutionary or overtly challenging transformative components of other case-studies (which seem to serve as too high a cognitive barrier for many high-production industrial agriculturalists, and which have fully turned away from the mechanical metaphor-mind). As one of the pioneers of this approach, Interviewee #67, stated: it was ‘an ecological and economic’ decision to evolve to an integrated approach.

7.2. Thematic Discourse Analysis of Interviews: The Distinct Nature of Transformative Agriculturalists and their World-Views

As will be seen in Chapter 8 (Section 8.3, the language of communities of practice), farmers within each of the different transformative agricultural case-studies share a knowledge of common techniques and a conceptual language largely intrinsic to those specific practices. However, in addition to this and in accordance with the transformative nature of their shift to an ecologically-based agriculture, there is an over-arching and different language use that reflects the revolutionary nature of their change in thinking. This language is distinct, and is what I call new-organic: a biophilic and nature-empathic language and associated metaphors (examples are given below). Clearly this change in language reflects the change in constructs of a new world-view, and some of the language constitutes the personal constructs themselves.

A note on the word ‘organic’

As indicated above and in Chapter 5, the dominant constructs of modern industrial agriculture – whether the 196 foundational constructs distilled in Appendix 2 or the successive distillations into 62 ‘Key’ constructs and then 20 ‘Superordinate’ constructs’ in Chapter 6 – are firmly rooted in the mechanical metaphor. These over-turned the earlier constructs that were deeply implanted in the pre-scientific, pre-industrial, pre-Enlightenment mind, and which historians appropriately termed ‘organic’.

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However, a major confusion now arises because of the popular modern use of the word ‘organic’ to describe food produced without synthetic fertilizers or chemicals, and often under a quality management system. To overcome this, and yet still retain the essence and importance of the concept of ‘organic’, I propose to use the term *new-organic* so as to clearly differentiate the two concepts in the rest of this thesis. This is because new-organic thinking has moved on from the more indigenous, ‘primitive’, animistic, pre-scientific and pre-Enlightenment era, to include not just previous elements of the ‘organic’ but also newer elements that have evolved with recent scientific and ecological knowledge in biology, ecology, complex systems, and other areas (along with adaptation of knowledge and skills from industrial agriculture).

*The Distinctive Language of Transformative Agriculture and the New-Organic World-View*

On analysing the interviews I repeatedly noticed that transformative agriculturalists evinced distinct differences to industrial agriculturalists in a number of areas, whether these were intrinsically brought to the table before change or slowly evolving after (there was evidence for both cases). For example:

(a) A different set of ethics/values were in evidence;
(b) Transformative agriculturalists were distinctively more biophilic or new-organic in thought and language use (see sections 7.2 to 7.4). Associated with this was a deep emotional connection to their landscape;
(c) They appeared more holistic and more ecological in their thinking (see section 8.4);
(d) They appeared more curious and hungry (or more open) for learning, which commonly was seen as an exciting, never-ending journey worthy of considerable annual investments in time (up to a month per year) and money (up to $25,000 per farm per year). Concomitant with this, and because of an embracing of more holistic enterprise diversity, was a relishing of working in different networks. ‘It opens your world up a bit wider’ said Interviewee # 67;
(e) They exhibited great excitement and enthusiasm for their change in farming practices; and
(f) though a small sample, women and husband-wife-partners seemed to play bigger roles in the change process, in management, and in partaking in the journey. In areas away from the mechanical/physical aspects of farming (like biological agriculture – Case-study # 1 – and its
linkages to human health; in native grasses – case-study # 5; and in areas of the subtle energy/spiritual dimension – case-study # 4) women were often the leading innovators.

Regarding ethics/values, for example, transformative agriculturalists were more inclined to express (in either words or actions) strong social, biophilic, or new-organic values in their approach to agriculture and their reasons for change. 

Interviewee # 56 summed up this distinctive trait when he talked about ‘this wonderful abundance of life [under their new holistic grazing system], and then on the other hand we’re killing everything’ [industrial agriculture].

Reflecting the underlying value of soil health to the entire transformative agriculture movement, Interviewee # 52 (male) stated: ‘I see healthy soils as a thing of beauty…creating a more resilient system…Managing the soil is managing our most important bank account.’

Interviewee # 51 (male) said ‘I’m doing it for connection.’

A wife-mother-business partner of a leading transformative family farm operation spoke of her family mustering cattle on horses in beautiful forested country: Interviewee # 25: ‘That’s the epitome of what it’s all about, working in a beautiful native country and doing things that’ve always been done and not a piece of machinery in sight.’

Another leading female transformative agriculturalist (Interviewee # 30), in speaking of the need for necessary change back to regenerative practices, said: ‘I just can’t wait for oil to hit $150 a barrel plus.’

Many spoke of long time horizons in their land management thinking (50 to 100 years); of a strong sense of place, of ‘heritage’, of ‘belonging’; of possessing an enormous sense of responsibility towards the land, and a passion for their land. 

Interviewee # 16 (male): ‘We are put here to make it better.’

Others spoke of ‘feeling sick’ at what they perceived as despoliation by industrial agriculture (Interviewee # 30 - female), and of feeling ‘intuitively right’ and ‘comfortable’ at rejecting industrial agriculture (Interviewee # 56 - male).
Interviewee # 62 (female) spoke of being ‘distressed’ at the breakdown of rural communities and the gulf between farming and urban areas. A number spoke of feeling spiritually close to the land.

One of the most distinctive features was that a number of transformative agriculturalists have taken the turn full circle back to incorporating old ‘organic’ components with new knowledge: a move to what I term the new-organic approach. They have done this by tapping back into, or re-connecting with, ancient spiritual, mystic, animistic, transcendent knowledge to do with the earth – including being in touch with earth or nature spirits (see Section 8.4 - knowledge culture #7: the transcendent). Another common feature not seen in the dominant industrial discourse, and aligned to the strong expression of concerns and values to do with the importance of local community and of healthy food for healthy people, was that a considerable number (33 %) were involved in farmers’ markets, organic marketing, developing their own food brands, and/or developing alliances to deliver healthy food from healthy landscapes and direct to consumers so as to bypass the industrial food chain and big supermarkets.

Interviewee # 30 (male): ‘We need to change the world…What we’re doing is so crazy, and I want people to understand what we’re doing and why…and some of the philosophy of what our farming is about…that there is another way, because a vibrant local rural community is crucial and necessary.’

Interviewee # 38 (female), who takes chemically-free, ‘organic’ lamb to a Perth butcher, said: ‘Over time the whole nation is going to benefit…to help the rest of the world to have better quality food and better energetic links with their food – that makes a difference to you, who you are as a person and how you operate…high quality, vibrant food that gave ’em the right life force…then I think those issues of greed and just raping everything …wouldn’t be there…people wouldn’t feel the need.’

Another area of distinctiveness was seen in the response to a question on self-description. The small sample of productivist-industrial farmers interviewed gave traditional descriptions. e.g., ‘farmer’; ‘just a farmer’; ‘primary producer’; ‘farm manager’; ‘business manager’. In stark contrast were the transformative agriculturalists. Many struggled to articulate their new concept of land management – some even declining to do so, saying it would need an essay.
Interviewee # 56 (male) – ‘a passionate holistic landholder’;

Interviewee # 40 (male) – ‘practical holistic farmer and educator’;

Interviewee #38 – ‘someone who’s trying to get out of the way of natural system functioning as much as possible’;

Interviewee # 51 (male) – ‘a regenerative agriculturalist, but more than that’;

Interviewee #30 (female) – ‘You’ll think I was mad…but I call myself an agricultural ecologist’;

Interviewee # 6 (male) – ‘tenderer of the land’.

I also frequently heard the comment (and from holistic grazing managers in particular) that they had much more free time as a result of having less mobs (sheep and cattle). A number had quantified their savings of labour-hours – up to 60% in some cases.

Examples of New-Organic Language and Thinking Related to New Ecological management and to Nature

Gleaned from the interviews, a small sample of new-organic language includes:

SOM [soil organic matter]; energy towers; universal energy; modalities; grazing charts; monitoring sites; equilibrium; wonderful abundance; orchids happily flowering and multiplying; evil radiata pines; giving the land a chance to heal; deep longing for the land; significant habitat; biodiversity and health; I see green, I see life; I see healthy soil as a thing of beauty; passion; more resilient system; regeneration; transformation; natural capital; functioning landscapes; ecological succession; need more energy in the paddocks; take the perennials to the bottom of phase 2; food pathway; holistic; linking to the community; it’s a full solar thing – you’re using solar energy right through your animals; I’m doing it for connection to nature; mosaics; a dynamic; different zones; mineral balancing; my heritage; lovely perennial grasses; their niche to thrive in; paddocks need significant rest; beneficial nematodes; polycultures.

There were also many contrasting descriptions of industrial agricultural practices, such as:

tired paddocks; hard-compacted soil is ‘sick’; energy that’s gone out of the landscape; I feel sick about industrial pasture improvement…it’s wrecking our ecology, destroying everything.

Further examples are seen in Section 7.2.
Many transformative agriculturalists talked of their different pathway to industrial agriculture as being ‘another way’, a ‘different journey’, while a common theme concerned ‘Mother Nature’s wisdom’: that she knows best and let her get on with it (see discussion later in Section 8.5 on ‘self-organising functions’).

**The Contrast in Language of the Two Contesting Discourses**

We saw in Chapter 6 (Sections 6.1, and 6.4 to 6.6) from the four sub-discourses of the dominant land-use discourse in Australian agriculture (the mechanical) and also from the interview material, that the language was more reductionist, masculine, aggressive, mechanistic, technical, quantitative, prescriptive, extractive, humanistic, and interventionist. In comparison, the constructs and language of the emerging discourse of transformative agriculture (the new-organic) was often starkly different. It can be characterised as being more feminine, cooperative, collaborative and giving; and more nurturing, organic, sympathetic, loving, non-mechanical, and holistic. It also appeared less reductionist, less humanistic, and less egotistically focussed, less interventionist and extractive, and more passive; and less technocratic (either economically or mechanically). This is revealing of the massive cognitive reconstruction that appears to have occurred to accommodate a reorganisation of the entire personal construct systems of these transformative agriculturalists.

Furthermore, of great significance is that the language of the transformative agriculturalists – of the new-organic metaphor or mind – emerges as a more unified language. That is, it is not segregated into the disciplinary, reductionist, specialist thinking of industrial agriculture and the mechanical metaphor and mind, but instead is more holistic. This accords with the approach of transformative agriculturalists in regard to different knowledge cultures (see Chapter 8, Section 8.4).

**The Use of Metaphor**

Noted earlier (Chapters 2, 3 and 5) is the key work of Lakoff and Johnson (1980) in describing how our conceptual system is largely metaphorical, and how metaphors structure how we perceive, think and what we do. Integral to understanding land degradation in Australia and the misapplied practices of industrial agriculture in this continent (and to
understanding the emerging nature of transformative agriculturalists) is the revolution in human metaphor use. This represents a radical change in how we think, cognate and feel following the scientific, industrial, economic-rationalist revolutions and the Enlightenment. That is, as unravelled in Chapter 5 and illustrated in Chapter 6, the human mind in the last 300 to 500 years shifted from the use of organic metaphors in our language and thinking to the mechanical. With transformative agriculture we are seeing a crucial turn not just back to the organic, but to the new-organic. However, such a turn back – a transformation – is monumentally challenging because, as Russell and Ison point out, it is difficult ‘to unearth a deeply embedded metaphor when it has taken root in the society’s unconscious’ (Russell & Ison 2000: 20).

In sections 7.1 and 7.2 above, and in Section 7.3 below, metaphor use and personal constructs are closely intertwined. For example, here is a selection of metaphors used by transformative agriculturalists:

- Soil was described as our most important bank account; nature and soil were described in terms of human health or body parts: as sick, tired, in good heart, or being given a chance to heal (e.g., tired paddocks); hard-compacted soil is sick; the landscape has lost its energy; bare ground was a wound, and which, in the process of healing, had scabs of vegetation on it; I feel sick about industrial pasture improvement…it’s wrecking our ecology, destroying everything; or else the land was in good heart, while healthy vegetated paddocks and treed riparian zones were lungs, a community could be gutted…it’s deserted, and certain vegetation could be a backbone of your ecology; compacted soils were like cement.

- Parts of nature were seen as having sentience or feelings: native grasses don’t mind being eaten off, while Mother Nature herself had feelings, wisdom and so on; the land itself needs to be comfortable; soils and systems can work; the landscape/nature can laugh or shrug things off; the land was telling us; self organisation functions were likened to self-raising flour; healthy soil was a sponge; earth-worms were fed like thoroughbreds, while soil fungi were lovely and fat under a microscope; land could be locked-up; the colours green and brown indicated ecological health and diversity versus their opposites.

- Other metaphors included natural capital, food pathways; whole soil food web; paddocks protected by trees on every boundary were rooms; industrial fertilizers were described as
hot, while chemical spraying was nuking [both alluding to nuclear reactors or nuclear waste]; interrelated systems of ecological function were giant cogs in motion, growing behind you; ruminant animals were tillage machines, nutrient and fertilizer spreaders and recyclers; an environment could be brittle; weeds were constructive tent-peggers; animals burrowing in the soil are ecosystem engineers; industrial agriculture is steel and diesel; feeding bugs is providing SOM for microflora; nature gives you a tail-wind in management; and so on.

In analysing the 2,000-plus pages of transcripts, I recorded metaphor-use under two columns: organic and mechanical. As metaphors are so deeply embedded in our language and thinking, I noticed on re-reading transcripts that I constantly kept missing many others. But a score of different metaphor usage (not of repeats, which was constant and voluminous) mid way through was over 200 organic metaphors and some 140 mechanical metaphors, then I stopped counting.

This analysis revealed a number of interesting points:

1. Lakoff and Johnson are right. The very building blocks of our thinking and word-cognitive picture language are metaphors. We are truly metaphorical creatures, as seen by the large numbers revealed in these interviews.

2. Transformative agriculturalists used a mixture of new-organic and mechanical metaphors. This is not surprising, as not only are we all a product of our modern post-scientific, industrial and economic rationalist world, but also the fact that transformative agriculturalists have both come out of and adapted industrial agricultural techniques. However, the truly new-organic, nature-empathic, anthropo-identification or signification of human traits to nature and its components came only from the transformative agriculturalists, and this was corroborated by their associated language (as illustrated above).

I further illustrate a few of the long list of new-organic or pre-industrial/pre-scientific age organic metaphors (the latter used by both industrial and transformative agriculturalists).

**General organic metaphors:** out on a limb; bee in the bonnet; bone of contention; in deep shit; black sheep of the family; turn around and bite us; voice in the wilderness; led by the nose; ahead of the pack; break the ice; been a breeze; fighting like cats and
dogs; got off our own dunghill; got some backbone; the mainstream; grass-roots; ripe for the picking; the chicken or the egg; touch wood; blazing the trail; bare as a badger’s arse [old English metaphor still used in Australia]; and so on.

Pre-modern technology metaphors: sailing: knock the wind out of his sails; rudderless; it’s been a breeze; plumbing the depths; a second wind; rate of knots; throw something overboard; keep head above water; on an even keel; Horses: ride it to death; narrow blinkers; cart before the horse; at the cross-roads; General: double-edged sword; throw some light on it (candle or lantern); re-invent the wheel; and so on.

3. As illustrated in Chapter 6, though the industrial agriculturalist case-study was only a small sample, the language of its practitioners was nevertheless distinctive in the different use of constructs and metaphors: more industrial in allusion; more mechanical, martial and aggressive, technical, and more quantitative. The thematic discourse analysis of rural media and corporate advertising and text material undertaken in Section 6.5 reveals this distinctive use of the industrial metaphor even more starkly.

4. The very nature of the mechanical metaphors used by both agricultural discourses reveals their chronological evolution from the 17th century on. For example:

Post-17th Century/emerging scientific and mechanical knowledge: the pendulum starting to swing (pendulum clock invented 1656); gun-shy; chained to (something); hammering (something); the whole spectrum; to resonate with; catalyst; crystallise; a false economy; keep fingers on the pulse.

19th Century (industrial revolution): bullet-proof; blows me away; really fires me up (furnace); take a hit; first at the coal-face; light-bulbs going off; shining lights; on the right track (train); messages that came through (telegraph/telephone); treadmill; galvanised me; drive them harder; got the horse-power; safety-valve; he was wound-up.

Early 20th Century (2nd Phase industrial revolution): wind it over; a driver; been driven into; running hot; ran into a brick wall; the wheels fell off; pumped them up; taking off (aeroplane), and off to a flying start; operating at the max; slow things down; pull things back; the higher the pressure; things out of control.

Mid-late 20th Century: shit hits the fan; kick start (motorbike); over-ride; drive it harder; backed off; road-test; new hub; in Management: tick that box, and bottom line; an immovable block; silver bullet; at the cutting edge; a diesel-head; something
misfires; on the radar; (aeroplanes) on a downward spiral, can’t shoot it down, crashed and burned; (jet age) it’s not rocket-science; critical mass; quantum leap; pushing the envelope; it’s a bit out there (space age); crops have a rocket under them; green feed is rocket fuel; prime-movers.

**Computer Age:** he’s plugged-in; get the systems in place; repair a broken system; stored in your hard-drive (memory); people are wired differently; spits out an answer.

5. Finally and fittingly, a surprisingly large number of metaphors concerned the mind and resistance to, or openness to, changing ideas and constructs (n.b., ‘changing their mind’) – revealing how much we operate as mental creatures and how we picture such functioning metaphorically. For example: forward thinking; let him have his head; open-minded (or close-minded); mind-set; mind boggling; mind numbing; deeply embedded (in the mind); rocks in his head; silo mentality; a no-brainer; your mind was penetrated; in my mind (in my opinion); bearing in mind; in the back (or front or forefront) of my mind; stuck in everyone’s mind; cracking open closed minds; mental barriers; thinking outside the square; I got to think around corners; thinking broadly/narrowly; bounce ideas off (xyz); can’t get their head around it; brain food (fresh ideas); it just clicked in my mind; dump my conventional thoughts; his/her frame of mind; and so on.

7.3 Distinctive *New-Organic* Constructs of Transformative Agriculturalists

An analysis of the nature and principles of approach of the transformative agricultural case-studies, and of the nature of transformative agriculturalists themselves (including their world-views and of their distinctive ecological or new-organic language - Section 7.2), allows us to enunciate some of the key constructs of the transformative or new-organic world-view.

Overall, and by comparison to the dominant discourse of industrial agriculture, the new constructs of the emerging transformative discourse - both conceptually (constructs) and linguistically (language and metaphor) – can be categorised as ecological, new organic, and holistic. This is by contrast to a mechanistic and reductionist approach. That is, generally they represent the antithesis of those held in productivist industrial agriculture. The transformative agricultural constructs thus appear as antinomies of the 62 key constructs of industrial
agriculture delineated in Section 6.1, and of the 20 superordinate constructs delineated in Section 6.6. They thus comprise a transformation of, and evolution from, the constructs concerning the domination of nature; of anti-nature, simple nature; of a mal-adapted Euro-centric and agrarian imposition of environmental and agricultural approaches to the Australian landscape; of a narrow economic utilitarian/rationalist approach to agriculture; and of a techno- or scientific-centrism. Implicit in such views is a strong ethical component (which is compatible with the approach of transdisciplinarity – Nicolescu 2002; Brown et al. 2010b).

Some examples follow, though these are by no means a comprehensive list of the emerging new personal constructs of transformative agriculturalists.

1. **Mother Nature knows best** (self-organising, emergent systems), of which desirable ecological succession is a key principle.

**Interviewee # 8** (male): ‘It’s up to Mother Nature…Just get the [grazing] principles right…and let the progress begin. With significant rest the whole system will keep going in the right direction…will keep pushing towards the better end of the species succession…The plants that grow leaf instead of stalk and seed…the general principles follow…We just need to take the hand-brake off…that is where nature will take us if we encourage it…the annuals aren’t destroying the landscape, it’s the management, and it’s not the type of animal, it’s the way it’s managed…we started from a low state and had to kick-start it.’

**Interviewee # 51** (male): ‘Your cogs [integrated, regenerative, self-organising landscape functions] are getting bigger behind you the more you progress down this path.’

**Interviewee # 61** (male): ‘You’ve got to work with nature…You get a bit of a tail-wind with nature.’

**Interviewee # 40** (male): ‘Nature will provide what’s necessary to make things work…you have to have the animal there – to innoculate the ground with microbes – to create the food, otherwise the landscape laughs it off.’

**Interviewee # 38** (female): ‘The land was telling us what could be done if you had the right soil situation…with land that’s been allowed to heal itself and do what it needed to do naturally….We’re trying to get out of the way of the natural systems as much as
possible. You do what the country is comfortable with.’

Interviewee # 2 (male) calls the principles underlying self-organisation ‘this self-raising concept’ [after self-raising flour].

2. **A major focus on soils as the key foundation to ecological and agricultural health.**

This construct is the antinomy of the industrial view of soils as an inert box requiring human manipulation. It is a key construct with many sub-constructs, and is linked to Constructs 3 and 4 below. Almost universal is the recognition of, and an aiming for, 100% ground cover. Other ways of expressing this are: ‘Bare-ground is like a wound, and pioneering vegetation is a healing scab’; ‘bare ground is dead ground’. For example:

Interviewee # 62 (male): ‘Only cement is meant to crack…The modern term “self-mulching” is a lie, because it means unhealthy, black cracking soil. True “self-mulching” should mean biologically active soil.’

Interviewee # 8 (male): ‘The soil was initially just something to stand a plant in, whereas the soil is a living thing; there is much more going on underneath than there is on top.’

Interviewee # 62 (male): ‘We’d plough ourselves into a drought with our cropping…fallowing is a huge irrationality…I believe it was originally done for mineralisation. The modern water paradigm – of fallowing for moisture – is stuck in everybody’s mind.’

This construct in turn leads directly to another key construct – Construct 3.

3. **Dry dams are a sign of healthy soils.**

With holistic grazing management and other transformative practices that yield more healthy and absorbent soils, it is regularly noted that run-off is dramatically reduced, and so empty dams are regarded by some, counter-intuitively, as a measure of ecological success.

4. **Biodiversity and unruly nature is a good.**

This is universally accepted, like a motherhood statement. It contrasts starkly with industrial monocultures or mono-scapes and simplified ecosystems. A sub-construct of this relates to accepting untidy landscapes as healthy; the antithesis of industrial agriculture, which appears more comfortable with controlled uniformity in monocultures, paddock arrangement, neatness and tidiness. Another component concerns diversity, which doesn’t just mean biological/ecological diversity. For similar reasons, diversity of
business enterprises on a farm is seen as giving greater economic resilience.

**Interviewee # 52** (male): ‘I set out to have as much diversity as possible…in terms of open space, dense shrubs…pastures…for both birds and insects…biologically and economically.’

**Interviewee # 51** (male): ‘Introduced grasses under industrial agriculture are only takeaway food – with low nutrient density. The native perennials are the backbone of your grasslands, and the broad-leaved weeds are like the good vegetables we eat.’

‘Ecological agriculture is untidy, it’s messy…it’s not a perfect pasture or crop.’

5. **A desired state in pastures means greater and more perennality; 100% ground-cover; better rest and recovery (as opposed to traditional ‘set-stocking’).**

The contrast is not only with set-stocked perennial pastures, but with the fact that the traditional industrial agricultural system (especially in the mixed farming areas of NSW, Victoria, S.A. and W.A.) has been based around an annual legume species (sub-clover) and often annual rye-grass rotation, which, for the traditional Mediterranean November to May period, leaves whole landscapes with bare soil.

6. **Weeds are there for a reason; are useful and our friends; and if properly managed, can enhance ecological succession.** Thus weeds are indicator species.

**Interviewee # 62** (male): ‘We accept all the weeds to get good grasses…Thank God we’ve got weeds, or we’d have a desert…Don’t treat the symptoms.’  ‘Lucerne’s my main weed now.’

**Interviewee # 51** (male): ‘Saffrons [thistles] punch holes…they’re our tent-peggers’ [opening up the soil for water absorption, for biota to enter and recycle nutrients, and to aerate the soil – the ‘ecosystem engineers’].

7. **The Brittlness Scale.**

This is another widely used concept evolved and propagated by Alan Savory and his Holistic Management system, which classifies environments on a scale of 1 to 10: a rainforest being non-brittle at 1, and a desert being brittle at 10 (Savory 1988). At these extremes each environment reacts differently to the same management, and a grassland environment may lie anywhere from 1 to 9 or so, and thus react differently under the same grazing regime. But *brittleness* is different to fragility, and is not totally rainfall linked. Some wetter environments, because of their lesser ecological resilience, may be
more brittle to a particular management regime than drier environments (Savory & Butterfield 1999).

**Interviewee # 17** (female) talks about Europeans having a ‘soft landscape’ (i.e. non-brittle), for which they developed specific farming approaches that they brought to Australia, whereas many Australian agricultural landscapes are more brittle and need different management approaches.

8. **Droughts are man-made:**
In response to a specific question in the interviews as to defining drought, I received many definitions that comprised antinomies to the conventional, industrial view. For example:

**Interviewee # 62** (male): ‘I don’t have droughts…they’re man-made. I don’t have them if you match livestock to carrying capacity…I see droughts as opportunities…But the general attitude is: “no drought’s going to get in my way”. That’s just human nature…We want to control things.’

**Interviewee # 25** (male): ‘If you build resilience, those natural hydrology buffers are still in place.’

**Interviewee # 56** (male): ‘We won’t suffer droughts if we can regenerate our soils, building resilience into natural systems so as to cope with sustained periods of below average rainfall…and us mindful of our ecology…to flexibly match stocking rate to carrying capacity.’

9. **Ruminant animals are needed in the landscape for ecological health.**
This is a major contesting antinomy to both industrial agriculture and also NRM (Natural Resource Management) and the ‘lock-up’ approach of National Parks and similar management. Under holistic grazing management practices this principle has now been frequently demonstrated in cropping, grazing and integrated production practices: in terms of increased ecological succession, regeneration of landscapes and the re-appearance of a greater diversity of grass, shrub and tree species along with associated diverse biota. Based on comparative ecological studies in African savannah grasslands
and the North American prairies, this matter also raises issues to do with the impact of the extinction of Australia’s megafauna on our landscapes (see Johnson 2009, 2005; Dawson 2006; Owen-Smith 1987).

Interviewee # 51 (male) calls the lock-up mentality the ‘national parking’ attitude.

Interviewee # 30’s (female) terminology is ‘the lock-down strategy…Locking things up is not going to get the soils working again.’

Just how counter-intuitive this view is was encapsulated recently by a Queensland cattle holistic grazing manager: ‘Instead of growing grass for cattle, we run cattle for grass’ (in The Land, October 2012).

10. Transformative agriculture produces ecologically healthy, nutrient-dense food.

Interviewee # 67 (male): ‘You can have it drenched in chemistry or you can have a few insects in it.’

11. Increased ground cover and greater soil biological activity raises ground temperatures and increases the growing season.

Some innovators claim this means an extra month of growth either side of winter, thereby shortening the winter.


There were many biophilic expressions that implied or stated that Mother Nature’s systems or ways of doing it were best and so should be mimicked or copied as templates (‘biomimicry’ – Benyus 1997). This relates to Construct (1) above - self-organisation - and directly challenges not just the ‘input’ mentality of industrial agriculture, but implies such attitudes have flowed into biological agriculture and biodynamic soil additives. For example:

Interviewee # 62 (male): ‘Those bugs would be there if they were allowed. Why do humans think they can breed a better bug? Just focus on feeding the microbes you’ve got.’
13. A shift in focus from the animals to the grasslands, soil and other ecological components.

In traditional industrial livestock practice, maximising animal production via genetic improvement plus a dominant focus on animal health and performance is standard and long-practiced procedure. In transformative agriculture this construct is upended as focus shifts to the components underpinning ecological health.

Interviewee # 56 (male): ‘Our focus has really gone from…the animal to a focus on the grass to a focus on the soil and now we’re actually focusing on energy flow through the whole system…on all these other modalities.’


This relates to earlier comments (see 7. above - ‘brittleness’) about the ‘soft’ European climate and concomitant inappropriate management systems transplanted to Australia (and dealt with in detail in Chapter 5 and Sections 6.1 and 6.3). By contrast, the indigenous first peoples of Australia exhibited cultural and religious practices that constituted an extraordinary fluidity and flexibility in responding to the variable Australian climate. Practices like holistic grazing management and pasture-cropping exhibit the same flexibility: matching management (cultural) practices – i.e. de-stocking in dry times – to the variable seasons.

Interviewee # 61 (male): ‘I’ve never fed [livestock in a drought]…I’m very flexible.’

Interviewee # 62 (male): ‘I don’t have droughts…they’re man-made…You’ve got to match livestock to carrying capacity.’

15. Livestock as cultivating, inoculating and fertilizing machines.

This is also linked to the construct that in humid, non-brittle soils a healthy and diverse microbial life is fundamental to ecosystem health. However, in a dry period, or in a brittle or semi-arid environment where soil microbial populations cannot be sustained, then the ruminant animal and its rumen microbes become the digesters or break-downers of plant material - and thus disseminators of nutrients, whereby they act as walking fertilizer machines. Animals and their microbes thus become ‘landscape healers’. As machine-
substitutes in fertilizer spreading, some farmers deliberately feed livestock minerals, trace elements and other nutrients (and even desired pasture seed) so their animals can distribute these across the landscape.

Interviewee # 38 (female): ‘The livestock are our machinery, our spreaders, inoculators, doing the mineral balancing, and with the right microflora.’

16. ‘It’s not cloven-hoofs that compact and destroy the soil, it’s over-grazing’.

As Alan Savory discovered and as many transformative agriculturalists involved in holistic grazing management and pasture cropping testify (see Section 7.2), properly managed animal impact and appropriate rest and recovery stimulates healthy soil regeneration, greater moisture absorbency, and a move to spongy, soft soils – the very opposite of hard, compact soils (Savory 1988). That is, the construct is entirely opposite and counter-intuitive to the accepted wisdom of not just industrial agriculture proponents but also historians, commentators and accepted folklore in general. This construct relates to (9) above.

Interviewee # 62: (referring to the use of modern satellites for minimum tracking and precision agriculture in industrial cropping so as to avoid soil compaction): ‘It’s a silver bullet for compaction. Compaction isn’t a function of livestock or machinery; it’s a function of soil health. The biggest compaction of soil health is gravity; and the biggest de-compactor is roots.’


At the very cutting edge of transformative agriculture, a number of innovators continue to push the boundaries of knowledge and accepted practice. This is occurring even amongst increasingly accepted thinking in the knowledge and diffusion leaders of the movement, such as the Savorys, McCoskers et al. One major development is what I call adaptive landscape genomics. The practitioners of this work don’t call their approach by any specific name, but are just following the principles of self-organisation and observing, and reacting to, landscape and/or plant-landscape and animal-landscape interaction and subsequent adaptive evolution of succeeding generations of plants and animals. By the term adaptive landscape genomics I mean a specific emphasis on, and recognition of, the plastic adaptation, evolution and selection of animals and plants best suited to their
environment via such mechanisms as epigenetics, non-additive gene function and so on. This thinking and its ground-proofing is not just a radical challenge to industrial agriculture and its non-holistic view of the animal-plant-ecosystem environment, but to the reductionist view of quantitative genetics and animals as non-plastic gene-boxes capable of lever-pulling manipulation through measurement of quantitative traits. However, the radical approach described here challenges even the accepted wisdom among holistic grazing managers who utilise flexible livestock trading as an essential tool in matching stocking rate to carrying capacity.

What the leaders of adaptive landscape genomics have noticed and are practicing – in both animals and crops – is that as they regenerate their soils, land and entire ecological systems to higher levels of plant succession and diversity (and to healthier functioning soils and so on), then due to (1) the different nutrients consumed by animals from nutrient-dense plants; due to (2) the wider variety of different nutrients, foods, minerals and so on from an expanding range of plant species; and due to (3) the reduction and/or elimination of chemical health treatments for animals due to their evolving more robust/resilient function (see construct (1) above), then their animals have genetically evolved and changed, or co-evolved, in lock-step with the changing environment. Some international workers call a simple adaptation of an animal to the environment ‘landscape genomics’ (Joost & Negrini 2010), but this new concept, which I label adaptive landscape genomics, takes this a major step further. Significantly, this work (as an essential component of transformative agriculture studied in this thesis) takes the integral role of ruminant animals in healthy landscape function into an entirely new area and level. It challenges not just the flexible ‘trade everything’ thinking of some holistic grazing management, pasture croppers and other case-study practices, but particularly challenges the industrial agricultural dependence on pharmaceutical-based inputs for clostridial diseases and anthelmintics for internal and external parasites. This is because the apparently healthier transformative agricultural systems are increasingly being shown to impart greater disease-resistance capacity in plants and animals in regard to withstanding clinical pathogenic effects. Amongst leading practitioners this has enabled the elimination of all synthetic preventative chemical and pharmaceutical inputs. In effect, the approach of adaptive landscape genomics constitutes a final severing of the umbilicus between transformative agriculturalists and the industrial agricultural suppliers.
and their associated power structure (Joost & Negrini 2010; Schwartz et al. 2009; Holderegger et al. 2007).

This work in Australia, via a widening community of practice, has now become linked to the work of Professor Fred Provenza in the USA and his insights into ruminant co-evolution with plants in landscapes; their selection of primary and secondary compounds for nutritional and self-medication benefits; and of ‘animal wisdom’ (Provenza 1995, 1996, 2000, 2003a, 2003b, 2008). It also links to the associated epigenetic work of Revell and colleagues in Australia with Merino sheep on saline landscapes (Digby et al 2009; Chadwick et al 2009).

Of equal significance, adaptive landscape genomics has been found to apply (albeit in a less plastic, less fluid and immediately adaptive manner) in cereal crop varieties. At least two transformative agriculturalists who have instigated biological cropping-livestock systems, have discovered that 100 year-old cereal varieties (i.e. pre the modern specially bred, dwarfed, low stalk protein, high-yielding, input-dependent varieties) out-yield the modern industrial varieties on their healthy, biologically active and functioning soils. In vernacular terms, the old varieties are genetically programmed to ‘hustle’ for nutrients and to work in symbiotic fashion with soil microbes, whereas the modern varieties are like drug-addicts: bred to be reliant on heavy inputs of limited nutrients. In a natural, co-evolved biologically active environment with no synthetic inputs, the modern ‘drug-addicts’ are exposed and have proved mal-adapted to the new but old environment. Examples of the new practitioners of adaptive landscape genomics follow.

**Interviewee # 38** (female): ‘We took out all the artificial supports of the animals and then started selecting purely on genetic capacity to deal with what we dished up…the progress in the animals was out-standing and now we find that they can perform under the poorest of conditions, still growing a heap of wool, raising early matured lambs…There’s a difference between us and the HM [Holistic Management] people: they don’t focus on the genetic capacity of the animals and the continual biological flow…if things get tough they just sell…but it’s the genetics and the biological continuity of those animals is integral…it’s a two-way thing: animals/soil environment. We’ve seen it with our own eyes…the right animals have the right gut flora/fauna for the soil…it’s a two-way synergy…and our animals are our soil inoculators. They’re our first line of defence…with
the right microflora in their gut…and each, animals and soil, improves with each other…the animals are quite robust and we can take them onto a poorer property and they can start to heal that, and we just don’t get worm resistance or daggy sheep…no mulesing.’

**Interviewee # 15:** (who, with her husband, owns their own flour mill and value-adds organic grains): ‘We grow older varieties [cereal crops]…One variety we’ve been growing 60 years or so…this wheat is yielding as good or better than any of the new varieties in our cropping systems [but without fertilizers]…and it’s not on a drug fix…it was bred to utilise natural nitrogen…the old grain varieties…their yields increase the more that they’re grown here…they become adapted…and their disease resistance is good…better crop yields and the hay is sweeter…and better bread with the bakers…and we’ve actually got to a point where this old variety…each yield is usually 50% higher than the everyday [modern] varieties of barley…they’re geared to healthier soils where a good root system is going to access the micro-nutrients, and I wonder whether…they’re not quite as locked-in in the genetics.’

This area of adaptive landscape genomics also opens up the important area of the impacts of industrial agricultural practices on human health: that there is mounting evidence that industrial agriculture (by killing off soil microbial life and its symbiotic benefits) is resulting in nutrient impoverished food, which in turn is linked to a plethora of human diseases (Jehne 2012; Hungerford 2008). But this area in itself would require many theses and cannot be addressed here. However, transformative agriculturalists are vitally aware of this issue – hence the saying by many of them: ‘healthy soils=healthy people=healthy societies=healthy planet’.

**18. Long ecological cycles versus the annual banking/financial cycle.**

A number of transformative agriculturalists pointed out that they work on long ecological cycles, yet are constrained by (and their ecology negatively impacted by) the Western economic utilitarian concept of an annual financial/banking cycle: that the human mercantile construct is at odds with the bigger natural ecological cycles.

**Interviewee # 67** (male): a pioneer of integrated cropping-livestock (see case-
study # 11) saw an ecological time scale, translocated to the financial, of three to four years being of benefit in his pasture-grazing rotation cycle for his crops. Yet ‘we measure our performance on an annual basis…long cycles of pasturing don’t show up in a financial analysis anywhere…ecosystem service values are never measured…a yield benefit three years down the track…it’s not been back-dated to where the actual benefit came from.’

19. A self-image as being antithetical to industrial agriculture:
Another key feature of transformative agriculturalists is an explicit rejection of many practices of industrial agriculture, and that they see themselves as distinct to industrial agriculturalists (and this often carries a strong ethical and philosophical basis – as we have seen). For example:

Interviewee # 56: and his wife, who have swung to holistic grazing management and pasture cropping in a major cropping region. Husband: ‘You see guys that spend 16 hours a day driving around with a spraying rig and putting out bucket loads of chemicals and they come home stinking like billyo, kids have gone to bed. You ask them why they’re doing it, and they’re doing it for the kids. Really? Gee, have you ever asked the kids?’ Wife: ‘This expectation that their child is going to take over this chemical ridden land when they’re finished with it…’

Interviewee # 62: ‘Everything in mainstream agriculture…it’s trying to repair a broken system…it’s all in repair mechanism…’ And: ‘It’s not the scientific soil tests that tell me our soils are better, its our stubbles disappearing’ [i.e. being eaten by the soil microflora in very quick time; relates to Construct (2)].

To Interviewee # 67 (male), industrial agriculture is just ‘steel and diesel’, as opposed to empathic management that puts Mother Nature in control.

For Interviewee # 17 (male), holistic grazing management compared to industrial pasture improvement constitutes ‘doing less than more’.

Interviewee # 30 (female) did botany and biology at Adelaide University and the Waite Institute and found them disconcertingly reductionist in their industrial agriculture paradigm: ‘There’s no real understanding of how important ecology is to production…they’re not interested in native grasses…there was no understanding at
all…and as far as going to industrial agricultural field-days…this agronomist said “we are so good at what we do we will never have another drought”…I don’t go to those things anymore, I can’t. I choke.’

7.4. The Superordinate Personal Constructs of Transformative Agriculture

The preceding sections in this chapter illustrate the distinctive nature of the new-organic thinking of transformative agriculturalists. This allows us to now encapsulate the superordinate personal constructs of the new-organic mind, those of transformative agriculturalists.

In addition to the constructs listed in 7.3 above, there are many other constructs that could be delineated for transformative agriculturalists and which, in combination with their language and metaphor use, reveal a striking turn to the new-organic. At one level this demonstrates the completion of an active learning circle, resulting in major metaphor shifts across time, as captured in Figure 7.1 below.

![Figure 7.1. Modified Active Learning Circle or Simplified Adaptive Cycle As Applied to Metaphor Shifts in the Western Mind](image)

(After Walker and Salt 2006: 82)

Figure 7.1
What is clear is that these personal constructs of the new-organic mind reveal a metaphorical mind-switch. While transformative agriculture has evolved out of industrial agriculture and incorporates modified use of some of its technologies and principles, overall the personal constructs of transformative agriculturalists – when viewed from an ecological and values perspective – represent an opposite (or antinomic) view. That is, they effectively constitute the ‘Yin’ to the ‘Yang’ of the mechanical, agrarian and economic utilitarian superordinate constructs of industrial agriculture (as listed in Section 6.6). This realisation therefore allows us to delineate the superordinate personal constructs of transformative agriculturalists: of the new-organic mind. Such a delineation is facilitated if we treat the superordinate personal constructs of the contrasting agricultural discourses as complementary Yins and Yangs of each other.6

The Superordinate Personal Constructs of Transformation.

**Industrial Construct 1:** ‘Man has control and power over a subservient, powerless land/nature; he is outside and above nature.’

**Transformative Construct 1:** ‘Humans do not have control and power over nature; nor are they outside and above nature; and nor is nature the enemy. Instead, humans are an indivisible (though small and influential) part of interdependent local, bio-regional, and global self-organizing social-ecological systems.’

**Industrial Construct 2:** ‘Nature, land and its resources (including water) are limitless, and ‘man’ is free to conquer, control, dominate and exploit them, as they are there to serve his purposes.’

**Transformative Construct 2:** ‘Nature, land and its resources are not limitless but finite, and it is incumbent upon humans to nurture and care for them, as our very existence and that of every other creature depends on such nurturance.’

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6 It should be noted that the construct delineation here is an attempt to capture the core metaphorical and psychological structures of two contrasting discourses. In real life, given that one discourse has evolved from another and that all agriculturalists are on separate and different life journeys, agriculturalists in both discourses bridge across any hypothetical dichotomy, with much overlapping, mixing, and variation of personal constructs across the full population distribution.
**Industrial Construct 3:** ‘Nature and natural objects have no feelings, soul nor ‘mind’; they are not mystical, have no religious nor mythical connotations; they have no enchantment. Therefore they can be mastered and possessed.’

**Transformative Construct 3:** ‘Many indigenous and other people believe, sense and ‘know’ that the natural world, its organisms and systems have feelings, soul and/or ‘mind’. They thus have mystical, religious and mythical connotations and enchantment. This should engender feelings of humility, nurturance and reverence in the way humans approach our natural life-supporting systems and other organisms, which are not seen as objects, chattels or machines for mastery, domination, and possession.’

**Industrial Construct 4:** ‘Nature/the land is inert, un-sacred, and without diversity, complexity or self-organising function; it is like a static machine: subject to, and able to be broken down to, simple mechanical laws for easy manipulation.’

**Transformative Construct 4:** ‘Nature and the land are precious, sacred entities, with a complexity and diversity beyond imagination, and the opposite of being machine-like in their organisation or functions. Nature’s capacity to self-organise to greater complexity, and to evolve emergent properties, makes it incumbent upon humanity, through nurturance and wise, biophilic management, to allow nature to freely function and express this self-organising capacity. Wise management often involves biomicry.’

**Industrial Construct 5:** ‘The soil and land is indestructible. The machine-like soil is an inert storage-bin/a bucket of plant nutrients: lifeless, inexhaustible, resilient, and so able to be mined, manipulated, ‘improved’.’

**Transformative Construct 5:** ‘The soil is a living, organic, complex, diverse entity – the earth’s delicate skin. It is not inexhaustible, and must be nurtured, treasured and allowed to properly function, as it sustains all agriculture, humanity, and life.’

**Industrial Construct 6:** ‘Australia’s soils and climate are like those of England/north-west Europe/north-east USA: humid and rich. Therefore they can be treated the same.’

**Transformative Construct 6:** ‘Most Australian farming functions in a brittle environment of variable seasons, low humidity, high evapo-transpiration rates, and with ancient soils of low nutrient status. Australian farming practices therefore need to be flexibly and ecologically matched to this unique environment and to the self-organising capacity of the landscape and its systems.’
**Industrial Construct 7:** ‘Droughts are abnormal aberrations, and Australia expects to experience four European-like seasons. ‘Average’ seasons are the same as ‘normal’; and droughts can be fought/beaten.’

**Transformative Construct 7:** ‘Irregularly occurring, often long-duration, droughts are a constant feature of Australia’s brittle environment. Land management therefore needs to be flexibly respectful and mindful of this, and to work with, not against, these big forces of nature.’

**Industrial Construct 8:** ‘Nature is the enemy; its plants and animals are ‘pests’.’

**Transformative Construct 8:** ‘Nature is our ‘mother’ and nurturer, our sustainer, friend and ally. Her creatures are our fellow ‘brothers and sisters’, to be understood, lived with, nurtured and managed accordingly so as to let nature express her self-organising capacities.’

**Industrial Construct 9:** ‘Australian native grasses and vegetation are inferior and ‘unimproved’, and so the Australian landscape and farms need to be ‘improved’ (with ‘introduced’, ‘superior’, ‘improved’ crops, grasses and animals), and developed, tidied up.’

**Transformative Construct 9:** ‘Australia’s native grasses and vegetation are part of ancient, co-evolved landscape systems that are adapted to this land and its climate, and so need to be understood, nurtured, encouraged and sustained as cornerstones of food- and fibre-producing systems. ‘Introduced’ crops, grasses and animals need to be selected and managed for adaptation to, and as an intrinsic part of, Australia’s self-organising, complex natural systems.’

**Industrial Construct 10:** ‘Farmers are heroic and independent; they can make best use of Australia’s land and resources.’

**Transformative Construct 10:** ‘Whilst farmers are integral to society’s health and to feed its population, they are not deserving of special status or treatment, but have to earn this through holistic, long-term regenerative nurturance of the land and its dependent communities. Their actions can degrade Australia’s land resources, and so they carry a huge responsibility to regenerate the Australian landscape and healthy rural, urban and Australian societies.’

**Industrial Construct 11:** ‘Enclosing land and dead, inert ‘nature’ creates property ownership and wealth. Such ownership/privatisation confers absolute rights of property and
gives individuals power over the land. Therefore, farmers, ‘developers’, ‘improvers’ and others can do with the land what they want because every individual has the right to pursue his own interests.’

**Transformative Construct 11:** ‘Humans are part of a rapidly shrinking, degrading natural environment which sustains their very existence. This environment, its vibrant land, natural systems and organisms therefore constitute collective natural ‘wealth’. Because of this interconnectedness, no one should ‘own’, control, harmfully exploit or despoil this natural and common ‘wealth’. Land ownership, therefore, constitutes a privileged temporal right with wider incumbent responsibility to regenerate the self-organising functions, complexity, diversity and health within our landscapes for the sustenance of life and the wider community.’

**Industrial Construct 12:** ‘There are no moral/ethical restrictions on wealth creation out of an inanimate, mechanical nature via human agency [labour and entrepreneurial behaviour], science, and technology.’

**Transformative Construct 12:** ‘If we despoil nature, degrade the land, and inhibit the self-organising propensity of natural systems and the healthy functioning of landscape systems, then profit-making is only short-term. For more than mercantile-utilitarian reasons, therefore, we have a moral and ethical duty to care for the land.’

**Industrial Construct 13:** ‘The ‘good’ farmer, via the use of modern machinery, ploughs, turns over the soil, tills, fertilizes, and sprays chemicals.’

**Transformative Construct 13:** ‘Regenerative agriculturalists use intervention (or non-intervention) techniques that regenerate the land and enhance its self-organising capacity to greater ecological complexity and resilience, and to improved landscape function.’

**Industrial Construct 14:** ‘The land/nature is a chattel, a utility, a factor of production. They are inert, consumable commodities, and so are available through ‘improvement’ by human agency, science and technology, for commercial annexation, division, exploitation and/or sale for commercial use and profit.’

**Transformative Construct 14:** ‘The use of natural resources under farming systems can be achieved using regenerative practices so as to avoid depletion and/or degradation of essential nutrients, minerals, and ecosystem services, and without impairing the self-organising capacity of natural systems and landscape function.’
**Industrial Construct 15:** ‘“Good farmers” are progressive, so development of the land for profit-making is good and necessary. Thus a healthy landscape is a productive landscape.’

**Transformative Construct 15:** ‘“Good farmers” are holistic landscape and resource managers who have profitable and productive operations but where their practices yield healthy, functioning, resilient, and sustainable self-organising landscapes and systems.’

**Industrial Construct 16:** ‘The land, ‘nature’, farming and every land-use decision should be determined/judged by economic criteria and the profit motive.’

**Transformative Construct 16:** ‘The prime consideration in farming practices should be the regeneration and maintenance of healthy ecological systems, landscapes and rural communities; these are the only long-term basis of physical, spiritual, mental and economic well-being.’

**Industrial Construct 17:** ‘The cosmos, nature, society and human body are ordered systems of interchangeable atomized and mechanical parts that can be repaired or replaced from outside (the technological fix). They are able to be governed by law and discerned and predicted through deductive reasoning. They are not part of a wider organic whole. Thus ‘good/best’ farmers are specialists: reductionist, not holistic, in their role and skills.’

**Transformative Construct 17:** ‘“Good/best” farmers are holistic in their approach, role and skills. They believe in, and are comfortable with, the cosmos, nature, society and the human body being complex systems that are part of a wider whole, and that are characterised by unpredictable and unfathomably complex interrelationships beyond quantitative measurement and discernment of human reasoning alone. Transformative agriculturalists see themselves as an indivisible part of this wider whole; as small players within it, whose role is to enhance the self-organising function of its systems.’

**Industrial Construct 18:** ‘Progress is underpinned by science, and other knowledge cultures have less relevance.’

**Transformative Construct 18:** ‘The Western Enlightenment concept of ‘progress’ does not accord with striving for the health of complex agro-ecological systems, except in a regenerative sense towards greater expression of self-organising function, emergent complexity, and healthy landscape functioning. To think and operate at this holistic level
requires an embracement of all knowledge cultures not just the scientific-reductionist and/or economic rationalist.’

**Industrial Construct 19:** ‘Efficient farms should be run like factories; the land is a factor of production and machine-like, and so inputs, outputs, yields and efficiency should be measured; monocultures are best for this.’

**Industrial Construct 20:** ‘Technology and science are all powerful, and can solve any problems, and so ‘good/modern/best’ farmers use big machines, ‘improved’ plants and animals, monoculture crops and chemicals.’

**Transformative Construct 19:** ‘Farm and landscape management is seen as operating within an agro-ecological holistic system, where every knowledge culture, actor and tool usage is designed to enhance, not harm, ecological health, self-organising function, diversity, and complexity. This requires great flexibility and reactivity in responding to the environment and natural systems (and the use of appropriate technology and systems - including animals within a functioning landscape). Such management should yield long-term ecologically sustainable and economic results.

The practical evocation and implementation of these superordinate constructs are clearly demonstrated in earlier sections of this chapter. For example, in Section 7.3 there are clear examples of a different ecological approach and ethic within transformative agricultural practice. Along with the basic premise that ‘Mother Nature knows best’ goes a whole range of interconnected thinking concerning such issues as a focus on healthy soil; the benefits of biodiversity and native grasses; the constructive role of weeds; and recognition of other issues and concepts like ‘brittleness’, ground-cover, and the need for ruminant animal impact in landscapes.

**Conclusions.**

The juxtaposition of the two different superordinate personal constructs – the antinomies of those for industrial agriculture (based on the mechanical metaphor) and those of transformative agriculture (based on the new-organic metaphor) – reveal two different world-views. The mechanical is about ‘man’ being in control; of thinking ‘he’ can manipulate nature; and thinking ‘he’ can know everything required to do this. The new-organic is about
humans respecting Mother Nature and her natural systems; of being holistic in approach and being prepared to not just live with the complexity and the unknown, but to actively encourage it and its further expression; to thus live with uncertainty and the paradoxical; and to be able to listen to nature, be empathic with her, and so to adapt and react to her in flexible fashion. It is a truly transformative way of thinking for a rationalist and humanistic society that, from the 16th century, has turned its back on the old organic and which is the product of a scientific, industrial, Enlightenment, and economic rationalist age rooted in the mechanical metaphor.

Such a metaphorical dichotomy of the mind – the mechanical and the new-organic – as George Kelly has shown, is fundamental to human psychology. However, while this Yin and Yang complementarity of difference allows us to both comprehend the metaphor shift of the Western mind and to delineate the superordinate personal constructs of agriculturalists in the different agricultural discourses, the real world is composed of shades of grey. The new-organic transformative agricultural discourse has evolved out of the mechanical-industrial, and agriculturalists in each (all on separate life journeys) share elements of their different superordinate personal constructs, world-views, and values-ethics. Strong evidence of this non ‘black-and-white’ but moving and evolving situation is revealed by Case-Study # 11: integrated productivism. Here we see an active transition phase, bridging the two metaphorical and agricultural discourses, yet, while questioning the mechanical mind, its practitioners are blending key elements of each.

Notwithstanding this, Chapters 6 and 7, in enunciating the Yin and the Yang of agricultural practice in Australia, clearly reveal that the key to a shift from the industrial-mechanical mind to the new-organic of regenerative-transformative agriculture requires a fundamental shift of the ruling metaphor of our society. This is what leads to transformative change in the individual farmer and thus to transformative change in agricultural practice.

In Chapter 8 we will now examine the process and mechanisms of transformative change, and with a view to gleaning useful lessons that may help us accelerate change to increased regenerative agricultural practices so as to best address the sustainability challenge confronting us: a sustainability challenge that has arisen because, as Interviewee # 6 told me, ‘the world is literally a large paddock and we’re going to overstock it’.
CHAPTER 8  THE PROCESS OF TRANSFORMATION

Prologue

Interviewee # 52 (male) recalled that a few years after the end of World War II, when he was about six years of age, his father placed him in the passenger seat of an old land-rover. The boy had to sit on a cushion so as to see out the dirt-encrusted windscreen as his father set out to drive to the far corner of their 900 acre (356 ha.) farm.

My subject remembered that, at that particular time, the farm had been ruthlessly cleared and ‘you could’ve jammed all the remaining vegetation into just one half acre’. Their neighbours were of similar mind: native vegetation was an impediment to ‘increased production’, and axe and bulldozer were familiar tools of post-war heroic farming endeavour.

As the man and boy bounced across denuded paddocks and creek-beds the boy wondered where they were going, because all his father had said was: ‘Come along. I’ll take you for a drive and show you something’. Eventually they stopped below a long, steep ridge and got out. The boy knew the spot. He had hunted rabbits here in what was the furthest corner of the farm, a section of poor skeletal soil on a sedimentary shale ridge rarely visited by human or domestic animals.

The man and the boy climbed towards the top of the slate ridge, and just before the crest the father stopped, pulled a piece of cloth from his pocket, and blind-folded the boy. Then, holding the trusting boy’s hand, father leading the son, they climbed to the ridge top, over, and then down for a short distance. They then stopped. The father removed the blind-fold. When his eyes adjusted the boy found himself in the midst of a carpet of variously coloured orchids and lilies: an entire hillside of some 10 to 15 species, including donkey, caladenia and green-hooded orchids, along with wax lilies - all bowing their heads as they swayed in a gentle breeze. When recalling the moment some 60 years later, the man said it was as if he had entered another world, a magical wonderland of gorgeous pastel blooms set against a waving russet carpet of kangaroo grass in seed.
That boy in adult-hood grew up to become an inspiring trail-blazer in re-vegetation of degraded farmlands. At a time when exotic species were still the automatic choice of gardeners and farmers, he developed a deep knowledge of ecological function and biodiversity, and of native plant silviculture. This man largely attributes his subsequent life-changing re-direction into farm regeneration to that magical day when his father blind-folded him and led him into another ‘world’.

**Prologue Postscript**

When asked about the fate of the orchids, the interviewee stated: ‘The sad thing is that as soon as we started putting super [superphosphate] out, that totally wiped them out.’

**8.1. Constraints to Learning and Adoption in Transformative Change**

It is one thing to describe the shift to a new-organic mind in agricultural practice, as I have done in Chapter 7. But if we are to deal with the sustainability challenge then the key to triggering further and more rapid transformative change is to understand how such transformation occurred. That is the intent of this chapter, a process so powerfully hinted at by Interviewee # 52’s recollection above.

However, before we can come to grips with the factors behind mind-metaphor transformation, I believe it is vital to first examine the alter ego of change: that of non-change; of resistance to or constraints on change. While Chapter 6 dealt with the factors that embedded the mechanical metaphor in the dominant modern agricultural discourse in Australia (see Sections 6.3 to 6.5), in this thesis I have studied a group of agriculturalists who had not just made minor changes to practice or had adopted some new technology but who instead had enacted or undertaken major paradigmatic or transformative change. It therefore seemed important to ask them about their views on why change has not occurred elsewhere in farming. This was especially the case given that a significant proportion had played (or were playing) key roles in education and as catalysts of change and adoption. This section reaffirms the importance of the knowledge-power nexus, but also reveals other connected factors.
I reiterate that most extension and adoption in agriculture concerns adjustments to practice or technology adoption. To the contrary, in transformative agriculture we are dealing with major and often entire systems change, or a complete paradigm shift. This involves vastly different issues concerning changes in personal psychological constructs. Enacting such change requires a new approach to learning, one centred on the learner’s point of view involving ‘the construction of new meanings or the reconstruction of existing meanings in directions which are valued by the learner’ (Thomas 1977: 47). This in turn means a re-alignment of one’s personal construct system. The converse to this is resistance to change, which can be re-cast under Personal Construct Psychology as being due to deeply rigid personal construct systems that have little capacity to change. Using evidence across many fields (including at macro levels of systems, complexity and self-organisation, and including thinking in ‘punctuated equilibrium’ theory), Gersick encapsulates the universal issue here: ‘The construct of a deep structure that keeps systems basically stable during equilibrium periods offers a new way to understand systems’ resistance to change’ (Gersick 1991: 32).

From a condensation of voluminous interview material, the following reasons for not changing practices to forms of transformative agriculture were cited – and where a number of factors often acted in combination.

**Family History and Culture**

This factor is critical, especially the influence of older male generations.

**Interviewee # 68** (male): ‘I had time to see some other things, so I wasn’t going to be poisoned with “What Dad did is what we’ll always do”. I think that stifles you.’

**Interviewee # 67** (male): ‘You’ve got to have an older generation that’s willing to change and younger ones that are hungry to grow…Family history…my father was an immigrant and he had made one big change…made him more open to more.’

**Tradition and the Need for Security**

This is relevant to Ison’s observation that ‘[t]raditions in a culture embed what has been judged to be useful practice’ (Ison 2005: 26).
Interviewee # 55 (male): ‘Maybe the less you’ve got to lose the more quickly you take this on.’

Interviewee # 50 (male) sounded a cautionary note: ‘There is on the land a fundamental misunderstanding of what innovation means because there is some value in conservatism…not lurching from one thing to the next…This has allowed people to survive.’

Peer/District Pressure and Fear of Change

Interviewee # 38 (female) heard the innovators Elaine Ingham and Arden Anderson at a workshop, which was an exciting galvanisation: ‘That was fabulous…It confirmed and expanded our thinking and gave us confidence that we weren’t just some kooks.’

Interviewee # 67 (male): ‘People look at me as if I’m mad… “You couldn’t possibly do that!!”’

Interviewee # 40 (female): ‘Culture and pride is often the big block to progress…They’ve always got an excuse why not to do it…It’s okay for Joe Blow, he’s lucky or rich etc…’

Cognitive Dissonance also seems to come into the picture. Interviewee # 68 (male): ‘Some people seem to take a lot of comfort in what was traditionally done…They ignore everything that didn’t work…Better the devil they know than the devil they don’t.’

Concerning the combination of factors leading to risk aversion:

Interviewee # 66 (male): ‘It’s easier to stay uncomfortable when challenged.’

Interviewee # 63 (male) cited an example of cognitive dissonance, having set up drought feed-lots to preserve his country. His neighbour said of his feedlots “That’s not good for the animals”, and yet he just let his die in the paddock, starved to death, and he criticised the dust in our half-acre of feedlots yet had it blowing off 1800 acres.’

Interviewee # 38 (female): ‘When we were riding with just being conventional it was okay, but people talk to us less now. Some of them are intrigued but too frightened to go there….I think they probably wish we’d just go away…didn’t confront them….They just can’t get their
head around it – it’s just too big a picture….They’re generational farmers…they’ve got history…they don’t want to take risks, don’t want to be the ones blazing the trail.’

**Interviewee # 51** (male): ‘With a lot there’s a fear of failure….a lack of life experience…and a fear of what other people think. With a lot of people, you can’t dig very deep or they just lock-up on you…don’t want to say what they really think…Everybody finds change difficult.’

**The Prophet in their Home-Town Syndrome**

This is a variant of fear of change, fear of what others think. Alan Savory, after decades of extension and change-agency work in three continents and numerous countries, talks about the ‘one hundred mile barrier’: that an innovator is increasingly recognised and his work adopted once outside the local district or region. Savory lists as the greatest constraint to change (what he says ‘is the elephant in the room no one talks about’) ‘the biggest vested interest in the world’: ‘people’s egos and pride’ (and especially ‘professional people’s pride’). Savory’s view is that ‘this problem is human and affects farmers as well as scientists and it is extremely difficult to deal with, talk or write about but it is a far greater vested interest than the financial one we all talk about’ (Savory: pers.comm. 2012).

This role of ego and pride and the 100 mile barrier was corroborated by many interviewees. For example:

**Interviewee # 47** (male): ‘My brother next door won’t do it – too close. But the further away you go, half an hour, those farmers will pick it up a lot better…We had a builder next door – no paradigms – picked it up straight away. It didn’t worry him that he was doing something different to everyone else. He probably didn’t think he was.’

**Interviewee # 38** (female): ‘the interested ones are usually 50 kilometres away, people not in your community.’

**Interviewee # 5** (female) spoke about the difficulty of ‘being a voice in the wilderness’: which is a powerful metaphor, as it has connotations of being alone in a wild or dangerous place, where one’s voice is lost and where one can easily get lost.
**Interviewee # 16** (female): ‘We’re regarded as total nutters by the locals…They’ve given up on our woopy-madness.’

**A Combination of Reasons to cement the wall up**

**Interviewee # 67** (male): ‘Why they won’t change? It’s a combination of reasons: family, genetics (the way they’re wired); it’s character or just how you are; lack of ground [acreage] to experiment; lack of resources and capital; and some of its mental – a lot are too comfortable, no energy.’

Another reason cited was the high average age of farmers. Yet in several discussions, particularly concerning the new developments in big machinery and techno-intensive Conservation Agriculture, the younger generation adopting this were seen as often reductionist and agricultural science- or agricultural college-trained, in love with technology and with the power and ease of high-tech and computer-controlled farming: as opposed to taking the harder road of more physical work and learning the craftsmanship required for livestock husbandry. It was also pointed out that farmers of a more mature age, who had seen droughts and experienced some knocks and life experience, were more open to consider alternatives. For example:

**Interviewee # 40** (female): ‘People have to be ready for change…There’s a combination of culture, pride, and points in a person’s life when one’s ready to change…There’s some young buggers worse than old.’

**Left-field Answers**

**Interviewee # 25** (male; involved in founding *The Dawson Method*, which is based on energetics, kinesiology and similar areas): ‘The left-brain, right-brain integration is critical to accepting new things, paradigm change etc., and a lot of that is insecurity due to personality…Those who don’t like change tend to have skull bones minutely slightly out of place…It determines the person’s personality…they like to be able to control everything that’s around them…so it’s luck of the draw which way your energy system is out of balance…also affects dyslexia, depression and addictions and aberrated thought-patterns – the whole spectrum. If you’ve got that particular imbalance…about 50% of the population…there’s an inability to look into the future and a desire to control…so there’s
nothing out of left-field that comes in….we call it “right temporal personality”, where the right temporal bone is out of place…It’s not a nurturing type of personality…more obsessive…associated with a fairly good left brain….accountants, lawyers and so on…’

**Female/Male Differences**

**Interviewee # 38** (female) noticed when running on-farm field-days that ‘women get close quicker, feel more comfortable, confident and trusting with the new stuff – and if wives come with the husbands there’s not a problem in communicating; the men are more accepting, if the wives are there – men alone are more resistant, you’ve got to prove yourself.’

**Interviewee # 30** (female): ‘It’s a pity there aren’t more women in agriculture… because this domination and stepping on everything is very much a male thing. I think people act out of either fear or love – I think most men act out of fear… It’s a society thing, they’re frightened to step out…’

This accords with a repeated observation from my research and travels: that often it was women who pressed for, or helped initiate, a practice change in chemically-based agriculture, and because of their concerns about the harmful effects of chemicals – on both family members and on the earth.

Again, these results concur with Alan Savory’s wide experience in adult education (or ‘learning fields’), to the extent that he says about ‘male behaviour and peer pressure’ that ‘I no longer waste time if only males are present. Women have to be involved because they do not let ego get in the way as much nor do they allow peer pressure to prevent them adopting something they see can save their family and children’ (Savory: pers. comm. 2012). Crucially, Savory observed that there is ‘a strong correlation with openness to new knowledge and higher self esteem.’

**A Lack of Ecological Literacy**

A major and repeatedly consistent feed-back throughout the interviews concerned a lack of ecological literacy among farmers: that in not having training in, and understanding of, soil, landscape function and other ecological scientific knowledge, then farmers could not read
their landscapes. They were thus unable to read land degradation symptoms; unable to realise what was causing this; and thus unable to take rectifying steps.

This became clear in my interviews with a group of 70 to 80 year-old NSW Riverina grassland managers. They valued their modified native grasslands (all realised these ecosystems had been radically simplified since the 1890s) and many tried to ‘spell’ their country and stock it conservatively – as Interviewee # 58 said, ‘hoping it would keep improving’ – but they did not know how to manage for regeneration. Consequently they remained sceptical about an approach like holistic grazing management.

Appended below are a small sample of interview comments on this issue:

Interviewee # 67 (male): ‘With a lot of land degradation, clearly farmers aren’t aware of their resources and they mine their soils.’

Interviewee # 62 (male): ‘If you don’t have the right tools to do something different then you’ll fall back into reductionism, because that’s what’s offered, what’s spoken about. Maybe that’s where we’re most comfortable. It’s very hard to convey a holistic-type approach…The banks and the advisors are encouraging that type of approach [the traditional].’

Interviewee # 52 (male): ‘Then we’d get summer storms and I’d be shovelling dirt and standing up fences year after year…but while we recognised problems we didn’t have any clue to solutions so we just kept going on the same path.’

Interviewee # 8 (male): ‘The common thread of people changing is soil health, and once they get a greater knowledge and then interest in ecology, a greater understanding, they’re more sympathetic to further changes…People think a flogged-out monoculture is normal, so they don’t know what to strive for…so education is the key, and it has to be practical, more how it’s done – if that information is shared then people are adopters.’

Corroboration of the value of ecological literacy was the frequent feed-back concerning the fact that once some ecological education had occurred (usually on courses with one of the various diffusion organisations) then their total perception changed and they could at last ‘see’ and ‘read’ their country.
The role of a lack of ecological literacy as a constraint on adoption of ecological regenerative land-use practices is supported by other work (for example Curtis & Robertson 2003 in regard to management of Australian river frontages).

8.2. Transformative Change and its Catalysts

Reasons for a Change to Transformative Agricultural Practice: Interview Material

As the switch from the entrenched paradigm of industrial agriculture to a different transformative system appeared so cognitively monumental and challenging, a key question in my research interviews to those who had switched was: ‘What were the factors behind such a switch?’ The answers proved both illuminating and significant.

Of the 66 practitioners who had changed, some 58% (or 38 in total) stated this change was due to a major life shock of some description. Such shocks included: a traumatic drought experience; being personally burnt (or their property burnt-out) in a bushfire; confrontation with possible bankruptcy; marital breakdown; their flock or herd contracting a major animal disease (e.g., Ovine Johnes Disease); losing large numbers of freshly shorn valuable sheep due to lack of protective shelter; loss of viable agricultural land due to soil salinity (up to 25% of the farm in one case); the collapse of the wool Reserve Price Scheme causing a major financial crisis; being poisoned by chemicals; superphosphate killing their native grasses; various other signs of ecological deterioration threatening their viability.

Of the remaining 42% who changed, a variety of reasons were given. The chief of these included that some were already biophilic or sympathetic to an alternative approach but did not know how to change until encountering new knowledge; or else there had been a gradual process of change occurring and some catalyst triggered or cemented the final step. These can be paraphrased as ‘When the pupil is ready the teacher appears’. In other cases the final barriers to change had been a lack of knowledge or a lack of ecological literacy, which, when overcome, led to a cascade of changes; while in still others, family members, friends, mentors or people of influence persuaded them to attend life-changing courses or field-days run by the various diffusion organisations involved in transformational agriculture.
Personal psychological make-up combined with education and personal and family history were clearly factors in the propensity to change (see section 8.1 above), with some being highly resistant no matter the circumstances, and others more amenable and more ‘open’.

That the major reason for transformative change was a major life-shock is highly significant, as it reveals much about the powerful nature of major cognitive-psychological-physiological factors that accompany paradigm entrenchment: that a major life-shock was needed in the majority of cases studied in this thesis to crack open the carapace of cement-like protection that encases (or which is the cement-like interstice and structure of) a cognitive-affective paradigm. This also explains (a) why deeply held paradigms are so resistant to change; and (b) why strong emotions are so often elicited when paradigms are challenged. And yet, when the carapace is cracked, change can rapidly occur, as described by Donella Meadows:

‘…there is nothing physical or expensive or even slow about paradigm change. In a single individual it can happen in a millisecond. All it takes is a click in the mind, a new way of seeing’ (Meadows 1997).

This phenomenon is also another reason why I have deliberately used the word ‘transformative’ in this thesis. It relates not just to the capacity of contesting practices to effect transformative change, but is a challenge in itself to the hitherto dominant approaches in agricultural extension of an implicit top-down approach. The cracking of the carapace of a paradigm in most cases requires something completely different in approach if transformative change and a truly transformative agriculture is to be achieved.

It would be easy to summarise this process in the extension agent’s glib saying that ‘Some people change when they see the light, others when they feel the heat’, but the story is more complex than this. Selected quotes below illustrate both the above factors of change and this complexity.

*Shock-induced ‘Road to Damascas’ ephiphanies*

**Interviewee # 62** (male) regarding the 1966 drought: ‘My father didn’t want to sell any stock and it [the farm] turned into a dustbowl and I reckon I’d got a sacrifice that lasted fifteen years.’
Interviewee # 40 (male): ‘Droughts do a hell of a lot of good for the landscape and communities in the end…it thins things out and fixes things up and humbles people…When we had those sorts of cycles, droughts and financial difficulties, recession, high interest rates, that’s why we had the greatest change occurring.’

Interviewee # 52 (male): ‘Christmas Eve 1983 we had that horrendous dust-storm…visibility down to 200 metres, howling north-westerly gale, and after lunch that day, and I still wonder what made me do it, I took my camera to take a few photos…The place was absolutely bare…Our top-soil was just flying away…and I ended up near the highway…I jumped the fence where it hadn’t been grazed…dry grass this high…and when I jumped the fence it was like landing on a sponge…So I stood there looking at all this previous organic matter. And at that point in time I’d been working for 24 years and I’d put my youthful enthusiasm and energy and blood, sweat and tears and everything else into trying to make this farm something to be proud of, and there it was, a bloody disgrace. It is a wrenching experience. And I stood there and let that sink in…and I said to myself: ‘If we survive this I’ll do everything in my power to see that this farm never looks like this again…the impact was so sudden…an absolutely life-changing experience…and that decision has just totally transformed my life.’

Interviewee # 51 (male): ‘I realised after the drought, we’ve got to be one thing or the other…that there has to be another way…and I realised I’ve got to dump my conventional thoughts and look at other ways of trying to regenerate my farm, because conventional wasn’t working.’

‘When the pupil is ready’.

Interviewee # 51 (male): ‘I’m only forty-six but at some stage of life you start thinking deeper or more spiritually…more mature…you’re more ready.’

Interviewee # 62 (male): He was already concerned about financial pressures, then went to a Grazing for Profit [GFP] course run by leading diffusion organisation Resource Consulting Services, and found his existing paradigms challenged. ‘This made me depressed and angry…it rattled my big paradigms…but GFP allowed me to have the eyes to see [the potential of an alternate pathway – in this case pasture-cropping]…This in turn gave me the
courage to jump off a cliff…the new and interesting ideas put the hairs up on the back of my head.’

Interviewee # 56 (male): ‘The alarm bells [in regard to industrial agriculture in a cropping enterprise] started ringing four years ago, then we had exposure to Christine Jones…her message resonated very loudly for us…There’s been a progression of understanding that’s come as a result of exposure to and education in all of these modalities…When I got married a key brick in the wall changed. Before that the light bulbs hadn’t gone on about the whole ecology and the importance of it in the context of us personally, the business and everything else…When we marched off and did the course (Grazing For Profit) in 2003 everything changed.’

Interviewee # 40 (male): ‘There are points in a person’s life when you’re ready for new things and its not when you’ve just come out of university, bullet-proof, and everything’s simple and you can just reach for this technological answer.’

Interviewee #52 (male): [In regard to industrial agricultural advisors pushing greater production and greater inputs and chemicals]: ‘We reached the limit of our comfort zone.’

Interviewee # 25 (male): ‘It’s the outstanding people you meet along the way, otherwise you just keep on doing what you’ve always done without thinking…The RCS [Resource Consulting Services] process was really beneficial…cage-rattling questions and you’re exposed to people you wouldn’t normally come across.’

Interviewee # 30 (female): ‘At uni [went back as a mature-age student] I kept coming across Alan Savory’s name and I followed up…it just made sense.’

*Bringing a non-traditional, outside trained mind to agriculture*

Interviewee # 38 (female): ‘We came in with fresh eyes…had a business leaning…a very analytical approach…and we were open to biological change in the paddocks … [such as the] retreat of the mushrooms…We didn’t have a history with agronomists.’
Conflict as a cause of change

Interviewee # 40 (male): ‘The polarities, being so far apart, might create enough energy to make new learning and development come out of it…The extremes bring about change in the middle.’

Enthusiasm from Emancipation

Percy (2005) and others have described transformative learning as emancipatory learning. This is most relevant, as a key – indeed almost universal – finding was that transformative agriculturalists evince enormous enthusiasm, passion and energy after they have made their big change in thinking and practice. With this goes an extraordinary hunger to go on an upward learning path, accompanied by increased optimism and positivity – all of which is infectious. Frequent feedback from family, friends and peers after they had made the ‘big change’ was: ‘What drug are you on?’ The process seems to be a re-birthing – a ‘born-again’ experience.

According to Personal Construct Psychologist practitioners and theory, such feelings of emancipation, enthusiasm and optimism are due to a reorganisation of one’s personal construct system, which in turn realigns their ethical and moral beliefs and concomitant emotional and beyond-conscious state of mind. That is, in realigning, they have become adaptively structurally coupled to their environment.

This important observation is connected to the issue of shock-induced change, which is part of the repeatable pattern of ‘punctuated equilibrium’ seen in many fields (see Section 3.4) and involving fundamental change to deep structures. In the individual’s case, this is usually due to the inappropriateness of ‘deep structures’ (their personal construct system) regarding their adaptation to the environment, or a disconnect in structural coupling, while triggers to change (and the significance of the change) are timing dependent. A crisis-triggered ending of the equilibrium period (via internal or external events) usually attracts newcomers to the system (Gersick 1991). Once the equilibrium is broken, and because individual’s ‘are no longer directed by their old deep structures, and do not yet have future directions’, then individuals ‘experience uncertainty, often accompanied by powerful feelings’ (Gersick 1991: 26; after Levinson 1978). The person then enters a period of transition, which can be
inherently unpredictable, but emotions play a huge part here: indeed a motivational role (through such emotions as fear). Yet, as Gersick, Mezirow, E.W. Taylor and others point out, equilibrium transition or crisis phases also trigger optimism with released energy (enthusiasm), and this enables the initiation of ‘fresh search activities’ and a moving ‘forward on the basis of new ideas’ (Gersick 1991: 27). All of this is strongly corroborated by my research interviews.

Conclusions

As discussed in Section 3.4, a key goal of this thesis was to examine change or transformative adult learning. Successful learning commonly involves behavioural change. This has clearly occurred in the case of these transformative agriculturalists, and, as covered in Section 3.4, much of this learning is clearly experiential in nature. But as we shall see in Section 8.3 (communities of practice), this was enhanced by elements of participatory social or collaborative learning. In the end the net result of the different forms and types of learning for transformative agriculturalists is a true example of transformative learning, particularly following what Jack Mezirow calls a ‘disorienting dilemma’ or what can be described as a shock which cracks the cosmic egg (Mezirow 2010; Pearce 1983).

The responses to the simple question ‘How and why did you change your agricultural practices and approach?’ are enormously revealing. This is because they involve not some simple adoption of a new technology or practice already aligned with the dominant, accepted or traditional practice (as nearly all agricultural extension involves), but instead involve a complete overthrow of an existing paradigm or accepted discourse. This in turn means the adoption of not just a new way of doing agriculture, but a new philosophy, a new world-view, and a new ethics-values base that contests accepted practice and puts one at odds with peers, farming district and even family. Only a ‘cracking of the cosmic egg’ (Pearce 1983) appears able to do this, and, as seen above, this meant in the majority of cases studied in this thesis a major life shock did indeed crack-open the mind; or else it meant a galvanising fillip to people whose minds were already ‘open’ to new thinking for a variety of reasons.

It is therefore clear from what we saw in Chapter 6 regarding George Kelly’s Personal Construct Psychology, and regarding the change in metaphor and language of the transformative agriculturalists, that what we are talking about here is major change in the
personal construct systems of these individuals. In the first case – change due to shock – it would appear this has led to a complete rebuilding of the person’s construct system from their superordinate constructs down through the subordinate constructs. To paraphrase Kelly’s words, people have reorganised the way they construct events and the world by concretely rearranging their constructs in hierarchies and by further abstraction. Kelly explained that this invoking of new arrangements among constructs subordinate to the superordinate constructs is how learning and change occurs. To do this it now becomes clear that major paradigm and world-view change comes from changing the superordinate constructs, and this involves no mere minor learning adjustment but most often a shock-induced overthrow of the old and replacement with something new. In turn such major paradigm change affects people’s core constructs: those that comprise our structure for understanding and predicting ourselves. This in turn explains why transformative agriculturalists, after an initial change, often go on an accelerated and ongoing learning journey that sometimes involves explorations and openness to the spiritual, mystical, and transcendent fields.

A number of interviewees also commented that once one major change had been made then others became easier. For example:

**Interviewee # 62** (male): ‘It was incredibly courageous I guess to actually change your whole property…like jumping off a cliff…but when you’ve jumped once its easier to do it again…It gives you the courage to step off the cliff again.’

**Interviewee # 67** (male): ‘Once you make a big change in your life…once you break the ice…its bloody easy to keep making changes.’

First, use of the metaphors ‘jumping off cliffs’ and ‘breaking the ice’ indicate the cosmic egg-cracking, radical nature of change required to break open a paradigm. Second, these observations suggest that once a person has enacted major personal construct change and reconstruction, then the rigidity of their personal construct system is lessened, making them more fluid and flexible to further adjustments (i.e., to further learning). Conversely, the resistant, aggressive, emotional behaviour seen in rigid paradigm defence (for example, among committed reductionist scientists or practitioners, or among some farmers of the dominant discourse) suggests, as Kelly outlined previously, that a challenge to their rigid construct systems is very threatening. Reactive emotions are elicited because core personal constructs are directly challenged. In terms of adaptive behaviour to rapidly changing
environments (as is occurring now in the global situation and particularly in regard to agriculture), such rigid construct systems could be seen to be maladaptive.

As Interviewee # 57 (male) said of his old thinking, the ideas were ‘set in stone’.

However, as we will see in Section 8.3 below (concerning knowledge diffusion), it is not an easy task to more widely spread a change towards new contesting agricultural practices (and their associated radical or different ideas, approaches and world-views/philosophies).

### 8.3. Communities of Practice and Knowledge Diffusion

As discussed in Section 3.4, the term communities of practice (Wenger 1998) emphasises a form of social learning through participation. It particularly refers to an iterative feedback between people and their environment, and where knowledge relevant to a specific context is constructed by giving meaning to existing knowledge. Integral to this is that the learner constructs or re-constructs their identity and reality from participation in practices of that particular social community. Thus there is an integration of (1) meaning (learning as experience); (2) practice (learning as doing); (3) community (learning as belonging); and (4) identity (learning as becoming). (See Figure 3.4, page 66).

What emerged from my analysis of the innovators and early adopters that comprise the core research group for this thesis was that learning-change and knowledge diffusion occurred amongst transformative agriculturalists. And a key way through which this occurs is via stories, narration and dialogue; these form connections, provide insights, and impart exemplars. Metaphors are a key part of this, and as we saw in Section 7.2, they became far more organic than mechanical amongst transformative agriculturalists. Key to this learning-via-story is a shift from the reductionist view of ‘discovery knowledge’ to ‘narrative knowledge’ (Russell & Ison 2000). Fundamental to the latter is the triggering of emotions, which, as will be further explored in Chapter 9, is integral to transformative learning.

Hajer pointed out the important role of story-lines in providing ‘actors with a set of symbolic references that suggest a common understanding’ and ‘the creation of coalitions’ (Hajer 1995: 62-63). Eshuis and Stuiver summed their importance: ‘Storylines provide a shared language. Thus they are instrumental in developing a shared discourse and building a
community of discourse’ (Eshuis & Stuiver 2005: 139). Maturana believes the latter are crucial to a healthy, learning and sustainable society, and he calls these ‘conversations of mutual acceptance’, which, he says, incorporate an emotion of ‘love’ (emotions being critical to transformative learning, as indicated above). The converse of course, as revealed in Chapter 6 and as Maturana pointed out, is that ‘interactions that do not entail mutual acceptance between people’ most often ‘entail one person trying to dominate another’ (Russell & Ison 2000: 158; and Russell and Ison citing Maturana 1988).

Innovation within a social context emerges as integral to transformative agriculture, and in this regard Pretty says that practices that are locally adapted and fitted to place ‘are most likely to emerge from new configurations of social capital, comprising relations of trust embodied in new social organisations, new horizontal and vertical partnerships between institutions, and human capital comprising leadership, ingenuity, management skills, and capacity to innovate.’ Significantly, he concludes that ‘[a]gricultural systems with high levels of social and human assets are more able to innovate in the face of uncertainty’ (Pretty 2008: 451). This seems to encapsulate the communities of practice I studied which are involved in transformative agriculture.

**Mechanisms of Change and Knowledge Diffusion**

A common feed-back amongst early adopters of transformative agriculture was that the catalyst which sent them searching for new knowledge and thus change (e.g. shock or a ‘disorienting dilemma’) also led them, however serendipitously, to encountering one of the key diffusion organisations founded by the leading innovators and their supporters. For holistic grazing managers and pasture-croppers this was most often Resource Consulting Services, the Holistic Management group or Principle Focus. Rowan Reid’s local influence on agroforestry in the Otway Agro-Forestry Network, and the Master Treegrowers Programme are other examples, as are courses run in such case-study practices as biodynamics, biological agriculture, and Permaculture. Many of the new ideas in the ten main transformative agricultural case-studies were often introduced by special training schools and courses through Resource Consulting Services and Terry McCosker, who, after Alan Savory, emerged as the main and on-going innovator in this area that most widely influences transformative change in broad-scale agriculture in Australia.
Courses like the Holistic Management group’s ‘Managing Holistically’ (now a fourteen day course over one semester, and adapted for the NSW TAFE system) and Resource Consulting Services’ ‘Grazing for Profit’ and ‘The Business of Farming’ (the latter often from three to six days of intense involvement in a centre removed from the participant’s home-base) take place with people of similar mind but often strangers. They sometimes constitute emotional, life-changing experiences. Such evolving communities of practice, if the participant signed-up to ongoing intense involvement in smaller groups formed out of the original course (such as growth-learning collaborative management boards, like ‘Graduate Link’ and its next level, ‘Executive Link’ under Resource Consulting Services) or continuing iteration with a mentor in the Holistic Management system, can mean decades of ongoing learning and growth within that particular community of practice. This is usually guided by a mentor or facilitator from the parent diffusion organisation.

One outstanding innovator in the agro-forestry area evolved an approach to farmer learning that exemplifies outstanding social learning practices. This person (Interviewee # 54) calls his approach to social learning ‘a hands-off approach’ by a ‘change-agent’, not by a teacher, but by a learning facilitator. ‘It’s a “no strings attached” sort of extension model’ he says. ‘I don’t think it’s possible for us as professionals to determine what the forest would look like. I was interested in what happens when you give farmers the skills, the confidence and some of the tools, what would they come up with?’ said Interviewee # 54. The result was great diversity of approach ‘because they believe this is more suited to what they want to do than what the neighbour is doing’. That is, said Interviewee # 54, they had ‘a level of ownership that you don’t see’ normally or elsewhere, and this was because he said to farmers ‘We want you to participate in this learning experience’. As a ‘change-agent’, concluded the interviewee, ‘a measure of any success is the ownership of their decisions’. Significantly, Interviewee # 54 also found that ‘it’s a level of faith that if you helped someone do what they want to do, what they want to do will be of benefit to the community.’ (Note: the harmonious result from regenerative agricultural practice accords with the enabling of emergence in self-organising systems, and of individuals structurally coupled to their environment, as will be explored further in Chapter 9).

Interview feedback confirms the transformative nature of this social-experiential and transformative learning in these communities of practice. For example:
Interviewee # 67 (male): ‘All of a sudden there’s a whole new group of people to meet; a whole new network, new things to learn. It opens your world up a bit wider.’

Interviewee # 56 (male): The whole thing is a journey, a moveable feast…Terry McCosker [founder of Resource Consulting Services - RCS] was the catalyst in our move to pasture-cropping, but other innovators influenced him, like the Joyces introduced Terry to subtle energy. Terry’s learning as he goes; same with Colin Seis [pasture-cropping co-founder] and Matt Barton [pasture-cropping early adopter and educator]…For us, the subtle energy system came via the Dawson Programme – and it was because we went through the whole RCS programme... When that finished we formed some very personal relationships with our board members – we kept the board together, meet two times a year, and once a year we get RCS to make sure we tap back into the system and keep our fingers on the pulse as to what’s going on.’

Interviewee # 8 (male): ‘For me, RCS was the breakthrough of information and change. More recently it’s been peers who nearly all went through that process.’

Interviewee # 17 (male): ‘Much of my motivation is influenced by the people I mix with; I only choose positive people.’

In a number of case-study areas the diffusion networks extend both temporally and physically across continents. In Holistic Management, for example, there is a training school for educators in New Mexico (the Centre for Holistic Management), and in Zimbabwe (African Centre for Holistic Management); elsewhere, in Resource Consulting Services and its offshoot Principle Focus, there is a similar active network of exchange, farm visits and organised tours that occurs as with Holistic Management, and which ranges between Australia, New Zealand, South America and southern Africa (Zimbabwe, South Africa, Namibia). Offshoots of Resource Consulting Services (such as Low Stress Stock Handling and KLR Marketing – the latter refined in Australia) had their origins (and continually iterate) with Bud Williams in the USA. In biodynamics, and via Rudolf Steiner’s writings, teaching and philosophy, trained proponents in many nations teach biodynamics (Australia, for example, has three main streams). In biological agriculture there is a strong influence from North America via regular schools and visits from such people as Dr. Elaine Ingham and Dr. Arden Anderson, and Ingham has a special soil laboratory in northern N.S.W. As pasture-
cropping is a significant Australian innovation, it appears as yet to have no outside cross-fertilization back into Australia; it is now actively taught by Resource Consulting Services as well as its founding innovators Colin Seis and Bruce Maynard. Many of the case-study diffusion organisations also have their own communication networks via websites, emails, newsletters and even publications – both nationally and internationally. A journal like Acres USA and Acres Australia is widely subscribed to by transformative agriculturalists in many different case-study areas, while holistic grazing managers often subscribe to Alan Nation’s Stockman Grass Farmer from the USA.

An equally significant mode of communication, education, learning, and reinforcement is derived via the classic books in the field. Alan Savory’s Holistic Resource Management (1988) and Holistic Management (1999) have been a huge influence for change in holistic grazing management, pasture-cropping and other areas. As soil health is a basic platform of transformative agriculture, the classics in this field are widely read and recommended either individually (word of mouth) or in newsletters or on reading lists in courses and put out by the various diffusion organisations. These include: Steiner (1924); Howard (1943, 1972); Balfour (1976); King (1911); Fukuoka (1978); Pollan (2006), and many other writers across a broad spectrum, including Vandana Shiva, Wes Jackson, Wendell Berry, Peter Andrews, P.A.Yeomans, and others.

Completing this ongoing learning journey, support and reinforcement by the various communities of practice include regular and not so regular conferences (e.g., via Resource Consulting Services; annually via Stipa). There are more general conferences on tangential aspects (such as Carbon conferences; livestock-related issues and so on), where leading innovators and practitioners from the key case-studies are key speakers. Over and above this, regular field-days are held at the properties of the leading case-study proponents, who serve as exemplars in their area and beyond. There is also a surprisingly high level of mutual farm visits by the leading innovators and early adopters in many or most of these livestock-related case-studies. A further key network, beyond common friendships, school and university connections and circles, is both the Nuffield scholar and Churchill Fellowship communities. A number of people interviewed won such scholarships and found this international travel experience and the ongoing networking invaluable. On their return they continue to publish and innovate in the field.
**Innovation Nodes**

In the course of my research I became aware of three nodes of innovation in communities of practice in different case-studies. I define such a node as a local region where a group of practitioners, in iterative and mutually supportive fashion, undertake a process of ongoing innovation and adaptation in a particular practice or practices, and from a starting position begun by one or a few innovators.

These three cases comprise: (1) the central west region of NSW, in the Gulgong-Wellington area, where an iteration between the originators of pasture-cropping and holistic grazing management has led to an ongoing innovation and adoption cycle in both practices; (2) the northern midlands of Tasmania where a group of high production, centre-pivot irrigating croppers and livestock producers have pushed their management systems towards an evolving integrated livestock-cropping system of ecological productivism; and (3) the Otway Agro-Forestry Network of south-western Victoria, based on the work of Rowan Reid.

Analysis of reasons why these nodes evolved is summarised in Appendix 9, but key features include: a confluence of historical, climatic and geographical factors; strong social factors, such as similar age, peer schooling, district, social, family, tertiary education friendships and networking; farm proximities; the previous social factors contributing to shared involvement in communities of practice and learning; regional settlement histories and densities; and finally, one or more founding innovators linked to early adopters in these regions.

**The Language of the Communities of Practice**

We saw in Section 7.2 that transformative agriculturalists across most case-studies share a language (technical and conceptual terms, metaphors, and so on) that reflects their new-organic, biophilic, empathic world-view. This is a language which reveals their changed personal constructs. But over and above this, within each case-study there is a sub-language (sometimes technical) that is specific to these communities of practice.

For example, unless you were practicing and trained in holistic grazing management or pasture-cropping you would be unlikely to understand the brittleness scale, or the meaning of
such words as animal density or herd impact; rest; recovery; and even rotation. Further, there is talk of vegetation recruitment, desired perenniality, and so on.

**Interviewee #62** (male) talked of constipated crops and filling in the feed curve.

Only people practicing biodynamics would understand what preps meant, or five hundreds or modalities, let alone cosmic energy flows. Likewise with people involved in biological agriculture, who might speak of Brix levels and refractometers; transitioning country; compost teas; sleepy teas; extracting microbes; refined humates; shunnels. The older Riverina grassland managers too have their own linguistic terms: saltbush country; light country; sweet country; balanced country; pine or boree country in good heart; frontage country; safe country; the worm (intestinal sheep worms); cover; country getting away; hard country; soft country; herbage; the fragile months; spelling country; tight seasons.

### 8.4 Holistic Thinking and Knowledge Cultures (New Theory Development)

In examining the question of transformative change in agriculture in relation to such wicked problems as land degradation and loss of ecosystem services, this thesis has focussed on what triggers personal transformation and practice change (i.e., on learning), and also on constraints to change. Preceding sections in this chapter address these issues. What emerges as crucial to this investigation (and as dealt with also in Chapters 5 and 6) is where the knowledge, culture, and attitudes of farmers are derived from.

We saw in Section 3.3 (Transdisciplinarity and Diverse Knowledge Cultures) that a major constraint to change/learning and dealing with complex wicked problems is that people (such as farmers in this case) are prone to silo construction of their knowledge, attitudes and approach. That is, as a result of training, background and so on people become locked-in by narrowed paradigms of thinking into certain forms of behaviour because they have radically different understandings of the world and how it works. These different perspectives combine their ontological, epistemological and ethical-value beliefs.

This field of different human perspectives or knowledge cultures has been enunciated by Brown, who has delineated five main or basic knowledge cultures (Brown 2008; 2010; Brown et al. 2010b). The first four come from within people’s own constructed silo walls: the
personal or individual; the local community; the specialist or ‘expert’; the organisational or institutional. The fifth knowledge culture is the non-siloed ‘holistic’. Based on Brown’s work and that of others (for example described in Keen et al. 2005), cumulative experience has shown that a key pathway to address a complex social-ecological wicked problem is to synthesise these knowledge cultures: to create a sixth knowledge culture, that of collective knowledge. The process to achieve this synthesis is via conducting an open transdisciplinary inquiry. Such a collaborative approach occurs via experiential social learning (see Section 3.4 on social learning; and see Keen et al. 2005). The veracity of Brown’s and others’ work on the six knowledge cultures is fully corroborated by my interview material (see below).

I will not address here the mechanism of transdisciplinary-based social learning and change (see instead Chapter 9). However, in this chapter (after collating the abundant evidence from my interview material) it became clear that the theory behind the proposed six knowledge cultures needs to be expanded to include two more knowledge cultures (i.e., a proposed total of eight to this point of theory development). Both these additional knowledge cultures are particularly relevant to the field of transformative agriculture. They include:

- Knowledge culture (#2): family knowledge (which comes between the individual (#1) and community (#3) knowledges); and
- Knowledge culture (#7): the transcendent. This includes spiritual, indigenous, mythological, mystical and transcendent type knowledge approaches, and comes between the holistic (#6) and the collective knowledges (#8).

**Farming and a Family Knowledge Culture (Culture # 2 of 8)**

As we will see from interview transcripts below, this is a particularly powerful knowledge culture in the farming context. As seen in Chapter 5 (page 99), Black (1970) observed that ‘the complex set of attitudes, values and beliefs that people carry in relation to the land and its use are generally inherited unwittingly; are generally unquestioned…’ Nowhere is this inheritance more true than via a family farming environment.

The family clearly has a powerful influence on personal construct formation, and Personal Construct psychologists Procter and Parry state that not only does ‘the family act as mediator
between society and the individual, but that in our society it is the earliest important arena in which the process of construct formation takes place’; and that ‘the family provides validational evidence for a whole range of constructs; physical, psychological and ideological’ (Procter & Parry 1977: 160-161).

Family farms are often handed on for a number of generations, and traditionally (including today) in a patriarchal fashion. Knowledge concerning the land itself, the seasons and other matters, and particularly farming practice is imparted to successive generations by usually the father or a male relation who manages and works the farm. Such knowledge involves paradigm approaches (such as that of industrial farming), but also a range of attitudes, cultures, habits, ‘unwritten ground rules’; ways of doing things and perceiving in regard to land-use; reliable sources and pathways of information. The family ‘heritage’, ‘name’, or the family’s place within a local community and how the family, individuals within the family, and others perceive its situational aspect, is also part of this historical accretion of knowledge and learning. Family ‘knowledge’ therefore sits between the individual and community knowledge cultures, but interacts closely with them. The examples below illustrate this.

**Interviewee # 67** (wife): ‘It’s pretty hard to change [on a family farm]. It requires energy, capital, and there is a risk…the older generation needs to be able to change.’ Her father-in-law, who was an immigrant and thus made one big change, was flexible and open to further change: ‘There wasn’t any generational hang-ups…he had nothing to lose.’

**Interviewee # 63** (male): ‘Family farm inheritance doesn’t allow people to take as much risk. They’ve got someone – an older person – looking over their shoulder who’s not going to let them.’ He cited a local fire captain whose every radio direction was relevant to his own farm. ‘The world revolves around just their one little place….People are chained to their land…generational family tradition. They’re living someone else’s expectations’.

**Interviewee # 64** (male): ‘There’s a strong sense of place here which is shared through all the generations of the family. But I’ve got this theory that the more dysfunctional and fucked a family is, sometimes the stronger the sense of place…it’s hard won, maybe not in an economic sense, but in an emotional sense, you know?’
**Interviewee # 56 (male):** ‘My father was a vet…and Dad was very open to new and different ideas and encouraged this…But there’s an impending tsunami in family succession [in Australia generally]. GFP [Grazing For Profit – a training course] forced us to actually sit down as a family and talk – because family succession in the bush is huge. It has human, psychological, financial and ecological health impacts across generations…..I was really keen for ‘J’ [his wife] to do it [a GFP course], because if we were going to run this business together, we really had to be able to talk the same language and have the same thought processes.’

**Interviewee # 50:** (Father): ‘My father and grandfather had a great skill-base…so the concept of grazing in natural areas is hereditary…there’s a lot of knowledge there if you go right back…they were sensitive to native bush and sheep etc…that’s the way they ran this country; that’s what made it…it’s been passed on…the family letters show the strength of the attachment between them and the land.’

(Son): ‘Anyone who comes onto a farm inherits what’s there…you see all the work that’s gone into it…grow up in it.’

**Interviewee # 25 (female):** ‘These old thought patterns and problems…it goes back to their background knowledge that they’ve inherited…generations of environmental conditioning and inherited genetic thought patterns.’

**Interviewee # 30 (female):** ‘My father, grandfather, were interested in birds…that was an influence’ (on her biophilic sensitivity).

**Interviewee # 14 (male):** ‘W.A’s a bit more innovative, not as conservative, because our culture here is only three generations at most; we’re not as established and historically more conservative.’

**Interviewee # 40 (male):** ‘”XX” constantly criticises me … but he can’t make the changes. It would tell everybody that he was wrong…he could never do that in front of his grand-kids…It’s a pride thing…Culture and pride are big barriers to change. Culture can be within a family, district, community.’
Knowledge Culture #7 of 8: The Transcendent

We saw in Chapter 2, and based on the holistic field of the Sustainable Livelihoods Approach, that spiritual capital has been added to the resources both available to, and regarded as important for, agriculture. In this context spiritual capital is defined as comprising concepts of spirituality, and spiritual health, diversity, meaning and integration relevant to indigenous and non-indigenous groups or individuals, and includes traditional, private or collective spiritual, mystical, world-view, empathic and transcendental beliefs and practices (Love et al. 2011; Berry 2009, 1999, 1988; Gibson 2009; Delio et al. 2008; Moseley 2008; Pepperdine 2000; Suzuki 1997; Collins 1995; Hamilton 1994; Berman 1981; Dubos 1972).

In the modern industrialised, scientific and economic rationalist world, and indeed within the scholarly paradigms and humanist traditions of academia, issues like a spiritual or supranormal dimension are rarely acknowledged. Yet, as many authors have shown (see for example Arabena 2010; Gibson 2009; Schaefer 2009; Berry 1999; Suzuki 1997; Collins 1995; Knudtson & Suzuki 1992; Sheldrake 1991; Fox 1988; Berman 1981; Frazer 1974; and Passmore 1974), this area of knowledge is not only a vibrant knowledge culture of the human experience, but the majority of the globe’s population today (and especially in past millennia) participated, lived, and gained daily meaning and reality from within this knowledge culture. We should not be surprised it has surfaced in the field of transformative agriculture, where paradigms have been overthrown and where there has been a major turn to the new-organic.

The latter is a crucial point. For millennia prior to the shift to the mechanical metaphor in Western society (including in agriculture) that followed the scientific and industrial revolutions and Enlightenment, not only was thinking couched in the organic, but most aspects of rural society (even post the birth of Christ in Christian societies) was immersed in the spiritual, mystical, animistic, holistic, and paganistic. This included a belief in, and experience with, nature spirits (known as sprites, fairies, nature orbs, and a host of other names). This was true of indigenous and early agricultural societies alike (see references above, and Frazer 1974 [1922]). However, as Weber identified early on, a key dynamic accompanying the rise of modern civilisation is disenchantment: the loss of sacred values, mystery, emotion, ethical meaning, and higher causes (Weber 1930; Lange 2008). This is a crucial insight, as it is clear that an overthrowing of the ethical and aesthetic consideration
(and seeing ourselves as set apart from nature) has set us on a dangerous course. Indeed Bateson argued that a loss of a sense of organic unity combined with an advanced technology meant that ‘your likelihood of survival will be that of a snowball in hell’, when what is really required is ‘an ecology of mind’ (Bateson 1972; Fuller 1988).

What then emerged in my research was that as transformative farmers in Australia began changing and evolving a new discourse different to that of the industrial agricultural model, they also turned to the new-organic in language, metaphor and thinking (personal constructs and so on) - as seen in Chapter 7 and this Chapter. In a significant number of cases this was either underpinned by previous religious beliefs (and in particular Christianity), or else involved an exploration (and then embracing) of transcendental areas that emphasise the full use and recognition of the beyond-conscious and/or involvement in areas like subtle energies, geomancy, and other paranormal events/phenomena. In a number of cases a belief in, or experience with, nature spirits and similar supranormal issues occurred. There were also frequent expressions of a deep emotional connection to landscape. In short, by reclaiming the new-organic, the turn to transformative agriculture clearly involved a tapping-into the old organic and beyond-conscious knowledge culture while also blending in new knowledge. The subtle energy experiences, beliefs and practices are dealt with in Section 7.1 (and in greater detail in appendix 8), while examples of the transcendent are listed below.

**Interview # 80** (male): Following major family and financial crisis in early 1991, then a mental breakdown, the interviewee undertook education via Resource Consulting Services and experienced transformative change. Before this, he saw his land turn brown (but not that of his neighbours), which he ascribed to ‘huge negative intent or bad vibes I gave off’ when mentally he was ‘in a bad place’. After his path of learning and change (which included examination of subtle energies) and the spectacular regeneration of his land, the interviewee and his wife late one evening noticed ‘nature orbs’ or ‘nature spirits’ in the air across his land. The interviewee stated that he called these together, and he has ‘before’ and ‘after’ photos of scattered and then concentrated orbs in the sky. For all other intents and purposes this interviewee and his wife appear to be conservative Queensland cattle people.

**Interview # 62** (male): ‘One hundred years ago a farmer, an agriculturalist, was really attuned. There was like a spiritual nature to it, and then science has just pushed all of that
away. I can’t help thinking that that’s one of the keys that we’re ignoring and one – because we haven’t got this transfer of knowledge anymore – that’s been broken down.

**Interviewee # 62** and his wife, as part of their journey, became involved with subtle energies (of the landscape via geomancy; and of the body via the Dawson Method, muscle-testing and kinesiology). ‘This stuff, it’s tapping into your sub-conscious mind and asking the subconscious mind questions…and it’s really just to work out your energy flows in your body…Why it’s gone haywire, and then you can play these different vibrational sounds which then correct the energy flows for you…I’m beginning to understand now that my subconscious is very connected to the earth, but my conscious mind isn’t. So I’ve got to try and tap into my subconscious.’

(Note: **Interviewee # 62** was reductionist-trained in finance and business; rose to senior management in a middle-sized mining company, where he ran a trading desk of over $8 billion, before returning home to the family farm – where he is still strongly business-focussed).’

**Interview # 56:** The statement of this husband and wife is an excellent summary of the journey of change for many of these transformative agriculturalists.

(Wife): ‘With subtle energies, it’s all about the vision…in my mind I can see this healthy, vibrant, flourishing ecosystem and how you do it…we’re saying: “We’re going to make this work.”’

(Husband): ‘We’ve got towers in [energy towers where ley-lines meet]…it’s about intent…it’s extraordinary…it’s observable – ultimately we’re talking about issues of faith here.’

(Wife): ‘These are very old traditional ways of living that have been lost over the years…it’s just bringing it back – so we map-dowsed and then went out and ground-truthed it, dowsed the ley-lines…put in the broadcaster, the biodynamic preps and a letter of intent in the “well”…about earth patterns in the sky being broadcast in the soil, and the atmosphere patterns…and also tapping into the subconscious…You see, a real feel for the land has been bred out of us.’

**Interviewee # 40** (a Holistic Management educator and farmer, male): ‘There’s a spiritual awakening which occurs soon after you’ve identified with the ecology and begin to change your actions to do it…for me that happened to be a Christian spirituality…It’s a progression. ..people begin to change their perspective, then they change their actions to follow the
perspective, and then they become at some stage humbled and more spiritually aware…The Smuts Institute in Pretoria…they noticed holism came to include the spiritual nature of ecology and people’s lives.’

**Interviewee # 38:** (Female): ‘We try and work with the energy systems of the environment …We make all our major decisions on using dowsing – not ley-line stuff – just the link with the animals and the land…we dowse for everything around our farming system…every decision…we dowse for an answer…spin a pendulum…don’t just trust ourselves…we’ve got a bolt on a piece of string or a nut and just ask the question of the universe and to the animals because that’s our link…through the animals…I mean this is starting to sound a bit weird…people just think you’re a complete lunatic… we can’t grasp the possibilities…humans just cannot comprehend – infinite and fantastic because the more we’ve seen the more fantastic the truth has become…you can’t tell other people.’

Interviewee # 38 (a trained physiotherapist and business manager) and her husband are large-scale croppers and integrated graziers, and she summed their approach: ‘It’s not just biological…There’s the energetic and the understandings of the correlations between all those aspects with the livestock as well as the atmosphere and the universe and all the rest of it.’

**Interviewee # 25** (male): ‘You resonate with the energies of your landscape – you become part of it.’

**Interviewee # 67** (male): ‘Everything old is new again.’

**The Distinctiveness of other Knowledge Cultures**

There was ample corroboration of the individual and community knowledge cultures, as each person operating in different knowledge cultures brings his/her life experience and its influences and community knowledge to the table. Also evident specifically among the industrial agriculturalists interviewed was their degree of specialist-institutional thinking: that they emerged as reductionist not holistic thinkers (Knowledge Cultures # 4 and # 5). For example:
Interviewee # 67 (male, regarding biodynamics): ‘I have enough science and knowledge, and that stuff scares me…it’s out on a limb isn’t it?’

Interviewee # 63 (male): ‘It’s essential we have evidence-based agriculture.’

Interviewee # 64 (male): ‘I find myself creating [farming] systems and deliberately pushing in the direction of having less diversity…Obviously I understand the arguments for biodiversity in natural ecological systems and their importance, righto?...But as its applied to farming…we’re in the here and now and we’ve got to make a buck this year. And as long as we’re not limiting our options too much for the future, I’m not too worried.’
(Regarding peak oil): ‘I don’t have answers but I have faith in human ingenuity.’

Interviewee # 8 (male): ‘…the agronomists, and the DPI etc… They won’t accept holistic grazing unless it is proven scientifically…won’t accept practical knowledge.’

Interviewee # 50 (male): ‘People who are working in the extension area think they’ve got to teach you something that they already know…top-down…whereas good extension extends your mind – it doesn’t extend your knowledge.’

Transformative Agriculturalists as Holistic Thinkers (Culture # 6)

What was most noticeable about transformative agriculturalists (by contrast to the reductionist/specialist thinkers in industrial agriculture that I interviewed) was their distinctive holistic thinking and approach to knowledge; and conversely a common scepticism regarding sole or dominant use of specialist/institutional knowledge. That is, transformative agriculturalists incorporated specialist knowledge, but as part of a whole. This also accords with Ravetz’s view of ‘Post Normal Science’.

We know from Brown that holistic thinking and an holistic knowledge culture is least used and valued in Western society, and that ‘the Anglophone culture is much criticised for its comparative lack of emphasis on the use of imagination and creativity’, let alone use of an inclusive language and synthesising mind (Brown 2010b, and citing Hospers 1969). My study of transformative agriculturalists has found the converse: that there is significant emphasis on
use of imagination, creativity, and holistic thinking (supported, for example, by Richards & Lawrence 2009). For example:

**Interviewee # 67** (male): ‘The corporatisation of agriculture is pushing specialisation more and more. You don’t find many corporates who run a mixed farming operation…As soon as you add the complexity of diversification, the corporates just don’t want to know about it….What we’ve done in previous years ecologically…building up ecosystem health and services…it isn’t calculated, it’s never measured…[but] that’s our whole benchmarking.’

**Interviewee # 62** (male): ‘I adapt to the coming crisis [drought, fuel costs] by being very flexible. Agriculture is the most difficult business I’ve seen or practiced. All others are two-dimensional, but agriculture is three. We’re working with the great unknown, nature…but you watch those blokes from Sydney [the ‘corporates’ in industrial agriculture], they’re going to show us how it’s done…nice and neat paddocks…They’ll fall down a hole because they want to control nature….The new agriculture just makes sense…you get a sense of the whole picture…It’s not just bits and pieces….I want to be an agri-culturalist not an agri-scientist…What’s the soil test going to tell me that I can’t already feel?…You’ve got to trust your instincts. I see that as a failing of agriculture, that we keep going back to the numbers.’

**Int.# 51** (male): ‘I could see you had to make a complete change, not a little one…because I look at the big picture…but the whole system takes a long while to get…and if I do something it should have multiple impact, multiple uses, multiple outcomes. There’s got to be multiple things in landscapes…different layers. It’s got to start interconnecting.’

**Interviewee # 59: (Female):** ‘The only uncertainty comes with complexity…the challenge is understanding the relationship between the simple little bits and the complexity of the whole thing…you must manage for the whole system…for your complexity…so while you’re working on little bits, you’re working at a much bigger and more complex animal…You can never understand how their ecology works, let alone what they want or don’t want…How do we know what an eagle does. We don’t need to know [but be creative]…Creative means being able to see possibilities and putting things together in a pattern that makes the most of the possibilities…Our management timescale? It’s forever.’

(Son): ‘It has to fit within the whole thing.’
Thinking Both Holistically and Collectively

As we will explore in Chapter 9, the significance of this expansion of knowledge cultures and knowing (and of their incorporation into collective thinking) has been emphasised by both Watson-Gegeo (2004) and Taylor (2001): and based on new work in the cognitive sciences, neurobiology, psychology, human and child development, first language acquisition and socialization, cognitive anthropology, linguistics, and the critical social sciences. Regarding transformative learning, Taylor says this combined work reveals ‘the need to include practices inclusive of other ways of knowing’ (Taylor 2001: 218), including of the emotional, affective, and beyond-conscious mind.

Figures 8.1 to 8.3 below illustrate the differences between traditional learning-extension under the industrial agriculture discourse, and the evolution to a transdisciplinary approach under the new transformative agriculture discourse.
Figure 8.2

(a) A Transdisciplinary Approach (1)

Collective / Integrated Knowledge

Holistic Knowledge

Community Knowledge

Individual Knowledge

Institutional Knowledge

Expert / Specialist Knowledge

(b) A Transdisciplinary Approach (2)

Transformative Agriculture

'Episteme' Collective / Integrated Knowledge

Transcendental Knowledge

Ecologically Oriented Knowledge

Institutional Knowledge

Expert / Specialist Knowledge

Family Knowledge

Local Knowledge

Figure 8.3

Generalised View of Different Approaches to Extension/Learning in Agriculture

The Dominant Discourse: Industrial Agriculture

Holistic Knowledge

Interdisciplinary Knowledge

Transcendental / Indigenous Knowledge

Specialised Knowledge

Institutional Knowledge

Interacting with historical land-use attitudes

Boundaries largely non-osmotic

A New Discourse: Transformative Agriculture

Individual Knowledge

Institutional Knowledge

Family Knowledge

Local Knowledge

Ecologically Oriented Knowledge

Figures 8.2 and 8.3
8.5. Practical Results of New-Organic Transformative Practices

This thesis does not address the issue of cataloguing quantitative evidence as to the effectiveness or otherwise of the success of transformative agriculturalists in Australia. However, in support of the extraordinary and ongoing shift from the mechanical to the new-organic in both practice and language (and thus personal constructs), there was an abundance of evidence (including physical, quantitative, and financial) that well-managed practices are working, and on large commercial operations in all environments across Australia (depending on the case-study; and see for example McCosker 2000; Savory & Butterfield 1999).

For example, in Case Study #6 (edible shrubs) where farmers have introduced a vertical, deep-rooted component to grazing operations, there was evidence of up to 100% increases in carrying capacity (*Tagasaste* in W.A.), and increased income plus greater biodiversity of biota and synergistic perennial native grass succession (saltbush, central NSW). Results in holistic grazing management have been astounding as 100% ground cover and other management features are implemented, including slashing of overheads (like fuel, chemicals, fertilizers); increased stocking rates and thus greater profitability; greater drought resilience; greater soil rehydration; healthier soils; greater diversity and regeneration in perennial and other desirable grasses, shrubs, trees and other biota; reduced erosion and salinity; and not least, more fulfilling and happier lives. In case-study by case-study similar results are indicated and are increasingly being quantified across the board. Both elements are providing evidence of the positive turn to the ecological in management and accounting, and providing invaluable information for the ongoing adoption of these practices.

**Implicit Ecological Principles Underlying Transformative Agriculture**

There is, as we have seen, explicit and sometimes detailed and sophisticated ecological teaching enunciated by a number of diffusion organisations involved in transformative agriculture (see Section 8.3), and principles that can be garnered from a wide list of commonly recommended/shared readings amongst these communities of practice. But over and above this, it is clear that much of the collection of constructs described in Chapter 7 (Section 7.3: ‘New-organic constructs of transformative agriculturalists’) can be fitted under three key ecological principles and/or naturally observed ecological functions. These
principles range from the physically functional or particular to the holistic or over-arching, and comprise:
(a) that at the physical functional level, four key and interrelated cycles constitute healthy landscape function;
(b) that landscapes and their biota co-evolve; and
(c) that a healthy, non-degraded or regenerating ecological system has a self-organising propensity which drives or inclines that system to greater complexity, greater interdependence, greater diversity and thus greater resilience. These concepts (and particularly the latter two) have only begun to be fully articulated, explored and understood in the latter decades of the 20th century – a period that coincides with the rapid unfolding and expression of the key case-studies of transformative agriculture studied in this thesis.

(a) *Four Cycles of Landscape Function.*

These comprise the energy or solar cycle, the water cycle, the mineral cycle, and the function of biodiversity in a landscape or ecosystem (Tongway & Ludwig 2011; Savory & Butterfield 1999). The healthy functioning of all cycles hinges on having a healthy soil and active photosynthetic capacity in plants. These principles are actually taught in the main transformative case-studies – such as those of biological agriculture, pasture-cropping, and holistic grazing management.

(b) *Co-evolution of Healthy, Functioning, Diverse Landscapes,* and
(c) *Self-Organising Emergent Systems/Properties.*

These two concepts are joined because they are closely related, as discussed in Chapter 3, Section 3.4. We saw there that self-organising or autopoietic biological/ecological systems, due to their intrinsic internal structures, have a propensity to increase in complexity: where the dynamics of a system tend to increase the inherent order of a system – yielding emergent properties.

As seen in the language in Chapter 7, Section 7.3, the above three key ecological-biological concepts and principles lie behind much of what is seen as the radical new thinking of transformative agriculturalists as they seek to apply regenerative practices. Many
transformative agriculturalists seek to restore landscape function, and they appear to do this by undertaking practice change in land management that allows self-organizing expression to be reasserted in the face of previous deleterious interference that had resulted in land degradation and loss of ecosystem services (and thus destruction of ecological complexity and diversity). ‘Let Mother Nature get on with it’ was a frequent refrain in my interviews.

Conclusions

In this discussion on transformative change in agricultural practice, it became clear that we are not dealing with the traditional model on which agricultural extension is based: that of linear, top-down technology- or new practice extension- adoption. Instead, what occurs is an entire paradigm ‘shift’ that requires a massive change in agriculturalists’ world-views and value- systems, and thus in their entire personal psychological construct system. At its heart this transformative change involves a metaphorical shift from the mechanical to the new- organic.

Chapter 8 presents evidence as to how and why personal transformative change and learning occurred and how the emerging discourse of transformative agriculture has begun to gain serious traction. Disparate pieces of theory and evidence now need to be pulled together, and so through the lens of tightly integrated theory and results, in Chapter 9 I intend to enunciate both the ‘how’ and ‘why’ of transformative change; to set this in the bigger picture; and so explore possible mechanisms that might enable its flourishing.
CHAPTER 9  DISCUSSION OF RESULTS

Introduction

We saw in Chapter 5 that the same psychological, environmental and economic factors precipitated both the American ‘Dustbowl’ and Australian ‘Mallee’ disasters. Regarding the core issue - the misapplication of personal constructs to do with land-use – Jacks and Whyte point out it was techniques evolved by ‘European farmers’ for ‘humid forest soils’ which had been ‘modified in the wrong way by the greater ease with which virgin prairie soils can be exploited by modern methods’. The solution, they said, via ‘a comprehensive plan to rehabilitate the prairies’, ‘[m]ust be mass-psychological’: that the ‘mentality of the farming community must be adjusted in accordance with the nature of the soil, or more accurately, with the nature of the environment.’ They concluded that such an approach was crucial because, while it is ‘difficult to change an ingrained human attitude to the land’, it is ‘easier than to change the climate’ (Jacks & Whyte: 1939: 292; 291).

In one insightful passage Jacks and Whyte go to the essence of what my thesis has now demonstrated. First, that there has been little change in Australia in harmful land-use practices over time despite not just evidence of their role in ongoing land degradation, but also that positive alternatives are available and known. Second, that this is largely due to the retention of seemingly immovable and impenetrable personal psychological constructs. And third, that change can occur in agriculturalists’ personal construct systems, leading to transformational change in land use.

This thesis began with the contention that language doesn’t just differentiate us as humans but also, because we largely speak and think in metaphors, that language is integral to addressing the sustainability challenge and connected wicked problems (such as the degradation of land and ecosystem services). In turn we have seen that this is intimately connected to how we form and/or change our personal construct systems. From this came the thesis question: ‘Regarding transformative change in regenerative agri-cultural systems, is there a closely integrated nexus between discourses, knowledge, power, communities of practices, and personal psychological constructs?’ This chapter attempts to answer that question.
9.1. Key Results

Chapters 5 and 8 are seminal to this thesis. Chapter 5 describes how, from the 17th century to the present, there was a massive shift in Western society from the organic metaphor of the pre-scientific, pre-industrial, pre-Enlightenment and pre-economic utilitarian mind, to the mechanical metaphor or industrial mind. The implications of this for the European conquest of Australia were massive, because the most important thing European settlers brought to Australia was a portmanteau of personal constructs regarding nature, agricultural practices, and indigenous people that (no matter how understandable) were not just inapplicable to a foreign environment and its co-evolved systems, but were deeply embedded in the mechanical mind. This set of personal constructs (historically-derived social constructions) comprised a complex set of attitudes, values, ethics, and beliefs in relation to the land that Black (as we saw in Chapter 5) said were ‘inherited unwittingly’ and were ‘generally unquestioned’ (Black 1970). Black also said such mental baggage was ‘apt to defy analysis’. I believe my thesis disproves the latter contention.

Likewise, in discussing the ‘agroecological perspective’ in history, Worcester said that belief systems were crucial: systems that were ‘more intangible, purely mental type of encounters in which perception, ideologies, laws and myths became part of an individual’s or group’s dialogue with nature’ (Worcester 1990). Never was that more true than in regard to Australian land-use post 1788. When to this European baggage is added the further development and entrenchment of a belief system and its personal constructs inculcated, first, during pioneering and settlement, and then under the umbrella of a dominant industrial paradigm through six succeeding discourse phases of an evolving Australian industrial agriculture, then we are confronted with a collection of very powerful, intransigent, and often destructive personal constructs in relation to Australian land-use. In short, the personal constructs derived from a deeply embedded mechanical mind-metaphor have prevented a regenerative adaptation to the Australian land, its climate, and biota.

This historical process in forming strong personal construct systems meant that the mechanical mind appears to have instilled the following belief systems in Australian industrial agriculturalists:
1. That ‘man’ can dominate and control nature, which is not revered and is regarded as simple and manipulable.


3. An implicit belief in an economic utilitarian-rationalist approach to agriculture, which results in land-use decisions being based on narrow economic criteria.

4. A powerful faith in technology and industrial science which holds that ‘man’ can know everything in order to dominate and control nature, thereby further separating ‘man’ from nature.

In short, as Merchant (1980) summarised, mechanism has rendered nature effectively dead, inert and manipulable from without. This supports Berger’s and Luckman’s contention that the social construction of reality is based on how symbolic and conceptual universes are socially derived from everyday experience, and thus how these function as legitimisations of social values (Berger & Luckman 1966). Regarding the critical restructuring of reality through the machine metaphor, Merchant perceptively concluded that ‘[t]he imagery, iconography, and literary metaphor associated with machines extended the experiences of everyday life to the realm of the imagination, where machines became symbols for the ordering of life itself. Out of such symbolic universes evolve conceptual universes as new definitions of reality replace the old’ (Merchant 1980: 227).

However, as Chapter 8 delineates, what emerged from my research of transformative agriculturalists across a wide variety of agricultural landscapes in southern Australia was that there exists a rapidly emerging, vibrant and diverse range of new and different transformative agricultural practices. These appear to exist as distinct communities of practice, and most contain a distinctive ecological language, personal constructs, and metaphors. These in turn are derived from key innovators and early adopters, and are often facilitated by sometimes sophisticated knowledge diffusion networks and mechanisms.

The distinguishing feature of these transformative agriculturalists is that they have turned away from being embedded in the mechanical mind-metaphor, and have instead embraced a new-organic mind-metaphor. Other distinguishing traits comprise:

- They have undergone a process of transformative learning and change, almost invariably within communities of practice.
Such change has involved a reorganization of their personal construct systems.

An espousal and practicing of an agri-culture embedded in ecology and community (a deep bio-mimicry).

Strong drivers from values, ethics and sometimes spiritual beliefs. This generally involves a rejection of industrial consumer society and its philosophical precepts (such as the ‘growth fetish’), and constitutes a radical change in mainstream Australian agriculture.

Commonly, the use of integrative/holistic and collective thinking across the different knowledge cultures, combined with use of a transdisciplinary imagination. This involves an holistic approach that is prepared to live with and encourage complexity, the unknown, the uncertain and the paradoxical.

A respect and empathy for ‘Mother Nature’ and her self-organising systems that allows adapting and reacting to her in flexible fashion.

In Chapters 6 and 7, I was able to distil the superordinate personal constructs of modern industrial agriculture (the mechanical mind – numbering 20), and of transformative agriculturalists (the new-organic mind – numbering 19). The existence of these two distinctly different discourses and their associated metaphors and world-views provided the touchstone for an understanding of how world-views are transformed via changes in personal constructs and their construct systems. The following sections explain this process.

9.2. Trying to Make Sense of it all: The Integration of Theory

Central to this thesis are the ideas and world-views in agriculturalists’ heads; their personal constructs. But how do we actually socially construct this reality? And where do the constructs come from? For me, George Kelly provided the most apt explanation of the first part to this question: that we socially construct and daily negotiate reality with mental building blocks called personal psychological constructs. Kelly was thus one of the early social constructionists.

The big question for Kelly, therefore, was ‘what can man make of reality?’, given that, as he expounded, ‘the structure we erect is what rules us’. Kelly’s revelation that personal constructs are dichotomous or bipolar explains much about transformative agriculturalists enacting a radical shift in their personal constructs (along with language and metaphor
change). Conversely, those embedded in the ‘mechanical’ channel of the dominant discourse of industrial agriculture are virtually unaware of this different world of ideas and constructs (the antinomies) which their own personal construct system negates. Such personal construct systems and world-views comprise a carefully erected edifice of historically and socially constructed meanings gathered over centuries and refined since 1788 through the six phases of Australian agriculture. This latter point answers the question as to where our personal constructs come from: it is across time and from the society in which we are embedded, including our communities of practice.

It is by understanding personal constructs that we come to realise, as Bannister pointed out (2003), that because two people look through different psychological goggles they therefore respond to the same situation in different ways. This again brings us back to the crux question of why people can put on different sets of goggles in their different social constructions of a bio-physical reality.

We saw in Chapter 3 that one of the drawbacks in Kelly’s work was that he didn’t address the historical and social factors which led to us developing different personal construct systems. I addressed this omission by examining such issues as Khunian paradigms, Foucauldian bio-power and normalization, and the existence of different knowledge cultures.

9.3. The Role of Paradigms, Discourses and Knowledge-Power in Inhibiting Change

I have reiterated in this thesis how, as a species, we have a conceptual system that is metaphorical and thus how metaphors structure our perception, thinking and actions; i.e., how metaphors are at the core of our personal constructs. In considering Kelly’s contention that personal constructs are dichotomous we can understand where Thomas Kuhn’s concept of *incommensurability* is derived (Chapter 3, Section 3.2). In exposing how a paradigm is a ‘prerequisite to perception itself’, Kuhn, in recognising the importance of language, stated that people from different paradigms are in effect ‘members of different language communities’; or in other words, a paradigm can mean ‘a linguistic framework’. Given our understanding of Personal Construct Psychology, it is clear, as Bednarz (2011) pointed out,
that incommensurability ‘stems from the incompatibility of the core metaphors around which
the intellectual contents of paradigms are organized’.

The concept of ‘discourse’ adds another dimension to that of paradigms in the context of the
nexus of knowledge-power and resistance to change. In defining a discourse as a shared way
of apprehending the world, Dryzek notes that a discourse doesn’t just construct meanings and
relationships but also helps to define common sense and legitimate knowledge, and that ‘each
discourse rests on assumptions, judgements, and contentions that provide the basic terms for
analysis, debates, agreements and disagreements’ (Dryzek 1997). Relevant to the world-
views and attitudes of agriculturalists, as Norton explained, discourses therefore ‘specify
certain things about the way the world is, and those things are taken for granted as the terms
and concept of the discourses are used in language’ (Norton 2006: 17).

So, because a discourse shapes our social construction of reality, the role of knowledge-
power is clearly vital in determining the discourse and thus reality and our personal
constructs. We saw in Chapter 3 (Section 3.2) how a Kuhnian paradigm defines what is valid
knowledge (‘truth) within a particular community of practice, and how it thus controls,
shapes, and constrains those working within a paradigm and their associated language use.
These processes in the entrenchment of the dominant paradigm of industrial agriculture were
well illustrated by my interview results from Case-Study # 12: industrial agriculture (Chapter
6). But the concept of a ‘discourse’ adds more subtle dimensions beyond that of a Kuhnian
paradigm. I have demonstrated that there is a closely integrated nexus between discourses,
knowledge, power, communities of practice and personal constructs; how a discourse
therefore shapes a person’s beliefs, habits, understandings, attitudes, their very rationality;
and thus how it determines their learning or else inhibits learning/change. However, what is
crucial is that people embedded within a powerful discourse can also not be aware of how
power-knowledge shapes their comprehension of reality (their personal constructs).

Foucault is thus seminal to this area of the determination of personal constructs and its
linkage to language, because he saw a discourse as ‘a complex entity that extends into the
realms of ideology, strategy, language and practice’, and that it ‘is shaped by the relations
between power and knowledge’ (Sharp & Richardson 2001: 195). As revealed in Chapters 6
to 8, my research supports this in the context of the dominant discourse of industrial
agriculture. As corroborated by Epstein in her brilliant study of the whaling discourse,
modern power is immersed in the social body; it involves a relational understanding, lodged within the discourse; and that ‘social relations, within particular regimes of practice’ work from the ‘ground up’, and so ‘are both simultaneously the locus of power and the site of the production of meaning’ (Epstein 2008: 3-4).

This relationship of knowledge-power, discourses and communities of practice illustrate Shiva’s ‘Monocultures of the Mind’ where the dominant Western knowledge systems (based on a particular culture, class and gender that has been globalised) first ‘inhabit the mind’, and are then transferred to the ground’ (Shiva 1993). This has relevance for regenerative-transformative agriculture, as, in traditional modern industrial agriculture, other knowledge cultures tend to be excluded, thus inhibiting a capacity for diversity and more complex social-ecological systems.

Perhaps most powerful of the nexus between discourses and personal construct formation in an area like agriculture are what Foucault identified as the hidden, subterranean functions of power and how these functions are usually unrecognised: how they thereby lead to the self-imposition or ‘auto-colonization’ (the socialisation) of the effects of power. This is behind Foucault’s work on how ‘norms’ work in society: what he called normalization. As we saw in Chapter 3, Foucault called this mechanism bio-power: the pervasive organization of our society ‘under the guise of improving the welfare of the individual and the population’.

In Chapter 6 particularly, it was revealed that the processes of normalization and bio-power are relevant in embedding the dominant agricultural discourse of the mechanical-industrial. This is manifested in the fact that the dominant discourse has socialised farmers into its practices because they have imbibed its pervasive norms, yet this power behind industrial agriculture has been largely hidden. The result is therefore both the imposition but also the self-imposition of the beliefs and practices of the dominant discourse.

How then to link this back to land-use practices, personal constructs, language and the propensity to change or resist change? The link is via Kelly’s Personal Construct Psychology and language. As Norton pointed out, our ‘experience is created through language in particular social practices’; ‘we fashion for ourselves a life out of the social resources – the discourses – around us’ (Norton 2006: 16). But, if one reads Foucault’s concept of bio-power too literally, then individuals could be seen as lacking agency. The marriage of Personal
Construct Psychology and discourse theories avoids the danger of this simplistic conclusion because, while social forces create individual experience and behaviour, nevertheless individual actions can modify and transform the social impacts. Thus, through the lens of what Norton calls discourse psychology, in his view discursive practices and individual ‘construing’ (sense making) are different facets of the same phenomena, where ‘both elements are founded in the use of language’ (Norton 2006: 16).

Crucial to this is the understanding that language doesn’t merely represent the world, but rather it is the social conditions (‘the circumstances under which it is possible to have shared meanings which can be communicated in language’) that ‘give rise to the very forms of speech or writing which are possible’ (Norton 2006: 17). That is, our talk and writing ‘are constructed out of existing cultural resources [discourses] which only make sense in an interpersonal context – they do not just have their origin in the heads of individuals’ (Norton 2006: 17).

Ivan Illich powerfully argued that even the function of our schools conforms to a ‘hidden curriculum’: transmitting the established ideology and social structure of society (Illich 1971). Foucault took this further with his concepts of bio-power and normalization. Marrying Kelly, Illich, Foucault and thus Norton’s discourse psychology, it becomes clear that a key way society influences the course of personal construct systems developing via a society’s ideology (or ideologies) is that such ideologies constrain ‘a person to act in a relatively limited set of possible ways’ (Procter & Parry 1977: 163). Through Personal Construct Psychology it is clear we organise constructs in an hierarchical manner, and ideologies determine this and us ‘to the extent to which we internalise the values of the culture’ (Procter & Parry 1977: 166).

In summary, ideology clearly plays a crucial role in the interrelations of meaning and power, thereby ‘sustaining relations of power which are systematically asymmetrical’ – what Thompson calls ‘relations of domination’. Hence Thompson defines ideology as ‘meaning in the service of power’ (Thompson 1990: 56). Crucially, these meanings comprise the meanings of symbolic forms (such as metaphors, practice and exemplars in agriculture) which are embedded in social contexts and circulate in the social world. Coming from a critical inquiry perspective, concerning ideology and language there is therefore a link between symbols and unequal social relations (Brasier 2002). The powerful rural
advertisements and their symbols analysed in Chapter 6 (Section 6.5) demonstrate this. The ‘power’ role of ideology in the agricultural context in maintaining a dominant discourse has also been well demonstrated in the USA by Brasier’s examination of agricultural organisations, and by Wright, who demonstrated the critical shaping role of ideology in the practice and attitudes of tobacco farmers (Brasier 2002; Wright 2005). Wright also found that farmers’ identities were closely linked to these issues.

**Constraints on Adoption**

The way reality is socially constructed via the shaping or imbibing of personal constructs is seen in the way paradigms act as ‘truth definers’; the way discourses function in defining meaning (and also in defining what is ‘truth’) and in shaping world views; and the nexus between knowledge and power (including the role of ideology). Clearly, this deep inculcation of personal constructs via the role of the mechanisms above explains why changing the fundamentals of land-use practice is so difficult, even in the face of obvious evidence as to why this should occur (e.g., in regard to land degradation). It also explains why, because of deeply entrenched personal constructs intermeshed layer upon layer over 200 years, that many non-indigenous Australian farmers still haven’t yet fully adapted to the Australian environment. In other words this bundle of cognitive and affective factors chiefly explains what lies behind constraints to changing land-use practices, and why those embedded in the dominant discourse in agriculture are restricted to one or a few knowledge cultures (particularly the ‘specialist’), and are denied, or not exposed to, functioning in the holistic, transcendent and collective knowledge cultures.

The powerful industrial agricultural discourse and mechanical metaphor (exemplified by its giant trans-national backers and associated practices and technologies) strongly reinforces these restrictions and controls, as is supported by the literature (see, for example, Shiva 2009, 2000, 1997, 1993, 1991; Henke 2008; Levidow & Boschert 2008; Stone 2002; Dahlberg 2001; Wilson & Tisdell 2001; Robertson 2000; Hubbell & Welsh 1998; Lockie 1996; Douglas 1986). It was inevitable that Funtowicz and Ravetz, in opening up the concept of ‘Post-Normal Science’ in 1991, expressed concern at ‘the technocratic view of science’ (its embedding in the mechanical metaphor), and of the ‘industrialization of science’, ‘the growth in scale and capital-intensity of research and its intimate connection with technology and political power’ (Funtowicz & Ravetz 1991: 138).
My research clearly revealed some of the factors, mechanisms and consequences of the action of bio-power and other power functions that helped embed a ‘stabilized mindpool’ in the dominant industrial agricultural discourse and in society (Chapters 6 and 8). Personal Construct psychologist Harri-Augstein’s use of the metaphor of a ‘mind-pool’ is pertinent in regard to the issue of construct embedding. ‘The culture of any given society’, she said, ‘is characterised by a vast array of artefacts; products which represent the ways in which individuals and groups have sought to express and record meaning…These artefacts represent a store-house of society’s strongest and most enduring systems of public meaning; the mindpool of a culture’ (Harri-Augstein 1977: 87). The aptness of this metaphor also lies in its implication of the power of the beyond-conscious in this area of constraints on adoption.

9.4. Knowledge Cultures and their Function

As discussed in Chapter 3 (Section 3.3), as humans negotiating reality and the factor of knowledge-power, we operate within and use different knowledge cultures (six of which have been listed up to now). We saw in Chapter 6 in regard to knowledge, attitudes and approach (and due to background, training and so on), that a major blockage to learning-change and dealing with wicked problems is that people are prone to silo construction within a particular knowledge culture: to paradigm entrenchment. This in turn has a major impact on the formation of personal constructs and their structural organisation. Therefore, in agriculture for example, this can impact on a practitioners’ ontological, epistemological and ethics-values frames and beliefs. The difference between the industrial-mechanical metaphor and that of the transformative new-organic metaphor is but one dramatic example.

However, a major finding from my research is that the transformative shift in thinking which saw agriculturalists turn from the mechanical to the new-organic came about as a result of an holistic synthesis of all the knowledge cultures via experiential learning. This resulted in the creation of ‘collective knowledge’.

The new transformative agricultural discourse has grown out of the dominant discourse of industrial agriculture. It is not just a new invention. In case-studies and practices such as pasture-cropping, biological agriculture, holistic grazing management and agroforestry, for
example, industrial agriculture technology and machinery is regularly used, and previous and ongoing specialist and institutional scientific, agronomic and ecological knowledge is accessed and adapted. These ‘mechanical’ origins of the new-organic mind are also seen in the ongoing use of mechanical metaphors by transformative agriculturalists (see Section 7.2, Chapter 7). But the difference to ‘normal science’ as utilised by transformative agriculturalists is that these knowledge cultures are synthesised with those from other knowledge cultures. That is, they have not just adopted Ravetz’s and Funtowitcz’s concept of ‘post-normal science’, where the latter avoid a ‘dangerously one-sided technocratic view of science’ (Ravetz 1971) whilst also incorporating ethics and values, but they have also gone a step further. Transformative agriculturalists have operated in an holistic knowledge culture. That is, their approach in creating collective knowledge supports not just the work of Brown, Keen et al. but, because they incorporate knowledge across all the knowledge cultures, also that of the approach of transdisciplinarity; of an open transdisciplinary inquiry (see Section 9.6, page 272). Kelly’s description of this process leading to a shift of personal constructs and transformation was that ‘it lets the rain in’. Donella Meadows took this further, and in the context of learning and adoption (see Figure 2.1, for example, page 36), she stated that ‘in the chasm is also transformation’ (Meadows 1997). This incorporation of many knowledge cultures is evidence of an adaptive approach to the complexity of self-organizing systems.

Furthermore, concerning different knowledge cultures, from my interview material it became clear that in agriculture generally the role of a family knowledge culture is critical, thus adding a seventh knowledge culture to this field. But equally significant amongst transformative agriculturalists was the active awakening and exploration of a largely repressed and ignored knowledge culture in agriculture; that of the transcendent, thus adding an eighth knowledge culture. This knowledge culture involves spiritual, indigenous, animistic and other beliefs and knowledge (such as ‘subtle energies’) that were and are part and parcel of an organic world view (especially amongst indigenous and pre-industrial peoples). Clearly, the turn to the new-organic amongst transformative agriculturalists has awoken renewed interest in this knowledge. As we shall see, this is a not unexpected response for a transdisciplinary approach where the imaginative, creative mind taps deep into the beyond-conscious and arouses transcendent thinking and emotions. This in turn creates a space for, and is indicative of, transformative change.
So with this understanding of the central function of personal constructs in Australian land-use, and how, via discourses, they are both shaped and reinforced, we can now see why constraints to land-use change are so powerful. However, by examining transformative change we are able to glimpse a path to the resolution of this impasse.

9.5. Transformative Learning and Change

Perhaps the most startling element of my research is that transformative change in agriculture involves a major shift from the mechanical to the new-organic metaphor-mind. This involves a major cognitive and affective leap that overthrows world-views, deeply held paradigms, attitudes, and a life-time’s training and practice within the dominant industrial agricultural discourse. Crucially this means a complete reorganisation of one’s personal construct system, as the metaphor switch involves pulling down the entire superstructure of one’s personal construct system and re-building it on the supports of new superordinate constructs.

In explaining how an individual’s personal construct system works, George Kelly and associated workers contend that not only are such systems constantly evolving, but that they are embedded in a personal context of meaning defined by its ‘relationships of implication’ to other constructs (Hinkle 1965). This explains why in industrial agriculture, for example, when a farmer is embedded in the mechanical metaphor he consistently (and for consistency’s sake) tends to embrace or follow most of the key concepts and superordinate constructs of the discourse: otherwise disorientation or disequilibrium and discordance is created. But if change is triggered due to a disorientation/disequilibrium which results in a shift to the new-organic, then the superstructure of a personal construct system is torn down and has to be rebuilt. In the case of transformative agriculturalists this means major metaphor and language change, as seen in an amalgamation of the four mechanical-industrial languages into one, and a switch to the new-organic metaphor/mind. Once the new superordinate constructs are in place – the main structural supporting posts and beams – then the subordinate constructs can be added (the cladding, walls, ceiling, and coats of paint). That is, the end result of transformative learning is an overthrow and thus re-structuring and re-ordering of one’s personal construct system.
A key question, therefore, is ‘What triggers change?’ In my research concerning those who experienced transformative change (Chapter 8, Section 8.2), in the majority of cases it was a major life shock that cracked the carapace of the mind to open it to change. The energy from this (as in cracking an atom) fuelled active searching for learning about alternatives to current practices. This is supported by the work of Mezirow (1995).

While ‘shocks’ or ‘disorienting dilemmas’ triggered change in the majority of transformative agriculturalists in my study, there were nevertheless a significant number who came to change via a more cumulative, less ‘shocking’ triggering pathway. In a review of the field, Taylor (2000) concludes that the process of triggering a transformation is complex and includes other contributing, more gradual causes besides just disorienting dilemmas/shocks. One that accords closely with my findings is that ‘integrating circumstances’ play a key role. These are periods where a person consciously or unconsciously searches for something that is missing in their life, and when they find this piece or pieces then the transformative process is catalysed. Mezirow says such change can result from an accumulation of transformations in ‘meaning schemes’ over a period of time (Mezirow 1995: 40). For Mezirow, meaning schemes are ways people make sense of experiences, deconstruct them, and act upon them in a rational way. George Kelly would rephrase this into the language and structure of personal construct systems (see directly). Thus for Mezirow, Transformative Learning means learning to purposively question one’s own assumptions, beliefs, feelings, and perspectives in order to grow or mature personally and intellectually (Mezirow & Assocs. 2000).

Importantly, such ‘integrating circumstances’ or triggering events are often subtle, gradual, and cumulative over a lengthy period of time, and they provide an opportunity for exploration and clarification of past experiences (Taylor 2000). This happens to be my own experience (a combination of recurring drought, mounting debt, and disequilibrium or dissonance over what was happening to our landscape and its biota – as explained in Chapter 1).

In his description of ten phases of transformative change, Mezirow has always emphasised the importance of the first stage of transformative change, that of critical reflection. This, however, implies a largely rationally driven process overly dependent on critical reflection, and at the expense of minimising the role of affective learning (where emotions and feelings play a crucial role in transformative learning) connected to the beyond-conscious development of thoughts and actions (Taylor 2001). Because humans are more than rationally
based we need to acknowledge that transformative learning ‘relies on the affective dimension of knowing, such as developing an empathic viewing of other perspectives and trusting intuition’ (Taylor 2000: 303). Significantly, as we will see directly, these elements are integral to transformative learning within communities of practice. Various studies (cited in Taylor 2000) have shown that critical reflection can only begin once emotions have been validated and worked through; i.e., that feelings trigger reflection.

It was evident in my interviews that the processes which triggered people to undertake a journey of transformative change were often non-rationally based: hard to pinpoint in time; often bound up with high emotional arousal; and seemed to be a mix of the beyond-conscious and intuitive. And this is where implicit memory and ‘non-rational critical reflection’ seem vital.

All this work is tightly intermeshed and congruent with other ontological, epistemological and theoretical lenses of this thesis. For example, it accords with George Kelly’s dichotomy corollary. Kelly found that the negation of the ‘other’ in a bipolar construct unavoidably means the negation or affirmation of a value, attitude, belief or world-view, and so it carries a strong ethical/moral component: an area absolutely crucial when considering land-use change, and which explains why transformative agriculturalists tend to see what they are doing as having strong ethical-moral, earth- and people-saving dimensions. Crucially, this element of a strong ethical-moral component leads to the arousal of emotions. Significantly, the main structural supports of a personal construct system – the superordinate constructs of individuals – tend to also be more ‘value-laden’ constructs (Fransella 2005).

The involvement or elicitation of emotion and the assumption of a strong values-ethical-moral element in transformative agriculturalists was a major finding of my research: epitomised by the high levels of enthusiasm and energy they evinced. As Gersick points out (1991), emotion is the critical motivator to change (see also Russell & Ison 2000b). Conversely, the cognitive confusion and emotional distress at such revolutionary periods leads people to search for answers or to seek help. Importantly, as Gould (1977), Gersick (1989) and others have noticed, when a person (or system) is in transition, confusion can suddenly turn to clarity; that is, as Gersick sums it, the system seems to pivot ‘on the insight around which a new deep structure will crystallize’ (Gersick 1991: 28). Prigogine’s colleague Haken called this ‘symmetry breaking’ (Haken 1981, cited in Gersick 1991), and this
metaphor clearly encapsulates the phenomena of the dawn of insight during transitions. This seemingly instant resolution into a coherent picture was captured by Kuhn as ‘keystone’ pieces; by Gould as ‘key adaptations’; and by Meadows as ‘a click in the mind’. As Gersick concludes, ‘The formation of insight is an important part of revolutionary periods in human systems’, periods that, in terms of self-organizing principles and thus of personal construct systems, deliver new deep structures (Gersick 1991: 30). (See Figures 9.1 and 9.2 pages 274, 275).

Supporting the finding that transformative learning involves a major reconstruction of a person’s personal construct system is Boyd’s work. This confirms that transformative learning comprises a process of individuation. By this he means ‘a fundamental change in one’s personality involving conjointly the resolution of a personal dilemma and the expansion of consciousness resulting in greater personal integration.’ Boyd argues that ‘the purpose of such a transformation is to free the individual from his or her unconscious content and reified cultural norms and patterns that constrain the potential for self-actualization’ (Boyd 1991, cited in Taylor 1998: 13). Moreover, Boyd moves from Mezirow’s focus on autonomy and the cognitive (where the ego is ‘the central psychic player’) to the whole person in society, whereby, through transformative learning, ‘the individual develops a greater interdependent relationship with a compassion for society’ (Taylor 1998: 14). Wilber in turn takes this the next step to include both nature and society (Wilber 1995) and, as we shall see directly, this aligns with the principles of self-organisation and structural coupling. Significantly, it also supports my research findings, namely that a high percentage of transformative agriculturalists – once they had made the change to the new-organic mind – saw their role as extending well beyond the individual farm level and to an intent to have positive impact on their own community, region and wider society.

The Integration of Adult-Transformative Learning

The significance of my application of George Kelly’s social-constructionist Personal Construct Psychology is that it explains how there is a self-organizing psychological system in humans that allows us to fluidly and adaptively react to the world and perceived reality in all its complexity. This has great relevance to the innovators studied in this thesis and thus to their learning and the process of transformative change, as it explains how the new meanings they derive from their new perceptions and understandings of the world are incorporated into
their mind, being, and behaviour after transformative change. Invariably such agriculturalists come to hold a more holistic view of the universe and learning, and thus, as Knowles et al. point out, they tend ‘to emphasise the significance of processes over products and qualitative change over quantitative change’ (Knowles et al. 2011: 23). Importantly, these agriculturalists quickly come to adopt and think in the holistic new-organic metaphor-mind. But of overarching significance is the fact that what I am describing are the principles of a self-organizing system and structural coupling – of which George Kelly’s Psychology was one of the first articulated examples.

Derived, therefore, from leading thinkers dealing with self-organizing systems and ideas on punctuated equilibrium, we know the periods of transition or disequilibrium that are the forerunners to transformative change present two distinct tasks or functions: (1) terminating the old deep structures, and (2) initiating a new one. That is, in this case when the basic psychological structures change, all the premises contingent on them are affected (Gersick 1991). This appears to explain the switch to the new-organic metaphor in the transformative agriculturalist mind, involving a major shift of superordinate personal constructs, and subsequently the attendant adjustment of subordinate personal constructs.

In addition, we have seen from my research that a transformative process of learning that can lead to a radical shift in one’s deep cognitive and affective personal self (the shift to the new-organic mind) most readily occurs, and is consolidated, in communities of practice (i.e., the location of, and a form of, social learning).

From the perspective of Kelly’s Psychology, the role of communities of practice can be seen as a combination of the experience corollary (where personal constructs are both validated but also reconstrued in the light of new experiences) and the commonality corollary (where people employ similar construction processes and so come to share common beliefs and a common language and metaphors). While both involve the process of learning, this nevertheless does not adequately explain the complete restructuring of one’s personal construct system that occurs during transformative learning within a community of practice.

Concerning the multiple processes that trigger transformative change (discussed in Section 9.5 above), from my research interviews it became clear that in almost all cases the result of these processes was the opening of the mind to prepare it for change. As seen in Chapter 8
(Section 8.3), a common feed-back from early adopters in transformative agriculture was that once they experienced a need for change then they began enthusiastically searching for new knowledge, and this led them in many cases to one or more of the various diffusion organisations involved in the field: each of which constitutes a community of practice.

In the people I studied it was clear that these different communities of practice subsequently played the vital role of both providing new information counter to the unsettled person’s previous world-view and paradigm, and then a social reinforcement role in allowing the completion of the other steps involved in transformative learning via participation, thereby nurturing and sustaining transformative learning. It became clear that communities of practice are largely the locus for Wenger’s postulated four functions of learning and the reconstruction of their identity: by integrating meaning (learning as experience), practice (learning as doing), community (learning as belonging), and identity (learning as becoming) (see Figure 3.4, page 66).

The role of communities of practice in transformative change accords with new research in transformative learning, which, as Taylor sums it, reveals that discourse is ‘not only rationally driven but equally dependent on relational ways of knowing’ (where ‘discourse’ here means ‘communicative exchange’; Taylor 2000: 306). The social and subjective elements are clearly seen to provide the conditions essential for that crucial step in transformative change: effective rational discourse. And this is because a plethora of work confirms that relationships (or connected ways of knowing) are conceptualized in a variety of ways: interpersonal support, social support, networking, learning-in-relationship, friendships, and developing trust (summed in Taylor 2000: 306-7). That is, developing relationships with like-minded people is essential for a transformative process to occur.

Other functions of communities of practice integral to transformative learning involved help from others, who assist the ‘changer’ to recognise perspectives and to trust their own values and beliefs. What is vital is evidence that only in such an environment can a person safely explore their own emotions and feelings to affectively learn. And this is where stories, narration, and dialogue are crucial, because they engage the emotions and other beyond-conscious cognitive functions that are so integral to transformative learning.
Russell and Ison encapsulate this within the context of self-organizing systems and structural coupling, and from the basis that ‘what we share is communication of the worlds we experience, we do not share a common experiential world’ (Russell & Ison 2000: 21). Russell and Ison conclude that useful knowledge (knowledge that will lead to satisfying action) is created by the joint action of both parties involved in communication, and it encompasses both scientific and aesthetic judgements’ (Russell & Ison 2000: 21-22).

What is therefore at issue here in the process of transformative learning is the resolution of contradiction. If we consider the journey of transformative agriculturalists as described in this thesis, they have enacted a radical shift in the mind: from the mechanical to the new-organic. This requires a process of fundamental readjustment of personal construct systems, the end result of which is a deep hunger to keep learning. But they need their hand held to manage the contradictions in thought and emotions as they undertake their ‘revolutionary journey of exploration’. (See Figure 9.2, page 275).

As seen earlier (Chapter 6), Yi-Fu Tuan pointed out that the resolution of contradiction in human societies generally occurs via such things as myth, narration and geometric figures. This resolution of contradiction for agriculturalists undergoing a transformative learning process is clearly one of the most vital roles of communities of practice. Symbols (like energy-towers, the soil food web, grazing charts) and metaphors have evolved and are evolving; story, narration, the role of exemplars is critical; and, in areas like biodynamics, Steiner’s narration myths are central. But all are facilitated via communities of practice. Learning (or imbibing) the specific language of a community of practice (and the more general and encompassing language and metaphors of the new-organic) is integral to this resolution-of-contradiction role.

What is also relevant concerning the roles of communities of practice, is that they enable unsettled, searching, disoriented change-seekers to explore and encounter (in a non-threatening environment) other knowledge cultures, and, over time, to amalgamate these into an holistic, integrated, transcendent approach to knowledge. This often seems to occur via a collective approach which consolidates the entire reconstruction of the personal construct system in the turn to the new-organic mind. Thus it is communities of practice that facilitate the process of transdisciplinarity: of the creation of a collective knowledge.
Concerning the process described above, and based on a wide survey of new work across multiple disciplines, Watson-Gegeo observed that ‘epistemological agents are communities rather than individuals. In other words, knowledge is constructed by communities – epistemological communities – rather than collections of independently knowing individuals’, and that ‘such communities are epistemologically prior to individuals who know’. Therefore, concludes Watson-Gegeo, ‘cognition is socially constructed through collaboration’ – what are called distributed cognitions (where ‘every cognitive act must be viewed as a specific response to a specific set of circumstances’ (Watson-Gegeo 2004: 335, 333, 338, and citing Resnick 1991). In other words, ‘[e]verything occurs in and is shaped by context’, and that ‘there is no activity that is not situated’, whereby ‘the whole person is involved in learning’ (Watson-Gegeo 2004: 338).

These concepts pose an enormous challenge to the cult of reason in Western culture and philosophy (the privileging of just one specialist knowledge culture) and explains why transdisciplinarity works in ‘epistemological communities’ that embrace inclusion of all knowledge cultures.

9.6. Pulling it all Together: The Meta Themes of Transdisciplinarity and Self-Organization

As summarised in Section 9.1, the approach of this thesis is one of open transdisciplinary inquiry, where ‘open’ means not bounded by privileging any specific discipline or knowledge culture. Both my approach in this thesis and clearly also of the leading innovators and early adopting transformative agriculturalists is one that is holistic in the fullest sense; i.e., by attempting a fusion of disciplinary knowledge with other forms of know-how to create a new hybrid which is both different and more than the sum of the constituent parts (Lawrence 2010). Integral to this fusion and hoped-for insight is the use of the imagination, associated with creativity, vision, originality and also with explicit and implicit memory perception and invention (Brown et al. 2010a & b; Taylor 2001, 2000; Ravetz 1997). The relevance of this is that I am studying complex and perverse wicked problems (humanity’s sustainability challenge, and degradation of land and ecosystem services), and the approach of transdisciplinarity seems best capable of successfully addressing these by providing the creative spark for an inquiry into complex systems. Concerning Kolb’s experiential learning
cycle (discussed in Section 3.4), this includes adding something beyond the ‘what can be’ question: i.e., the challenging ‘What if?’

While we saw in Chapter 3 that Kolb’s adult experiential learning cycle accords with modern thinking about complex systems using soft systems thinking methodology, it was Gunderson’s and Holling’s work in Resilience Thinking and Panarchy (Section 3.1, and that specifically looked at change in complex social-ecological systems), which proved fundamental to this thesis. That is, they saw a key driver of non-sustainable human behaviour as being due to our misconceptions about how the world works: where in farming, for example, this has meant inappropriate and maladaptive discourses regarding landscape and bigger systemic and biological function. Key to this thesis, therefore, is Gunderson’s and Holling’s conclusion that the dynamic systems-thinking approach which best explains the functioning of complex social-ecological systems (and key also to resolving key paradoxes involved in these, as found in wicked problems), was what they call the Nature Evolving approach.

Holling and company describe the Nature Evolving view as one ‘of abrupt and transforming change. It is a view that exposes a need for understanding unpredictable dynamics in ecosystems and a corollary focus on institutional and political flexibility.’ The theory/approach thus seeks integration, first, of the dynamics of change across space and time, and second, across disciplines (or what they call ‘interdisciplinary integration’) (Holling, Gunderson & Ludwig 2002: 14; 22) – in effect, of transdisciplinarity. That is, Holling, Gunderson et al. have taken thinking on change in complex systems from the simplistic ‘Punctuated Equilibrium’ thinking (see Section 2.5, page 34, and Figure 9.1 below), and firmly placed it within the evolving framework of the functions of self-organizing systems.

Crucially, Holling and Gunderson have tweaked the Checkland-Kolb learning cycle into a modified heuristic model, which serves as a metaphor of the adaptive cycle (Section 3.2; and see Figure 3.3c, page 64). Relevant to this thesis, and as outlined in Resilience Thinking and elsewhere, two of the key aims of resilience management are (1) to prevent a system from moving to unintended system configurations in the face of external stresses and disturbance; and (2) to nurture and preserve elements that enable the system to renew and reorganise itself following a massive change; i.e., to preserve the system’s capacity for self-organization and
expression of emergent properties (Walker & Salt 2006; Walker et al. 2002). (See Figure 9.2 below).

**FIGURE 9.1. Simple Punctuated Equilibrium of a System**

Figure 9.1
What stands out here from my research and delineation of the ecological principles underlying transformative agriculture in Australia (Section 7.3), is that they are in complete concordance with the *Nature Evolving* approach. Over and above implicit acceptance and part understanding by transformative agriculturalists of the functioning of holistic complex systems, these comprise three key principles: (1) an acceptance of the four cycles of landscape function; (2) the co-evolution of healthy, functioning, diverse landscapes and their biota; and (3) the overriding principle of an acceptance and implicit understanding of self-organizing, emergent systems/properties across both time and space. With this goes an overpowering ethical approach to restoring landscape function by letting ‘Mother Nature’ get
on with self-organizing to greater complexity via the expression of emergent properties, and, through thus improving landscape function and soil health, to correspondingly improve human and community-social health. And because of structural coupling in complex systems, transformative agriculturalists find that they are constantly innovating and adapting as they apply new transformative practices in their landscapes.

Their ethical-philosophical approach, and the polar-reversal turn to the new-organic, concomitantly means strong affective learning and functioning, and thus the expression and utilisation of emotions, feelings and other knowledge/experiential aspects. In turn this relates to the issue of the utilisation of all knowledge cultures as part and parcel of a transdisciplinary approach. The very existence of the new transformative agricultural practices and the eclectic nature of the learning processes leading to their emergence supports the proposition that ‘we are capable of thinking in different languages of all possible knowledge cultures’ (after Keen et al. 2005).

Clearly, what I have described here is that the leading innovative transformative agriculturalists in Australia have, without knowing it, exemplified a sophisticated and
integrated use of transdisciplinarity in approaching the wicked problems of the sustainability challenge and of degradation of land and ecosystem services. They have exemplified and practiced all the key elements of an open transdisciplinary inquiry:

- They iteratively and adaptively work with and within complex social-ecological systems;
- Their approach is strongly grounded in ethics and values designed to both challenge existing paradigms and to change their social-ecological environments and systems;
- They are holistic thinkers, in that they do not operate in silo knowledge cultures, but combine and utilise diverse knowledge, skills and other know-how to create new fusions of transcendent understandings that are greater than any of the parts. The knowledge cultures (mind cultures) utilized include: the (1) individual; (2) family; (3) community; (4) specialist; (5) institutional; (6) holistic; (7) transcendent; and thus (8) collective;
- Through their involvement in communities of practice (the key sites of transformative learning), they exemplify, practice, and foster many of the sophisticated elements of an open and collective transformative learning;
- They exemplify the use of the imagination (of creativity, new insight, vision and originality) combined with memory perception and invention. This therefore includes not just the cognitive but also the intuitive elements of the creative mind that taps deep into the non-rational cognitive functions, emotions, the ‘beyond-conscious’ and affective mind, and thus also implicit memory. It is this combination that delivers often unexpected solutions; and
- The combination of the above features (of an open transdisciplinary inquiry) in synergy with the imaginative spark, and by empowering the full functioning of nature’s self-organizing propensity to work towards greater complexity and to evolve emergent properties, has delivered profound solutions to such wicked problems as degradation of land and ecosystem services in Australia.

This is powerful proof of the efficacy of the approach of transdisciplinarity in handling wicked problems.

9.7. Extending the Imaginative Boundaries

The Role of Language in Self-Organizing Human Systems

Supporting the new holistic solutions from this approach of transdisciplinarity is the concept of emergent properties. *Emergence* has been defined as ‘the arising of novel and coherent
structures, patterns and properties during the process of self-organization in complex systems’ (Goldstein 1999: 49; see also Corning 2002). This was exemplified in my research, for example in the emergence of better adapted plants and animals because of a process of co-adaptation in the newly regenerated landscapes and social-ecological systems (and via such mechanisms as epigenetics): what I describe as adaptive landscape genomics (Section 7.3).

This feature, as an expression of emergence, supports Maturana’s and Varela’s concept of structural coupling: that humans co-evolve with their environment rather than adapt to it, and that this doesn’t just apply to a transformative agriculturalist’s plants and animals under their management hand, but also to themselves. This is because their own cognitive-neural system is dynamically connected to, and evolves with, the very environment they are manipulating, changing, and allowing to be self-organizationally expressed. When Lynn White stated that our ideas are part of the ecosystem we inhabit (White 1967: 1203), he was only touching the surface. While modern humans don’t see themselves as so immersed, this nevertheless is because we are so conjoined with our world that we (our bodies, brains, emotions, beyond-consciousness) are an integral component of a constantly evolving system complexly interconnecting both within ourselves and the rest of the indivisible environment around us.

For example, when transformative agriculturalists work with subtle energies of ‘earth’ and ‘mind’ to allow emergent properties to operate/appear, this new but old knowledge can be seen as being part of their co-evolving systems. This is holism at a depth and complexity hitherto beyond the apprehension of the mechanical mind, as reigns in industrial agriculture. It is truly of the new-organic.

In the context of agricultural change, this concept of emergence and of autopoiesis (the process of perception arising from the systemic operation of a living organism coupled to its environment) has major implications for issues like adult learning and social and transformational learning; the concept of communities of practice; and for a theory like Kelly’s Personal Construct Psychology. What Kelly described in 1955 was a self-organizing system of human psychological processes, and the concept of self-organization explains well how humans can adjust and restructure their personal construct systems in response to an interactively changing environment and ideas concerning this. Thus Maturana’s and Varela’s cybernetic explanation of operational closure (where, regarding our nervous system, outside influences trigger it to change itself in ways determined by its own self-regulating process;
Fell 2000; Varela 1979) elegantly explains not just how humans impose their constructed information (or their meaning) onto the environment rather than the other way around, but also how a person’s personal construct system adjusts and adapts in a co-evolutionary way.

Such a relativity of knowing and the social construction of reality is flagged in physics, sociology, biology, anthropology and other fields by thinkers like Heisenberg, Einstein, Polanyi, Lorenz, Levi-Strauss and others. In Personal Construct Psychology terms this is aptly captured by Thomas who says that ‘[e]ach man and woman is not only a personal scientist but also a personal artist when it comes to the construction, appreciation and revision of meaning’ (Thomas 1977: 50). This interactive embedding in relativity ties in directly with a key theme of this thesis: the role of language and transformational change.

This is because, given operational closure and the implication that the nervous system doesn’t have knowledge of the world outside at any point in time (but only knowledge of its own history of changing connections), then, as Fell points out, the ‘ongoing connection with the outside world is recursive, meaning that its most recent output is the next input.’ Crucially, says Fell, the ‘way in which this recursion is expressed in humans is by a braiding of language and emotion’ (Fell 2000: 504; Maturana 1988; 2002). It is this braiding, this ‘interplay between our use of language and our emotions…which provides the basis for an explanation of understanding’ (Fell & Russell 2000: 36). Fell and Russell therefore conclude that ‘all issues arise in our language and they are only ever resolved in our language’ (Fell & Russell 2000: 36).

This meta context of autopoiesis and self-organisation thus takes thinking about language beyond the old Sapir-Whorf hypothesis (that a language determines the thinking capacity of the speakers), while also putting a new and interesting spin on Wittgenstein’s proposition that ‘the limits of my language mean the limits of my world’ (Whorf 1956, cited in Brown 2010b; Wittgenstein 2001). Therefore this new work across many disciplines (and under the theoretical umbrella of autopoiesis) has major implications for the vital role of communities of practice in transformative change. Regarding the relevance of Personal Construct Psychology, Maturana’s claim that we do not just use language but are immersed in it means that ‘our ever-changing present reality consists of how we describe our experience to ourselves’ (Fell & Russell 2000: 37). In other words, ‘we act according to our current view of the world’, which is both exactly what George Kelly said, and also means that ‘in our use of
language we construct our own reality and we humans have evolved our particular manner of living largely through reliance on the use of language as our principal relational dynamic’ (Fell & Russell 2000: 37).

Both Luhmann (1986) and Capra (2002) have resolved the dilemma of individual people not necessarily being the component parts of social systems, by arguing that it is communications instead that are the component parts. For Capra it is networks via communications, conversations and dialogue that provide the organisational frame. Importantly, this approach in turn implies that meaning is not transferable, but that it arises in the course of conversation; this is supported by evidence from biology which reveals language is essentially connotative rather than denotative (Mingers 1995; Fell & Russell 2000). That is, as Fell and Russell conclude, ‘our whole culture arises through networks of conversation leading to widespread agreement about concepts and values’. This is because the flow of our language and emotions are so delicately interwoven, so braided together, it is ‘only when we dance in the flow of one another’s emotions can we experience understanding’ (Fell & Russell 2000: 45).

**Implications for Transformative Learning**

The implications of this are significant. If one assumes that we are part of a larger self-organizing system (the earth and biosphere) to which we are structurally coupled, then adaptive behaviour assumes iterative adjustment, function and expression of emergent properties to maintain equilibrium/sustainability of such a system. From the above and my research results, this implies maladaptive behaviour involves: the denial and denigration of emotionality and of the strong human seeking for transcendental and immanent meaning; and a denotative use of language, where knowledge is assumed to be waiting to be objectively ‘discovered’. Such a concentration on a restrictive knowledge inquiry approach to reality therefore appears to have resulted in the anthropogenically-caused sustainability challenge now confronting humanity.

The converse to this is the approach of transformative agriculturalists, where there is evidence of an emotional synergy achieved through language, which leads to collective learning and collaborative action. Vital here is the fact that the confidence that comes with new understandings, because of this process, thereby opens up more choices and creates more
possibilities in human interaction, learning and therefore adaptation. As Taylor (2001) affirms, it is emotions and feelings that trigger reflective exploration, and this exploring of one’s feelings leads to greater self-awareness and likely changes in meaning structures. This in turn results in greater self-trust, inner strength and feelings of courage. The evidence from my research clearly reveals that such confidence allows people to make transformative change and apply transformative practices: that it is indeed a function of self-esteem (as a number of my informants indicated). Such behaviour in turn opens up greater choices; this in turn involves a true ethical imperative in terms of being structurally coupled to one’s environment in adaptive fashion, and to addressing the sustainability challenge confronting us.

Regarding transformational change and learning, we have seen from the evidence of my thesis how the overlooked emotional component in human behaviour, learning and language is enormously significant. Part of this links back to our personal construct system, where, when our core constructs (those relating to us understanding and predicting ourselves and our behaviour) are challenged regarding a change in our self-image or identity (a key part of transformative change), then key emotions are aroused: threat, fear, guilt, shame, anxiety, hostility, but also excitement, enthusiasm and/or euphoria.

In raising this intimate braiding of language and emotions, Fell has touched on the central issue at the heart of this thesis: the role of language (especially regarding transformative learning and change). He cogently summarises the overwhelming significance of the key implications of new cognitive sciences for the role of language and its acquisition, and, from this thesis’ point of view, particularly in the context of communities of practice and transformative change:

- ‘perceptions arise in individuals as a result of networks of ‘conversation’ (which includes talking, reading, thinking and a significant non-verbal component)’;
- ‘the networks of conversation, in time, become the culture for that society, which then facilitates certain communications and limits others’;
- ‘cultural change results from ongoing networks of conversation, mainly in small groups’;
- ‘the language used in this conversation is primarily connotative, rather than denotative. i.e. it does not specify objective “facts”. Language is not principally a way
of referring to things; it is the way we coordinate ourselves with one another’ (Fell 2000: 504).

Importantly, according to this view of cognition and biological science, our flow of language is constrained at all times by our flow of emotions, and vice versa. As Fell concludes (and to reiterate his key point), while we may be rational/emotive animals, ‘it is not our rationality that distinguishes us from other animals; it is the way our rationality and emotionality are braided together through the complex language system we have developed’ (Fell 2000: 505). And fundamental in the function of transformational change (as revealed by my study of agriculturalists) is the way emotioning [the flow of emotions] predisposes people to action, particularly via the triggering of enthusiasm (Fell & Russell 2000; Maturana 1988). Crucially, metaphorical language is integral to describing emotions and thus the reaching of agreement about these and associated meanings (as affirmed by Kövecses [1990]) and others).

Kövecses has shown that the ‘shape’ of our understanding is an emotional pattern determined by the metaphorical structure of our language. As Fell and Russell conclude, this has huge implications in agricultural change work because of ‘the powerful self-organizing properties of …metaphorical language’ (Fell & Russell 2000: 44). In other words, we need to understand that effective learning and communication link ‘emotions’ (via metaphorical language in particular) and reflection; this is a reality amply demonstrated by transformative agriculturalists interacting with and within communities of practice. As Taylor affirmed, in allowing the role of the beyond-conscious cognitive processes to operate, and because the transformation process is not just rationally driven, ‘feelings are found to be the rudder for reason, without which it wanders aimlessly with little or no bearing in the process of making decisions’ (Taylor 2001: 234).

This supports Watson-Gegeo’s claims that new research in the cognitive sciences and theories of language across a range of disciplines constitutes ‘the beginning of a paradigm shift in the human and social sciences that is revolutionising the way we view mind, language, epistemology, and learning’ (Watson-Gegeo 2004: 331). Key to this, and linking to the idea of self-organizing complex systems, is the fact that cultural and socio-political processes are central to cognitive development. According to Watson-Gegeo part of this shift includes:
That the body-mind dualism of Western philosophical and mainstream scientific thought is ‘fundamentally mistaken’ – that ‘all cognitive processes are embodied’;

That more than 95% of all thought is unconscious (what Lakoff and Johnson called the ‘cognitive unconscious’), and that this ‘beyond-conscious’ thought, lying outside our awareness, is what ‘shapes and structures all conscious thought’ (Lakoff & Johnson 1999: 13);

That the term mind is better used than cognition (which tends to over-emphasise higher mental functions at the expense of other functions). This shift emphasises the fact that emotions are essential to logical reasoning, including moral decisions, and that emotion ‘links closely with cognition to shape action, thought, and long-term development’ (Fisher et al. 1988, cited in Watson-Gegeo 2004; Taylor 2001). My research supports the relevance of this to transformative change, as it reveals that emotions, the beyond-conscious, and the moral and ethical are integral to both transformative change and in the fundamental shift from the mechanical to the new-organic metaphor;

That cognition has now been expanded to incorporate many other components of human mental life (such as symbolic capacity, self, will, belief, and desire, which relates to the seventh knowledge culture I identified – the transcendent [see below]);

Crucially (and confirming Lakoff and Johnson’s ground-breaking work), language is indeed not only metaphorical but thought itself is metaphorical. This is made possible through categorization that is typically conceptualised as prototypes; many of these categories and prototypes are socio-culturally constructed, and (as we have seen) this occurs within communities of practice; and

That there exist distributed cognitions, whereby people think in conjunction with others; that cognition itself is socially constructed through collaboration (Watson-Gegeo 2004: 332-333). Again, the relevance of this to the role communities of practice play in transformative learning amongst transformative agriculturalists is obvious.

All this is pertinent to my thesis and the way we derive personal constructs, the role of metaphor in these, and that, as Watson-Gegeo explains, ‘knowledge is constructed by communities – epistemological communities – rather than collections of independently knowing individuals’ (Watson-Gegeo 2004: 335). This in turn relates to discourse and power: to who determines knowledge, ‘truth’, and to ideology.
Watson-Gegeo (who built her early research in the Solomon Islands with the *Kwara’ae* people), then raises one further key point: that the vital aspect of human experience still largely missing from the new neuroscience is that of transcendentality or spirituality. In Chapter 2, I touched on the newly incorporated concept of ‘spiritual capital’ in regard to the use of resources available to agriculturalists. This included concepts of spirituality, and spiritual health, diversity, meaning and integration relevant to indigenous and non-indigenous groups or individuals; it also included traditions, private or collective spiritual, mystical, world-views, empathic and transcendental beliefs and practices.

Watson-Gegeo says that reductionist Western science has ‘closed off from reality-grounded science the recognition of the strong human seeking for transcendental and immanent meaning’. Such ‘recognition’, she says, links strongly to the ecological (Watson-Gegeo 2004: 342). This observation is dramatic confirmation of my research findings: that once the turn to the new-organic is made, not only does it usually involve a significant emotional, moral and ethical response, but often also a spiritual response and an exploration of transcendent knowledge. That is, Watson-Gegeo confirms both the existence and the importance of what I term the transcendent knowledge culture. Clearly, as she confirms, the very operating base of this is a new-organic mind.

**Conclusions**

The role of metaphors in language, therefore, is integral to:

- an understanding of meaning;
- learning in communities of practices;
- communication, change, innovation, and transformation; and
- mythology, story, dialogue, values, beliefs, discourse, power and ideology.

Earlier, Bateson (1991) recognised the biological basis to metaphorical thinking (because metaphors can capture the essential similarities of form and pattern), while Krippendorf (1993) found that metaphors can create new realities by the way they ‘organise their users’ perceptions’. Thus Norgaard was absolutely right: that it is through the enlisting of new, and the extension of old, metaphors that we can communicate evolving understandings and design new institutions (Norgaard 1995: 125, after Lakoff and Johnson 1980).
This was dramatically demonstrated from my analysis of the language of the two different agricultural discourses. What the more reductionist, masculine, aggressive, mechanistic, technical, extractive, humanistic, interventionist lexicon of the four languages of the industrial-mechanical revealed (Chapter 6) was their narrower approach to knowledge (and thus to learning). As such this language tends to be excluding by both shaping and restricting the personal constructs, ideas and actions of Australian land-users. As Brown (2008, 2010a, 2010b) has cogently argued, if we wish to constructively address the challenging social-ecological wicked problems of the modern era, then we need ‘the development of an open and inclusive language’ so as to create new ‘avenues for collective learning’ (Brown 2010b).

The antinomies or personal constructs of the emerging transformative agricultural discourse (Chapters 7) – of the new-organic mind - are more holistic, integrative, and nurturing; more feminine and organic, collaborative, sympathetic, and loving. They thus tend to be more amenable to reflection, to collective and transformative learning, and to integrative-holistic thinking. They are also inclusive of elements of other knowledge-mind cultures, including but not only the specialist and institutional.

My research results confirm that language use is integral to personal construct formation, and, via discourses, to not just construct formation but to the exercise of power (such as through ideology). As Norton (2010) commented, ‘language controls reality’, and a key to this is that we do appear biologically programmed to think metaphorically: that discourses can exist ‘as multiple and competing sets of ideas and metaphors embracing both text and practice’ (Hajer 1995: 4). However, while Hajer and others see discourses as contesting, and while there is an element of this in the challenge to a dominant industrial agriculture by transformative agriculturalists, the new-organic transformative agriculture is more than merely ‘contesting’ or ‘opposite’. In having evolved out of the mechanical mind of industrial agriculture, it therefore carries forward the best and most relevant of industrial agriculture’s knowledge. Rather than an issue of ‘black-and-white’ and simply contesting, it is more apt to view the new transformative agriculture as complementary: or, in Kelly’s concept of the antinomies inherent in personal constructs, transformative agriculture emerges as the alter ego or Yin to the Yang of the dominant discourse.
The reality of a new-organic transformative agriculture can therefore be seen as a dichotomous complementarity in the unity of ‘agri-culture’. Thus the lynch-pin finding of this thesis (confirmed by analysis of over 2000 pages of transcripts) is not so much the historical analysis revealing the monumental shift (post the 16th century) from the organic to the mechanistic metaphor in Western European thought, but the fundamental finding that transformative agriculturalists have undergone a life-changing shift, or transformation, to a new-organic (or ecological) metaphor and mind.

What clearly emerges, therefore, is that in the twenty superordinate personal constructs of industrial agriculture enunciated in Chapter 6, and in the 19 superordinate personal constructs of transformative agriculturalists distilled in Chapter 7, lie both the cause and the solution to such wicked problems as degradation of land and ecosystem services in Australia.

So to my thesis question: ‘Regarding transformative change in regenerative agri-cultural systems, is there a closely integrated nexus between discourses, knowledge, power, communities of practice, and personal psychological constructs?’; the answer is an emphatic yes. Clearly the contesting discourse of the new-organic metaphor-mind would seem to provide a touchstone for not just regenerative change in Australian agriculture, but the revelation of a pathway for ‘transforming the earth’ and its self-organizing social-ecological systems to new states of health, balance, and adaptive equilibria: that is, to address humanity’s sustainability challenge.
CHAPTER 10  CONCLUSION

10.1. KEY RESULTS

The Context

This thesis has been undertaken at a time of increasing concern about the global sustainability challenge and associated wicked problems like food security. The magnitude of these issues means it is imperative that we implement radical, different and transformative approaches in the way humanity currently behaves as the dominant species on this planet. A new mind, heart, and thinking are required.

Given its role in feeding humanity, agriculture will be front and centre in helping to address these issues. This is because it is both part of the problem and the solution. Across a wide variety of agricultural landscapes in southern Australia there exists a rapidly emerging, vibrant and diverse range of transformative agricultural practices. These are derived from a group of key innovators and early adopters. They have been facilitated by sometimes sophisticated knowledge diffusion networks and mechanisms; they have triggered major systems changes; and they are producing healthy food in volume while also regenerating landscapes and eco-systems.

The findings from this thesis confirm that such developments result from the experience of personal transformation. I am describing this transformation as a fundamental shift of the modern mind-metaphor: from the ‘mechanical’ to the ‘new-organic’. This shift was dependent upon a restructuring of their personal psychological construct systems, which led to a radical change in their world-views, values, ethics, behaviour, and land-use practices.

The significance of this thesis in identifying this mind-metaphor shift and possible mechanisms to enact this, is confirmation that the future of humanity resides in that ‘one square foot of real-estate between our ears’. The shift of the Western mind-metaphor therefore appears to have both major implications and wider application in a society confronting the urgent need for, and undergoing, transformative change.
The findings of this inquiry into agricultural transformation are summarised under 10 main areas, which are listed below. Each of these has major implications for practice.

1. **Maladaptation and the Need for New Thinking; for a New Inquiry Approach**

   - To address the sustainability challenge will require entirely new thinking. The open transdisciplinary inquiry of this thesis suggests a pathway which could generate such transformational change.

   - This thesis breaks new ground by identifying a number of key factors involved in transformative agriculture at the grass roots that is occurring in widely dispersed areas of Australia.

   - This research disproves a prevailing notion amongst extension workers in the field of innovation that farmers are not the originators of new technologies and/or new agricultural systems. On the contrary, this thesis reveals that transformative change in regenerative agriculture in Australia is largely farmer-derived and driven: that it is a bottom-up, grass-roots process.

   - Crucial to addressing the degradation of land and ecosystem services was the realisation that non-sustainable and pathological human behaviour involves misconceptions about how the world and its complex systems work. The problem lies in the underlying belief systems and world-views.

   - In farming, inappropriate and maladaptive discourses and consequent practices were exemplified by a widespread lack of ecological literacy. Beliefs were found to be deep and multi-layered, and to go to the core of the philosophical, religious and world-view foundations of Western society. They carry enormous cognitive-affective power, and so are not easily changed. However, while such ideas truly are a key part of the ecosystems to which we belong, the thesis results show they can be changed.
2. **Key Psychological Elements of Change: Personal Constructs and Metaphors**

- The units of our thinking and beliefs, and of how we socially construct reality, are our personal psychological constructs. These are the determinants of our behaviour because, as George Kelly said, it is the organisation, structure and entities of our personal construct system ‘that rules us’. These constructs are therefore the units of change.

- Crucial to this change are the social and historical factors that determine our personal constructs, hence the importance of discourses; the role of knowledge-power, and who defines ‘truth’ and ‘reality’. The implications of this are that what we see truly does depend on how and why we look at it, and that our experience is created through language in particular social practices – in this case agri-culture.

- Central to transformative change is that humans largely think and communicate in metaphors (picturable, rationally visible, publicly discussable and debatable analogies). Language and metaphor change was crucial in the transformative change documented in this thesis. Metaphorical thinking links deep into personal constructs, touching deep beyond-conscious, emotional and aesthetic levels. The changing and embracing of new metaphors reconfigured how the participants in this study experienced and understood the world.

3. **Metaphor Switch One: from the Organic to the Mechanical Mind-Metaphor**

- The key touchstone of this thesis and the background to our society’s capacity to address transformative change was the analysis of Western thought in Chapter 5. This established that over the last four centuries the Western mind made and consolidated a metaphorical shift from the ‘organic’ to the ‘mechanical’; to what ultimately constitutes ‘the death of nature’. This entailed a monumental shift of the collective Western mind.

- The personal constructs comprising this mind-shift (and thus the apprehension of reality and how the world works) were brought to Australia post-1788 by Europeans. Subsequent phases of agricultural practice expanded these ‘Key’ constructs, 62 of which were delineated.
• Using the lens of Personal Construct Psychology, subsequent thematic discourse analysis identified 20 key drivers of past and contemporary maladaptive and degrading Australian land-use: the superordinate personal constructs. Understanding these 20 driving constructs also provides a basis for initiating or consolidating transformative change. These 20 superordinate personal constructs of modern industrial agriculture are grouped in four sub-discourses, with an associated language and metaphors: (1) ‘man dominates nature’; (2) agrarianism; (3) economic utilitarianism-rationalism; and (4) ‘science and technology rules’.

• The metaphorical shift in the Western mind from the ‘organic’ to the ‘mechanical’ confirmed an established feature of human thinking and cognition, namely that personal constructs are bipolar (dichotomous), existing in binary oppositions. Because every perception and statement we have is a denial of its other, the importance of a personal construct is not just what it affirms but what it negates. Not only can this impart rigidity to a personal construct system, but it carries a strong ethical/moral component. Crucially, only the individual can take responsibility for this. Regarding farming land-use, this is clearly vital.

• This study has confirmed that the knowledge-power nexus – through such mechanisms as paradigmatic training and Foucauldian discourse behaviour (for example, through training, bio-power and normalization) – proved vital in instilling in farmers the mechanical mind-metaphor and all its attendant personal constructs. Traditional industrial farmers found the antinomies to the mechanical – those of ecological, holistic thinking – ‘unthinkable’ and emotionally challenging (Chapter 6). Clearly, as Kelly predicted, the thinking of such industrial farmers appears to have become ‘channelized’, thus structuring their thinking and limiting access to other ideas.

4. Metaphor Switch Two: from the Mechanical to the New-Organic Mind-Metaphor

• Understanding the basis for a metaphorical switch provides the foundations for transformative change. Since a person’s personal constructs and personal construct system governs what they do, they can only change things by changing themselves. From this came a key conclusion: that to enact transformative learning and change means
recombining and creating new channels of thinking. This means first enacting a fundamental metaphor switch in the mind. In turn, this entails comprehensive change of both superordinate personal constructs and thus the entire structure of one’s personal construct system.

- Supporting the above conclusion, analysis of the distinctively different language and metaphors of transformative agriculturalists revealed they had made such a metaphor switch in their minds (and thus in their personal constructs). I termed the new metaphor-mind the new-organic (‘new’ and ‘organic’ because this thinking involved a combination of original organic thinking-metaphors with new ecological and holistic knowledge).

- By analysing the dichotomous antinomies of both the mechanical and the new-organic mind, and by undertaking a thematic discourse analysis of my interview and other material, I have delineated 19 superordinate personal constructs of transformative agriculturalists. These comprise a unified language, with thinking embedded in the ecological, holistic and new-organic. They thus constitute a transformative change from the dominant mechanical-industrial discourse and its mechanistic, reductionist language and metaphors.

- Involved in this transformative shift is a shedding of the mechanical metaphor. This has meant a rejection of its four core precepts and personal constructs (and thus world-views) by transformative agriculturalists: those concerning ‘man dominates nature’ (of anti-nature, simple nature); of a mal-adapted Euro-centric and agrarian imposition of environmental and agricultural approaches to the Australian landscape; of a narrow neoliberal, economic utilitarian-rationalist approach to agriculture (and such tenets as the ‘growth fetish’); and of techno- or scientific-centrism.

- I therefore concluded that transformative change in agriculture is either unlikely to occur or will not be lasting nor effective without such a metaphorical shift. Clearly therefore, the contention by Black (1970) that the personal constructs of farmers (historically-derived social constructions which comprise a complex set of attitudes, values and beliefs in relation to the land) are ‘apt to defy analysis’, is disproved.
Integral to transformational change was also a strong emotional and ethical-moral component. This appears to be largely derived, first, from a change in metaphors (which link deep into our subconscious, emotional and aesthetic levels), and second, consequently of farmers’ superordinate personal constructs. This study confirmed that metaphors are a vital touchstone of the process of transformation, as they braid our rationality, beyond-consciousness, and emotionality through complex language. This confirms Norgaard’s (1995) contention that, because metaphors ‘can touch us at deep emotional and aesthetic levels’, they ‘can powerfully reconfigure how we experience and understand the world’. Supporting this was the observation that transformative agriculturalists experienced huge emotional release on enacting transformative change within communities of practice. This in turn (via triggering enthusiasm, for example) both predisposed people to, and provided energy for, action.

Confirming the above was my delineation of a number of distinctive new-organic constructs of transformative agriculturalists (Section 7.3). I also found that transformative agriculturalists applied three key principles in their land-use practices (either consciously or intuitively): (1) they try to enhance the four cycles of landscape function; (2) they assume components of natural systems have co-evolved with that system; and (3), connected to (1) and (2) above, they recognise the underlying principle of self-organisation. Integral to the successful application of these principles and regenerating healthy, diverse, functioning soils, is active management of the essential component of ruminant grazing animals in their agricultural systems.

5. **Constraints to Change, and the Role of Knowledge-Power**

Thematic discourse analysis of my research material confirmed that the knowledge-power nexus embedded in discourses is supremely important in entrenching the dominant discourse of industrial agriculture. Such a nexus and its mechanisms defines what is a socially constructed ‘reality’, or what is ‘truth’, and is thus crucial in shaping a person’s beliefs, habits, understandings, attitudes and practices. Some of this is obvious (as in training in a paradigm), but in other cases it is unrealised, unrecognised or self-imposed, as in examples I exposed of Foucauldian bio-power and normalization.
The role of ideology was also shown to be important in the knowledge-power nexus of a dominant discourse. As it is immersed in language and reflects the needs and concerns of the power-holding group in society, ideology clearly shapes individual personal constructs and thus serves to constrain people to behave in a relatively limited set of possible ways whilst internalising the values of a culture. This confirms that ideology sustains asymmetrical relations of domination in a society. In industrial agriculture this penetrates all levels of society. Elements such as ‘productivism’ are clearly ideological.

The interview material also revealed elements that lead to constraints to learning and knowledge adoption in a farming community. These included family factors, tradition and the need for security, peer/district pressure and fear of change, male-female differences, and a lack of ecological literacy. The latter factor inhibits a capacity to change because, for example, in not understanding landscape function farmers therefore cannot ‘read’ either their damaged landscapes or the impact of deleterious practices.

This lack of ecological literacy has major implications at the wider level of addressing broad social-ecological wicked problems: that by not understanding the meta picture of how self-organizing systems work then much of corrective human activity is potentially misdirected or counter-productive. This conclusion confirms that it is the power of the dominant discourse of industrial agriculture (and thus the mechanical mind) that constitutes the largest constraint to changing land-use practices.

Thematic discourse analysis thus reveals discourses are fundamental in agriculture because: (1) they can act as constraints; (2) they are central to power; (3) they are avenues for learning and change; and (4) changing them can therefore be transformational.

6. Transformative Learning and Change

Shock (or a cumulative series of disturbances) in the majority of cases was needed to crack open the carapace of the mind for transformative change. This is further evidence of the powerful nature of both paradigm-entrenched and discourse-embedded personal constructs and their structural systems. However, the features and sequence of transformative change in agriculturalists confirmed that the mind is opened to a
fundamental metaphorical shift. The release of strong emotions during the process of transformative change further confirms this. That the expression and recognition of feelings is crucial to transformative change is supported by recent work in a range of fields concerning the interdependent relationship of emotion, reason, and implicit memory.

7. **Communities of Practice**

- A major finding of this thesis is that communities of practice are both the key locus of transformative learning-change but also of embedding the discourse of industrial agriculture. In transformative agriculture, communities of practice were found to play a crucial role by providing new information counter to the previous world-views and paradigms of unsettled searching people in the process of transformative change. Coupled with this was provision of a social reinforcement role so that people could fully complete the steps involved in transformative learning-change. Confirming Wenger’s, Lave’s and others’ work, communities of practice clearly facilitated social learning through participation. This involves iterative feed-back between people and their environment, allowing the construction and imparting of meaning and of knowledge relevant to a specific context (including the learning of new agricultural practices).

- It was found that the reconstruction of identity and a new perception of ‘reality’ by the learner within or of a particular social community was central to transformative learning and change. Such facilitation of transformative learning therefore, as Wenger articulated, comprises an integration of (1) *meaning* (learning as experience); (2) *practice* (learning as doing); (3) *community* (learning as belonging); and (4) *identity* (learning as becoming).

- Stories, narration and dialogue within communities of practice were integral to transformative learning, as these form common understandings, connections, and coalitions; provide insights and symbolic references; impart exemplars; and hinge around metaphors. Such communities of practice in transformative agriculture have their own common or shared language and lexicon, which is instrumental in developing a shared community discourse.
• Accompanying the metaphor switch from the mechanical to the new-organic in agriculturalists was a shift from reductionist ‘discovery’ knowledge to holistic ‘narrative’ knowledge. This triggers emotions released by both the transformation process and the touchstone of new or key metaphors. This confirms Pretty’s assertion that ‘[a]gricultural systems with high levels of social and human assets are more able to innovate in the face of uncertainty’. The development of a safe environment and of relationships with like-minded people is integral to the process of change, and implicit in these new configurations of social capital is trusting relationships, support, friendship, and high values.

• Crucially, communities of practice allow the resolution of contradiction during the process of transformative change, via the provision of energy-catalysing symbols, metaphors, and narration. These enable the individual to make the metaphor shift in the mind to the new-organic with a concomitant restructuring of their personal construct system.

• Finally, it is communities of practice that facilitate one of the key processes of transdisciplinarity: the creation of collective knowledge. My research revealed that communities of practice proved to be the main vehicles that exposed the learner to other knowledge cultures and to the very concept and process of holistic thinking – elements integral to transdisciplinarity.

8. Transdisciplinarity

• A major finding of this thesis confirms that transformative agriculturalists exhibited and practiced all or most of the features of an open transdisciplinary inquiry; of a transdisciplinarity approach. This occurred without them consciously realising it or even being aware of the concept. Such agriculturalists proved remarkably holistic in their thinking, and were able to access multiple knowledge cultures. This holistic, collective thinking allowed them to switch from the mechanical to the new-organic mind-metaphor, and this occurred either within specific, or across a number of, communities of practice that now exist in Australia.
Another key finding was that the turn to the new-organic created an openness to the hitherto excluded ‘transcendent’ knowledge culture. Facilitating this is that in a transdisciplinarity approach the imaginative, creative mind taps deep into the beyond-conscious mind, and this, when linked to transformative metaphor change, arouses transcendent emotions and thinking and a greater openness to new and even confronting types of knowledge.

The turn to the new-organic mind in transformative agriculturalists, and their approach of an open, collective knowledge inquiry was accompanied by an open and inclusive language (which supports the contention of Brown 2010b). Such language opens up avenues for collective learning and a metaphor shift in communities of practice. Compared to the lexicon of the four languages of the mechanical mind in agriculture, the ecological language of the new-organic mind was more biophilic, empathic, integrative, nurturing, feminine, collaborative, sympathetic and loving, holistic and inclusive. Such a language is also more conducive to reflection, learning and integrative-holistic thinking.

Therefore, with additions, I suggest the key components of an open transdisciplinary inquiry (transdisciplinarity) comprise:

i. Collaborative, creative, higher order holistic thinking which transcends discipline boundaries and privileges none. This means an incorporation of all knowledge cultures described to date (the personal, community, specialist, institutional, and holistic, plus my additions of family and transcendent) to form a ‘collective’ knowledge.

ii. The use of the imagination and beyond-conscious knowledge-knowing (including insight, intuition, creativity, vision, originality, and also explicit and implicit memory), which enables going beyond the question ‘What could be?’ to asking ‘What if?’

iii. The explicit contribution of a values, ethical-moral, and critical inquiry perspective to problem resolution.

iv. Addressing wicked problems within a working understanding of the meta-theory of self-organization in autopoietic systems, and how humans are structurally coupled to their environment. This means the incorporation of a ‘Nature Evolving’ ontological-epistemological perspective (point 10 below).
9. Implications for Traditional Extension

- The evidence of this thesis disproves the dominant view in the extension field that farmers are not the originators of new technologies and/or new agricultural systems. To the contrary, transformative agriculturalists (‘self-mobilisers’ or ‘self-starting insurgents’) follow different pathways of social and experiential learning and change, which occurs in communities of practice outside the traditional extension environment. When considering transformative change, it would therefore seem more desirable to replace the outmoded usage of such terms as adoption, extension, and barriers with a more useful lexicon, such as transformative-change or learning and constraints.

- If, as this thesis contends, what is needed to address humanity’s sustainability challenge is entirely new ways of thinking and learning, then by definition traditional, linear, top-down approaches predicated on technology adoption (and more recently on practice change and knowledge dissemination) will most likely fail. They tend to do so because they do not address the issue of changing superordinate personal psychological constructs, let alone the reorganisation of a personal construct system. Instead, what is required is transformative change, which involves the cracking of the mind’s carapace and a concomitant major metaphor-mind shift.


- While the concept of autopoietic, self-organizing systems was inherent in the ontological-epistemological approach to this thesis, what revealed its importance was the repeated intimation by transformative agriculturalists that they saw their role (as managers of complex-dynamic systems) being to just ‘get out of Mother Nature’s way and let her get on with it’, ‘to take the handcuffs of her’. It was subsequently discovered in extensive field work that they were right. If they stopped harmful agricultural practices and moved to practices that encouraged diversity in their landscapes; if they encouraged the four cycles of landscape function to return to health, then they experienced remarkable and often rapid responses. This occurred, for example, in vegetation regeneration and successional progress to greater diversity and more desirable species and greater
perreniality, along with rapid increases in biodiversity. That is, they were witnessing the arising of emergent properties and a move to greater complexity. The constant iterative adjustments and adaptation required of them in their management of complex systems also spoke of their structural coupling with their environment.

- Remarkable proof of the appearance of emergent properties was the evolution of co-evolved, better adapted plants and animals in the newly regenerated landscapes and social-ecological systems of a number of transformative agriculturalists: of what I term adaptive landscape genomics. This comprised the result of humans and their ruminant animals being adaptively structurally coupled to their self-organizing social-ecological systems.

- This in turn reveals a wider principle lying behind such transformation: that when humans are appropriately structurally-coupled in a self-organizing system, transformative and social learning results. This in turn leads to a shift from the mechanical to the new-organic mind-metaphor (or what has been termed an holistic ecology of mind), associated with a total reorganisation of a person’s psychological construct system.

- Personal transformation and aligned structural-coupling then releases energy and emotion with which to act in transformational ways.

10.2. New Theory Development

- In the approach of transdisciplinarity and one of its central tenets or characteristics – the synthesising of all the knowledge cultures (without privileging any) so as to achieve a collective knowledge – this research suggested that two further knowledge cultures need to be included (in addition to the personal, community, institutional, holistic, and collective): those of the ‘family’ and the ‘transcendent’ (Section 8.4).

- To the current characteristics or tenets of transdisciplinarity, this research also suggested that an additional key element needs to be considered for inclusion as a core element in its theory. This involves the inclusion of the use of principles around the self-organization of complex-dynamic systems (see point iv. On page 295 above).
A key discovery was the appearance of co-evolved, better-adapted plants and animals in the newly regenerated landscapes of transformative agriculturalists. This is termed adaptive landscape genomics: meaning a specific emphasis on, and recognition of, the plastic adaptation, evolution and selection of animals and plants best suited to their environment, and via such mechanisms as epigenetics and other non-additive gene functions (see Section 7.3). These newly selected and adapted animals and plants, in turn, are proof of the appearance of emergent properties where humans and their ruminant animals are adaptively structurally coupled to their self-organizing environments.

10.3. Preparing for Change

Gus Speth recently stated that ‘a system that cannot deliver the well-being of people and nature is in deep trouble. It invites ideas and actions that are transformative’ (Speth 2008: 65).

This raises a key question: given the promising alternative approaches inherent in a regenerative, broad-scale agriculture evolved by transformative agriculturalists studied in this thesis, how does a society accelerate the spread and adoption of these ideas and practices?

The short answer is that transformative change cannot be imposed. People have to be readied for it; to suffer shocks and disturbance that prepares them for transformative change. What best needs to be done, therefore, is to ‘prepare for change’. Thomas Berry called this ‘The Great Work’ (Berry 1999). Milton Friedman (in a broader political context) aptly summed the issue. ‘Only a crisis – actual or perceived – produces real change’ he said. ‘When that crisis occurs, the actions that are taken depend on the ideas that are lying around’, and in regard to such ideas and alternative policies, we need, said Friedman, ‘to keep them alive and available until the politically impossible becomes politically inevitable’ (Friedman 1962: introduction).

In agriculture in Australia, while unable for ethical and practical reasons to actually trigger or attempt to force transformative change, it seems we can nevertheless be proactive in ‘preparing for change’. Such behaviour might include:
• political action to prepare a more level playing-field in the areas of government policy and in R&D and extension support of transformative agricultural practices (see section below on suggested future directions of research);
• education, learning and extension in the fields of greater ecological literacy, Human Ecology, and the practices of an open transdisciplinary inquiry (transdisciplinarity);
• an empowering and funding of grass-roots innovators as teachers so as to spread their ideas and practices;
• support of their communities of practice (as opposed to contestation);
• translated extension work concerning the results of transformative agriculturalists;
• greater understanding (and translation) of the functioning and mechanisms of self-organizing, autopoietic complex-dynamic systems; and
• concomitant with the above, the urgent need for encouraging and empowering social movements attempting to reconnect urban and regional communities to agro-ecology, healthy food, the soil, and nature.

The end result should then be a stable-full of ideas, proven techniques, and quantified data that can be made available when crisis comes, and when ‘shocked’, ‘disoriented’ and ‘unsettled’ agriculturalists and others begin searching for alternatives and so begin a journey of transformation.

**Suggested Future Research Arising from this Thesis**

In addition to the above, the results of this thesis suggest it would be important to conduct further research into a number of key areas which may assist in this ‘preparation for change’, and which could lead to humanity better handling the social-ecological wicked problems confronting us. Suggestions include:

• To conduct objective biophysical research and quantification, and economic quantification, of the practices, results and impacts of different regenerative agricultural practices.
• To conduct research into other agro-ecological practices world-wide, both ancient and contemporary.
• To do further research into the important and newly articulated (i.e. only discovered in this thesis’ research) field of *adaptive landscape genomics* (see #17 page 205), and because this field has the potential for high relevance in the quest for regenerative
agriculture not just in Australia but beyond. This could include an exploration of epigenetic effects and similar co-evolving factors.

- To conduct social research into a third and fourth constituency of farmers only alluded to in the thesis (and beyond (1) the mechanical-industrial, and (2) the new-organic as articulated in this thesis): (3) to investigate why a third constituency of farmers who change practices but then slip-back or creep-back; and (4) to investigate the reasons why those farmers who claim to have made a transition from one set of constructs to another (i.e. transformed their world-views, shifted their paradigms), but then do not feel empowered enough, in the face of external circumstances, to convert their ‘change of mind’ into changed practices.

- In regard to the motivations for transformative change in agricultural practices and systems, there is a need to conduct social research into what are the relative merits of objective evidence for benefits versus beliefs (which could bias the interpretation of subsequently perceived benefits).

- Because of the potential for the wide application of broad-scale regenerative agricultural techniques, further comparative research into parallel international practices in southern Africa, the USA, New Zealand and South America would prove highly useful.

- Research into examining the work of regenerative agriculturalists against the work and frameworks of ‘Resilience’ theory literature (e.g. how do thresholds and changes of state in Australian landscapes fit in?); and also to test the ideas and theories of self-organisation and autopoiesis in the same context.

- To investigate the reported evidence of greater succession, perenniality and diversity in grasses, shrubs and trees, particularly in holistically grazed and pasture-cropped systems. This should also include changes in soil biology and structure. The same applies to a need for investigation of general biodiversity change.

- Further social and case-study work is required on the two proposed new knowledge cultures involved in collective learning and transdisciplinarity: those of ‘family’ and ‘the transcendent’.

- Biophysical and chemical research into the alleged health benefits of food coming off regenerative landscapes by comparison to that off industrial farming landscapes.
10.4. Our Landscapes and Minds as Palimpsests

Because of their existing personal psychological constructs, from 1788 Anglo-European settlers understandably brought a severely limited ‘mind’ and consciousness regarding the new land of Australia. Even 220 years has been too short for most non-indigenous Australians to adapt and to develop an empathic understanding of this new land. Consequently the new settlers created an Anglo-European palimpsest of the Australian landscape: but one whose writing is of degraded or destroyed ecosystems, soil, grassland, and forest. However, the glimmer of hope emerging from this thesis is that the original ‘writing’ of the land – of inherent self-organizing and dynamically complex systems - is not destroyed: that with care, empathic knowledge, respect and ecological sensitivity, the original ‘writing’ of ‘Mother Nature’ can be enabled to materialise and be expressed, and so be ‘read’ again – and in both our ‘minds’ and in our landscapes.

The frontispiece to this thesis comprised two quotes. J.L. Thompson exhorted insurgents to operate ‘in the cracks of society’, and to exercise ‘considerable imagination, critical thinking, subversion and undutiful behaviour’ so as ‘to destabilize and de-construct the authority of the inevitable’: that this would be transformational of both society and individuals. The innovative agriculturalists studied in this thesis have begun this process. They provide a real and achievable pathway to both regenerating landscapes and society while at the same time providing healthy food and ecosystem services for those societies.

But then there is ‘the authority of the inevitable’ (in the words of J.M. Servan in the second quote). As Servan exposed, our largest constraint towards transformative change resides in our collective heads; in our minds and hearts. This ‘authority of the inevitable’ is the result of over four centuries of Western thought which now binds people ‘by the chain of their ideas’, and which has deeply embedded the mechanical metaphor ‘in the soft fibres of the brain’.

What transformative agriculturalists have done is to reveal that such ‘mind-chains’ can be broken through a return to the new-organic. It seems fitting, therefore, that I close by quoting an individual whose mind is deeply immersed in the ancient *organic* – but who clearly spoke in frustration at the eternal ‘gab-fests’ of bureaucrats and other groups attempting to create change, but never seemingly addressing the grass-roots nor the core issues:
Oren Lyons, faith-keeper of the Onondaga Nation – Address to delegates of the United Nations, 1977:

‘I do not see a delegation for the four-footed. I see no seat for the eagles. We forget and we consider ourselves superior, but we are after all a mere part of our Creation. And we must continue to understand where we are. And we stand between the mountain and the ant, Somewhere and there only, as part and parcel of the Creation. It is our responsibility, since we have been given the minds, To take care of these things.’

(Lyons 1977, in Harvey 1997: 14-15)
APPENDICES

APPENDIX ONE: Interviewee List by # Code   (In strict confidence: for examiners only). For Libraries and open access sourcing, identities of all interviewees have been deleted, to comply with the ethics protocol and non-disclosure agreement.

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APPENDIX TWO. Origin of ‘Foundational’ Personal Constructs of Australian Land-Use (From an early, expanded draft of Chapter 5)

*Overthrow of the Organic Metaphor in Favour of the Mechanical 1500-1700*)

| Construct F1 | nature is like a machine. |
| Construct F2 | ‘man’ can dominate and master, has power over, nature. |
| Construct F3 | males are dominant and powerful, females subservient and powerless. |

| Construct F4 | nature is dead, composed of inert atoms or matter. |
| Construct F5 | nature is a chattel. |
| Construct F6 | Nature can be managed and manipulated. |
| Construct F7 | nature is there to serve humans. |
| Construct F8 | female nature is there to nurture the male. |

| Construct F9 | ‘Man’s’ role is to subdue and control nature by wresting secrets from nature. |

| Construct F10 | Machines exist to manipulate nature |

| Construct F11 | Man and nature are separate |
| Construct F12 | it is God’s will that man exploits nature for his own ends. |
| Construct F13 | Natural objects have no feelings. |
| Construct F14 | Man has dominion over nature – he is her guardian and caretaker. |
| Construct F15 | Humans are rational stewards managing nature for its own best interests. |

| Construct F16 | the world is composed of atomic parts and inert bodies in movement in a dead cosmos. |

*Emergence of the Dominant Modern Discourse – the Mainstream Narrative of Western Culture: Science and Technology-based Mercantile Capitalism*

| Construct 17 | reason is the supreme good. |
Construct F18 – rationality, objectivity and science – not theology, spiritual or other knowledge – explains the natural world.

Construct F19 – ‘man’ is at the apex of creation and so the earth is a purposeful creation for the human species.

Construct F20 – ‘man’ has the capacity to transform and improve a manageable nature.

Construct F21 – ‘man’ is an outsider to nature and so nature is alien to ‘man’.

Construct F22 – nature, being alien, *terra nullius*, and mindless mechanism, is available for annexation, utilitarian purposes and for human gratification.

Construct F23 – man can master and possess nature because it and its organisms have no soul or mind.

Construct F24 – as nature is a machine, she is subject to, able to be broken down to, simple mechanical laws.

Construct F25 – like nature, the economy and society worked according to mechanical laws.

Construct F26 – a mechanical nature (and the animals and people dependent on her), being empty, lifeless, homogenous, passive and with no agency, was available for commercial annexation, division, exploitation and/or sale.

Construct F27 – enclosing land and dead, inert ‘nature creates property ownership and wealth.

Construct F28 – the creation of private property with labour, leads to civilised society.

Construct F29 – progress is good and a given – civilisation moves in a desirable direction.

Construct F30 – an ever increasing accretion of new objective knowledge underpins progress.

Construct F31 – inanimate, mechanical nature is the raw material for wealth creation through ‘improvement’ via human agency (labour and entrepreneurial behaviour), science and technology. There are no moral/ethical restrictions on this.
Construct F32 - the power of humans and ‘reason’ is limitless in managing the world and reality.

Construct F33 - the scientific method is the only way to gain knowledge and truth.

Construct F34 - other knowledge cultures are inferior – they have no value.

Construct F35 - the functions of nature and the operation of ‘blind chance’ are of no account besides scientific knowledge and the power of humans and technology

Construct F36 – The cosmos, nature, society and human body are ordered systems of interchangeable atomized and mechanical parts that can be repaired or replaced from outside (the technological fix). They are able to be governed by law and discerned and predicted through deductive reasoning. They are not part of a wider organic whole.

Construct F37 – events that can be described can be controlled.

Construct F38 – ‘civilised’ Europeans are over, or superior to, colonised/indigenous People, just like man is ‘over’, or superior to, woman.

Construct F39 – nature has no needs nor organising function of its own.

Construct F40 – Matter is composed of particles (the ontological assumption).

Construct F41 – The universe is a natural order (the principle of identity).

Construct F42 – Knowledge and information can be abstracted from the natural world (the assumption of context independence).

Construct F43 – Problems can be analysed into parts that can be manipulated by mathematics (the methodological assumption).

Construct F44 – Sense data are discrete (the epistemological assumption).

Construct F45 – nature is a reserve, a storehouse, available for human use.

Personal Construct Formation in the New Era of Mercantile Capitalism Prior to Australian Colonisation (1700-1850)

Construct F46 – privatisation gives individuals power over the land.

Construct F47 – nature, being a chattel, inert and un-sacred, is a utility – purely for use
and profit-making.

<table>
<thead>
<tr>
<th>Construct F48</th>
<th>labour, nature and land are commodities.</th>
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<tbody>
<tr>
<td>Construct F49</td>
<td>land can be parcelled, divided and sold.</td>
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<tr>
<th>Construct 50</th>
<th>purchase of land and ‘ownership’ confers absolute rights of property.</th>
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<tr>
<td>Construct 51</td>
<td>land values can be determined by factors beyond actual or potential use.</td>
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<tr>
<th>Construct F52</th>
<th>care of ‘nature’ is irrelevant to the process of making a living; to profit-making and land-use.</th>
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<tr>
<td>Construct F53</td>
<td>nature is nothing special – not mystical; it has no spiritual or mythical connotations; it has no enchantment.</td>
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<tr>
<th>Construct F54</th>
<th>land is a factor of production.</th>
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<tr>
<td>Construct F55</td>
<td>a piece of land gives a family security.</td>
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<tr>
<td>Construct F56</td>
<td>land means liberty, freedom and equality.</td>
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<tr>
<td>Construct F57</td>
<td>a piece of land is magical – it promises ‘Nirvana’ and ‘the good life’.</td>
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**Personal Construct Formation in the Era of British Imperial Invasion/Conquest (1700-1900)**

<table>
<thead>
<tr>
<th>Construct F58</th>
<th>all resources – natural, material, human – are exploitable</th>
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<tr>
<td>Construct F59</td>
<td>a Christian people (especially if British) are at the apex of civilisation – superior to ‘primitive’ people.</td>
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<tr>
<td>Construct F60</td>
<td>‘primitive’ people can be conquered and made ‘subjects’. They need ruling because it is a moral duty and imperative to ‘civilise’ ‘primitive’ people.</td>
</tr>
<tr>
<td>Construct F61</td>
<td>faith, the spiritual, can be replaced by reductionism: by observation, experimentation, measurement and rational proof as the basis of secure knowledge.</td>
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</table>
Construct F62 - foreign, new worlds are available for conquering, annexing, dividing and exploiting, and map making and surveying are necessary for this.

Construct F63 - conquering humans from the imperial centre have divine authority – to do with the conquered land, resources and people as they wish.

Construct F64 - the new *tabla rasa* continent of Australia is available for the *de novo* reconstruction of society.

Construct F65 - The naming of the earth’s contents via map-making means availability for appropriation (the deployment of power).

Construct F66 - surveyed lines denature and take the mystery out of nature and the landscape, and can be imposed on the landscape – irrespective of its form, function and integrity. By implication, the inert, inanimate land has no diversity, complexity, no self-organising function.

Construct F67 – maps, as a weapon of imperialism, undergird state and capitalist power.

*Personal Construct Formation at the Collision of Western Europe and the New Land, Indigenous People and Biota of Australia (1788-1900)*

Construct F68 – the new lands of Australia are all an exploitable resource, to be parcelled as capitalist factors of production.

Construct F69 – the new lands and resources of Australia are limitless and there for the taking.

Construct F70 – Australian resources are for profit and export to England.

Construct F71 – under *Terra Nullius*, because the Aborigines are primitive and uncivilised and because the land is therefore unoccupied and belongs to no one, it is
An Alien Landscape to the Anglo-European Eye

**Construct F72** - being alien, strange, and un-European, the new land has to be dispassionately tamed and moulded into a proper landscape.

**Construct F73** - the Australian climate is abnormal – a European-like climate is ‘normal’.

**Construct F74** - droughts are aberrations.

**Construct F75** - Australian soils are no different to the humid and rich soils of Europe — and so, with ‘normal’ rain, can be treated the same.

**Construct F76** - to ‘civilise’ the new land and make it normal and familiar, English-European animals and plants need to be introduced.

**Construct F77** - European agricultural plants, animals and farming systems can therefore be applied to the new land.

**Construct F78** - Australian native grasses are inferior and unsuited to a civilised, modern agriculture.

**Construct F79** - Australian nature is the enemy.

**Construct F80** – despite its uniqueness and differences, Australia still experiences the four European seasons.

**Construct F81** – Australia’s ephemeral watercourses, when seasons reverted to ‘normal’, will behave like ‘normal’ European rivers, streams and rivulets.

**Construct F82** – as in Europe, wet weather is ‘bad’, ‘poor’, ‘inclement’, ‘miserable’ and so on.

**Construct 83** – European crops and grasses, and livestock, are superior and thus are ‘improved’.

**Construct 84** – the Australian landscape can be ‘improved’ to an European ideal, and requires European flowers, shrubs and trees.

**Construct F85** - the Australian landscape is ‘untidy’ and unruly, and so needs tidying-up.
by clearing native vegetation and planting European species.

Construct F86 - a desirable tidy landscape and farm shows how nature can be controlled.

Construct F87 – drought is ‘not’ a regularly occurring element in the Australian environment, and seasons will soon revert to ‘normal’ European-like seasons.

Construct F88 – it is ‘normal’ for the ground to be bared in a drought – because rain and normal seasons will soon return; and so maintaining good ground cover is not important.

Construct F89 – a ‘normal’ season is normal as in Europe: regular, humid, predictable.

Construct F90 – evaporation rates and humidity levels in Australia are the same as in Europe.

The Social Construction of Landscape

Construct F91 – a socially-constructed European landscape is assumed to be the norm of what should be and what exists as reality in Australia.

Construct F92 – the individual human is central to landscape and land-use.

Construct F93 – the separation of man and nature means ‘man’ controls the landscape technically, politically, intellectually. Land thus becomes a possession, a measure of wealth and status.

Construct F94 – the role of the pioneer is to carve out order in an alien, forested, inchoate wilderness.

Construct F95 – nature can be domesticated through colonization and cultivation.

A Belief in Racial Superiority

Construct F96 – Aboriginals are deemed inferior – and so suitable for conquest, genocide, and dispossession.
Construct F97 – being inferior and uncivilised, it is inconceivable that Aboriginals can hold complex thought (e.g. in relation to ecological sustainability and relationships).

**Attitudes to Nature, the Soil, and Natural Systems**

Construct F98 - Australia’s ‘empty’ country, plains, forests, water and natural resources are limitless.

Construct F99 - Australian native fauna are ‘pests’.

Construct F100 - because there are few or no forces affecting nature’s stability, there are few limitations on the ability of humans to change nature

Construct F101 – the soil is both indestructible, inert (non-living) and inexhaustible because it is assumed to be as rich and humid as in Europe.

Construct F102 – droughts are beneficial because they rest the soil.

Construct F103 – the country always bounces back after drought – it is resilient no matter how badly managed.

Construct F104 – water is inexhaustible and so can be wasted.

Construct F105 – limitless water means an English-style green lawn can be grown to civilise the alien environment.

**Land-Use Constructs Emerging from the Successive Phases of Anglo-European Settlement**

Construct F106 - the Australian environment is robust and resilient.

Construct F107 - good, traditional farmers change the environment in which they live.

Construct F108 - modern-day good or ‘best’ farmers obtain competitive returns from resources while maintaining and improving their asset values.

Construct F109 - under ‘developmentalism’, economic growth is good, and the environment is a bag of monetary resources.
The Pioneering Discourse: Imperial Conquest and its Constructs (1788 on)

Construct F110 – humans are free to exploit nature, the land, and indigenous peoples as they wish.
Construct F111 – nature is limitless and needs to be conquered - to be mastered.

Construct F112 – every individual has the right to seek his own interests.

The Settlement Discourse: ‘Enclosure’ and its Constructs (1850 onwards)

Construct F113 – Australia’s land and resources are for use to fuel British industrialisation via the production of cheap raw materials.

Constructs F114 – land must be unlocked – out of the hands of the rich squatters.

Construct F115 - set-stocking is good; it is traditional; and it is easily managed.
Construct F116 - grazing with sheep and cattle improves the pastures.
Construct F117 - high stocking rates can be maintained, as in Europe, because normal seasons will soon come.
Construct F118 - the land is limitless and resilient, and so can be flogged out because it always bounces back after rain.

Construct F119 – cloven hooves cause soil compaction and damage.

Construct F120 - agriculture and farmers, as the core of a society’s wealth, are special, unique, and deserving of privileges.
Construct F121 - cultivating the soil provides direct contact with nature, which allows farmers to acquire the virtues of honour, manliness, self-reliance, courage, moral integrity, and hospitality. Such virtues follow God’s creation of order out of chaos.
Construct F122 - farming engenders the virtues of independence and self-sufficiency, and a solid, stable position in the world order.
Construct F123 - from farming comes social primacy, moral vitality and the infusion of
Construct F124 - Australia’s vast land resources can best be utilised by yeoman-farmers on small farms producing export surpluses.

Construct F125 - settler’s living areas (in acres) are predicated on what yeoman farmers require in England – what is ‘normal’.

Construct F126 - profligate use of irrigation water will overcome the limitations of land and climate.

Construct F127 – land degradation is the government’s fault.

Construct F128 – state and federal drought policies are logical because droughts are abnormal, and so are capable of being ‘fought’ and ‘beaten’.

Construct F129 – because resources, nature and land are limitless, land settlement laws can make provision for compulsory clearing of vegetation.

Construct F130 – pioneering and settlement is heroic (building a nation).

Construct F131 - a farmer has to extract as much as he can from the land so as to meet the annual banking cycle of mortgage requirements, because of legislative remits imposing short-term leases and over-optimistic stocking requirements.

Construct F132 - because variable and long natural cycles do not match the annual banking cycle, the land has to be worked hard to meet repayments – after all, it is only rented land.

Construct F133 - the land is mine, I can develop it and do with it as I wish, because development of the land is good.

Construct F134 - the land is to be conquered and made productive.

Construct F135 - there is no onus on obligation or sense or pressure of shame in the way we can use the land.

Construct F136 - natural capital is a free good – and available through open access (thus externalities can be ignored and the future discounted).
**The Industrial Discourse and its Constructs (1880s on)**

**Construct F137** – Farmers should be optimistic: because droughts are ‘abnormal’, and regular rains and seasonal patterns will soon return, thus the rain will follow the plough.

**Construct F138** - it is easier to buy cheap land than seek to improve the impoverished or degraded land one already possesses. i.e. land is a disposable chattel.

**Construct F139** – because the soil is resilient, robust, rich and humid, this means ‘soil mining’ is possible.

**Construct F140** – constant ploughing and tilling improves the soil, building humus and trapping moisture.

**Construct F141** – because no viable pastures grow, the best use of the Mallee is monocultural wheat growing.

**Construct F142** – if the once bullet-proof soil does get exhausted, then just add some more fertilizer.

**Construct F143** – ‘Dry-farming’ over two years captures two years rainfall for a crop.

**Construct F144** – because soils are so resilient, under hard economic times they can withstand continuous cropping.

**Construct F145** – a constantly cultivated monoculture of wheat is a buffer against drought.

**Construct F146** – you can afford to lose dust and soil because there is plenty more – The soil is limitless and inexhaustible.

**Construct F147** – to grow wheat we have to clear the land, and so the salt isn’t our fault.

**Construct F148** – to keep our land the government requires us to clear, so if anyone is at fault it is the government.

**Construct F149** – the new virgin wheat-lands and pioneering give a sense of a limitless future and of power.
Cooke’s suggested eleven ‘attitudes of mind’ or constructs comprised:

12. Construct F150 - that man conquers nature;
13. Construct F151 - that natural resources are inexhaustible;
14. Construct F152 - that habitual practices are best;
15. Construct F153 - that what is good for the individual is good for everybody;
16. Construct F154 - that an owner may do with his property as he likes;
17. Construct F155 - that expanding markets will continue indefinitely;
18. Construct F156 - that free competition coordinates industry and agriculture;
19. Construct F157 - that land values will increase indefinitely;
20. Construct F158 - that tenancy is a stepping-stone to ownership;
21. Construct F159 - that a factory farm is generally desirable; and
22. Construct F160 - that the individual must make his own adjustments to calamity.

*The Scientific Discourse and its Constructs (1930s on).*

- **Construct F161** – data is only useful if it contributes to human well-being
- **Construct F162** – humans and technology can solve any problem (‘techno-centrism’).
- **Construct F163** – you can’t leave it to nature to solve problems (it has no self-organising function).
- **Construct F164** – soil is a static, inert ‘storage bin’ of plant nutrients.
- **Construct F165** – the soil is a static, non-living machine – easily manipulated.
- **Construct F166** – soil can be mechanistically manipulated for productivity by adding chemical fertilizers – and especially the nutrients N,P and K.
- **Construct F167** - to control the accounting and soil-machine operation, crops in industrial agriculture need to be simplified and standardized into monocultures.
- **Construct F168** – because the soil is really a machine, and man is separated from it...
and nature, man can be the controller and can increase productivity by applying bigger, better and faster technology; to do this ‘man’ can live and work entirely in a machine.

**Construct F169** – the depersonalisation and neutralisation of nature allows the maximisation of agronomic and animal performance; thus a malleable nature is ‘the enemy’.

**Construct F170** - if something in the machine-like nature is broken, ‘man’ just needs to apply more technology and more chemicals to fix it.

**Construct F171** – nature can be harnessed to human ends because ‘man’ has mastery over nature.

**Construct F172** – because of modern fertilizers and chemicals, Australia’s old and poor soils can be mined with impunity because chemicals and technology will fix them.

**Construct F173** – the good modern industrial farmer adopts big machines, plant mono-cultures, uses fertilizers and chemicals, and neatly ploughs and manipulates his paddocks.

**Construct F174** – a good farmer ploughs deep, turns over the soil, and tills neatly and precisely in rectangular or square fields.

**Construct F175** - to be a ‘good’/’best’ farmer’ in Australia means using introduced, exotic ‘improved’ crop and pasture species (initially from Europe, and more recently from North America).

**Construct F176** – native grass species are inferior.

*The Economic Utilitarian Discourse (1950s on)*

**Construct F177** - all land-use decisions should be based on economic criteria, because economics is amoral: maximising production and profit is the main/sole driving ethic.

**Construct F178** - to make money from the farm, annual productive capacity and economic returns must be maximised.

**Construct F179** - agriculture is purely a business venture – a means of production reducible to inputs and outputs, and where the product is a ‘neutral’, economic, value-
free entity.

Construct F180 - agricultural production is purely for produce for sale to the urban market, a commodity’s value assessed only in economic terms.

Construct F181 - the power of technology, fertilizers and chemicals nullifies land scarcity (and thus the threat of degradation).

Construct F182 - the good/’best’, professional farmer treats land like it is a factory unit (as in ‘Taylorism’); it has to deliver highly quantified yields per given time and area; all is measurable in gross margins per area.

Construct F183 - de-sexed ‘Mother Nature’ is not only reduced to a manipulable entity but also a variable – which itself can be measured, exploited (‘maximised’) and ‘out-smarted’.

Construct F184 - the good/’best’ farmer is a specialist – a reductionist in his role and skills (not holistic).

Construct F185 - because of ‘nature’s’ unknown, subterranean complex and mysterious ways, she is feared deep down. Such fear of the enemy (an inimical nature) can be overcome by vengeful dominance.

Construct F186 – under the modern, Australian post-war work ethic one has to ‘improve’ at all costs’.

Construct F187 - a healthy landscape is a productive landscape, not an ecological entity or part of a system.

Construct F188 - because of technology and science, farmers and urban people don’t need to be close to nature.

Construct F189 - because of technology, modern fertilizers, and machines, the land can be flogged because it can be ‘fixed up’.

Construct F190 - because technologies, and therefore farming, are neutral, all-powerful, progressive and profitable, the value and complexity of other knowledge cultures and complex systems are redundant.

Construct F191 - natural diversity on the farm is untidy, alien, foreign and incomprehensible, and so it is undesirable, uncontrollable and a threat.

Construct F192 – industrial ‘institutionalism’ means diversity and complexity in
social-ecological systems is bad and a threat.

**Construct F193** - under economic rationalism, the main object of farming is productivity growth, the maximisation of production, the maximum extraction of ‘value’, and performance efficiency from natural resources.

**Construct F194** - farming as a ‘business’ is driven by the ‘bottom-line’: inputs and outputs precisely manipulated for maximum ‘performance’.

**Construct F195** - modern technology will unlock more of a reluctant, difficult nature’s secrets for manipulation.

*The Techno-Chemical, Productivist, Economic Rationalist discourse (1980s on)*

**Construct F196** – ecological, holistic and other knowledge approaches and their language and metaphors are irrelevant to modern, successful farming.
APPENDIX THREE. Derivation of Key Personal Constructs From Foundational Personal Constructs

The 196 foundational constructs distilled in an expanded draft of Chapter 5, and distilled in Appendix 2 above, provide a raw material base for a thematic discourse analysis. This is because the building blocks of our beliefs are personal constructs. Because many of the foundational constructs emerged at different times and from different origins, there are many cross-overs, parallels, and close synchronies between and within many of them. My first step, therefore, was to condense these into distinct key personal constructs, irrespective of any time sequence. The resulting 62 constructs, differentiated under four themes, appear to drive the dominant values, beliefs and world-views regarding nature, landscapes and land-use in Australia.

The 62 key constructs are represented below. In parentheses are the foundational personal constructs from which they are derived (from Appendix 2, numbers F1 to F196).

**Theme 1: To Dominate Nature; Anti-Nature; Simple Nature.**

**K1. ‘Man’ is in control: he is outside and above, alien to nature, because ‘man’ and nature are separate.** (F11,14,20,21,22,23,52,53,65,79,92,93,94,95,99,100,107, 110,111,126,129,130,133,134,135,142,149,170,171,172,173,174,181,183,187,189,195).

**K4. ‘Man’ has dominion over nature because he is at the apex of creation, and so the earth and nature was created for him, as a storehouse, and to serve him for his own gratification (i.e. it is God’s will that man exploits nature for his own ends). So man, a rational steward, is nature’s guardian and caretaker, managing her for her own best interests.** (F2,6,7,11,12,14,15,17,18,19,20,21,22,41,45,52,53,58,59,64,68,92,93,94, 95,98,99,107,109,110,111,121,128,129,130,133,134,135,139,142,149,150,154,169, 171,172,183,187).

**K2. Nature, land and its resources are limitless and inexhaustible, and ‘man’ is free, and it is his duty, to be master, and to conquer, control, dominate and exploit them (man has power over nature).**
K3. Nature (and the soil) is like a static machine: dead and composed of inert atoms or matter, in movement in a dead cosmos. Nature is therefore subject to, and able to be broken down to, simple mechanical laws, and so can be managed, manipulated, improved and transformed. Machines exist to manipulate nature.

K5. Subservient, powerless, female nature is there to nurture the dominant, powerful male. (F2,3,7,8,38,45,71,92,93,94,95,110,111,126,134,150,159,169,171,183).

K6. ‘Man’s’ role is to subdue and control nature by wrestling secrets from her. (F2,6,9,11,13,14,15,20,21,22,23,24,26,27,42,43,44,47,52,53,54,58,61,66,68,71,92,93,94,95,99,100,107,110,111,126,128,129,130,134,139,141,150,159,169,170,171,181,183,184,188,189,195).

K7. Nature and natural objects have no feelings, soul nor mind; they are not mystical, have no religious or mythical connotations, have no enchantment, and so they can be mastered and possessed. (F6,11,13,14,20,21,22,23,24,26,27,39,42,43,44,47,52,53,58,61,63,65,68,71,79,86,92,93,94,95,98,99,100,106,107,110,111,118,129,133,134,135,138,139,141,142,146,150,159,161,162,163,165,166,167,168,169,170,171,173,174,181,183,187,188,189,190,195).

K19. Because all resources (natural, material, human) are exploitable, and because a Christian people are at the apex of civilisation (superior to ‘primitive’ people), such uncivilised, primitive native peoples can be conquered and exploited. (F5,12,19,38,41,45,58,59,60,62,63,64,65,67,68,71,93,94,95,96,97,110).

K8. Nature/the land is inert, un-sacred, without diversity, complexity or self-
organising function, and so you can’t leave it to nature to solve problems.

(K29. Nature/the land is untidy/unruly and needs taming/ordering, tidying-up, and so needs domestication via colonising, cultivation, and monocultures.

(K57. Natural diversity and complexity on the farm, being undesirable, untidy, alien, the ‘enemy’, incomprehensible, and uncontrollable, is a threat. Thus deep down, mysterious nature is feared/the enemy and can be overcome by vengeful domination.

(K31. The soil and land is indestructible (‘bomb-proof’), inert (non-living), lifeless, inexhaustible, and resilient, and so it can be mined because it is a ‘machine’.

(K35. Set-stocking is good, is traditional, and is easily managed, while grazing with sheep and cattle improves the pastures.

(K37. Cloven hooves cause soil compaction and damage. (F119).

(K14. The rain follows the plough, because constant ploughing and tilling both improves the soil and traps more moisture.


(F45,92,93,100,103,106,107,110,115,116,117,139,151,152,153,159,171,189).

(F75,92,93,95,98,100,101,103,106,107,110,137,139,140,141,143,145,146,150,152,153,159,171,172,174).
K45. Habitual practices and monocultures are best.

K50. Soil is a static, inert storage bin/bucket of plant nutrients, and so to make plants grow you just have to add some nutrients and man-made fertilizers.

Theme 2: Mal-Adaptation to the Australian Environment, and Agrarianism.

K20. Pioneers and settlers/farmers are heroic and independent, and farmers can do with the land, nature and its peoples what they want because every individual has the right to pursue his own interests.

K22. The climate is abnormal, un-European, and seasons will soon return to ‘normal’ or ‘average’; this also assumes low evaporation rates and high humidity, as in Europe.
(F73,74,75,76,77,78,80,81,82,87,88,89,90,102,104,105,106,115,116,117,118,125,128,137,140,141,143,144,145,175,176).

K23. Droughts are abnormal aberrations, and Australia experiences four European-like seasons. Droughts therefore can be ‘fought’ and ‘beaten’.
(F73,75,74,75,76,77,78,80,81,82,87,88,89,90,92,93,102,104,105,106,111,115,116,117,118,125,117,118,125,128,137,140,141,143,144,145,149,175,176).

K27. The rivers, streams and rivulets are abnormal, un-European, and will soon flow regularly again. (F76,77,79,81,87,88,89,90,102,104,105,106,125,126,128,137).

(F73,76,77,80,81,82,87,88,89,90,104,105,125,128,137).
K24. The alien land has to be dispassionately tamed and moulded, ‘civilised’ and ‘improved’, and domestic animals and plants need to be introduced.


K25. Australian Nature is ‘the enemy’, its plants and animals are ‘pests’; Australian native grasses and vegetation are inferior, and so the Australian landscape needs to be ‘improved’, tidied-up, made orderly – using superior European grasses, crops, and domesticated animals according to an European ideal.


K23. Water is inexhaustible, but any run-off is ‘wasted’.

(F45,58,74,80,81,82,87,88,89,90,92,93,98,104,105,106,117,126,137,151).

K26. Australian soils are like those in England/Europe: humid and rich, and so can be treated the same.

(F45,58,74,75,76,77,78,80,81,82,87,88,89,90,92,93,94,95,98,101,103,105,106,107,110,111,115,117,118,125,128,137,139,140,141,143,144,145,146,147,151,153,159,170,173,174,175,181,183).

K30. It is ‘normal’ for the ground to be bare in a drought, because normal rain and seasons will soon return, and the land always bounces back (is resilient).

(F26,45,73,74,75,78,79,80,86,87,88,89,90,92,101,103,104,106,107,115,117,118,125,128,135,137,139,140,141,143,144,145,146,147,151,153,176,189).

K32. Droughts are beneficial because they rest the soil.

(F88,92,102,103,106,107,115,117,118,128,135,144,176).

K39. Settlers’ living areas are to be predicated on ‘normal’ English-European living areas for yeoman farmers.

(F46,49,73,74,75,80,87,89,90,92,93,95,98,103,104,106,110,111,112,116,117,118,325)
K40. Land degradation (including salinity) in planned settlement areas is the government’s/bank’s fault.

Theme 3: Economic Utilitarian/Economic Rationalism

K14. Like nature, the economy and society work according to mechanical laws.

K11. A mechanical nature, being empty, lifeless, homogenous, passive and with no agency, is thus a chattel, a utility, a factor of production (assessable only in economic terms). Being an inert consumable commodity, it is available (through ‘improvement’ by human agency, science and technology) for commercial annexation, division, exploitation and/or sale for profit-making, wealth-creation, parcelling and selling. Land values can thus be determined by factors beyond actual or potential use, and agricultural production is for sale to the urban market.

K12. The creation of private property with labour leads to civilised society.
(F25,26,27,28,31,46,47,48,49,54,55,56,57,63,64,65,67,68,71,93,94,95,112,124,129,130,133,138,147,156,158,186).

K15. Enclosing land and dead, inert ‘nature’ creates property ownership and wealth; and ownership/privatisation confers absolute rights of property and gives individuals power over the land.
(F13,21,22,23,25,26,27,28,31,39,41,45,46,47,48,49,50,51,53,54,55,56,63,64,65,66,
There are no moral/ethical restrictions on the creation of wealth out of an inanimate, mechanical nature via human agency [labour and entrepreneurial behaviour], science and technology.

‘Good/best’ farmers/settlers are progressive, and land/nature development and profit-making from this is good and necessary. They maximise productivity growth, production, the maximum extraction of ‘value’, performance, efficiency, returns, profits, asset values, wealth and status from natural resources.

Owning land promises the good life, liberty, equality, and delivers optimism, a sense of power and security.

Land must be unlocked and made available to all.

Farmers, who engender moral vitality and infuse life into the rest of society, are special, honourable, manly, self-reliant, self-sufficient, courageous have moral integrity, are hospitable and independent. They are thus deserving of privileges; and so Yeoman
farmers can best use Australia’s vast land resources.

(F55,56,57,67,70,71,92,93,94,95,120,121,122,123,124,130,149,158,181,195).

K41. Tenancy is a stepping-stone to ownership, and rented land can be worked hard.

(F127,28,46,49,54,55,64,92,93,95,106,110,112,120,121,122,124,129,130,131,133,134,135,1
38,158,186).

K46. Expanding markets and land values will continue indefinitely.


K55. All land-use decisions should be based on economic criteria.

(F25,26,27,28,49,54,65,68,92,93,95,100,106,107,108,109,110,112,115,117,118,126,
129,130,131,132,133,135,136,138,139,142,146,147,154,159,166,177,178,179,

K17. Free competition coordinates industry and agriculture.

(F25,26,27,28,54,64,68,93,108,109,112,135,138,156,175,177,178,193,194).

K48. A factory farm is desirable.

(F25,26,27,28,54,92,93,99,100,106,107,108,109,110,126,129,135,138,139,142,144,147,153,159
,164,165,166,167,168,170,171,172,175,176,177,178,179,180,181,182,183,
184,186,187,188,193,194,195).

K42. There is no onus on obligation or shame in Australian common law, so farmers can
do as they wish.

7,118,121,122,130,131,132,133,134,135,136,138,139,141,142,144,146,147,149,150,151,153,
154,171,177,181,182,183,186,189).

K43. Soil conservation is optional.

(F47,52,98,101,103,106,109,115,117,118,121,122,129,131,132,133,135,136,138,139,141,14
2,144,146,147,153,177,181,183,186).
K36. The land/nature/the environment is an exploitable, monetary resource for profit-making. Thus any ‘surplus’ grass is ‘wasted’.

K61. Agriculture is purely a business, a means of production reducible to inputs and outputs; thus a healthy landscape is a ‘productive’ landscape, not an ecological entity or part of a complex system.

K60. One has to ‘improve’ at all costs.

K34. Australia’s land and resources are for the profitable production of cheap raw materials for export.

Theme 4: Techno-Centricism/Scientific Centrism

K9. Reason is the supreme good, and is limitless in managing the world and reality; therefore the rational, scientific approach is the best way to gain knowledge. This is because rationality, objectivity and science (not theology, spiritual or other knowledges) explains the natural world. Thus other knowledge cultures are inferior.
K13. Progress is good and a given (civilisation moves in a desirable direction) and is underpinned by science and an ever increasing accretion of new objective knowledge; and so one has to ‘improve’ at all costs.

K10. The cosmos, nature, society and human body are ordered systems of interchangeable atomized and mechanical parts that can be repaired or replaced from outside (the technological fix). They are able to be governed by law and discerned and predicted through deductive reasoning. They are not part of a wider organic whole.

K53. The ‘good farmer’ ploughs, turns over the soil, tills, and fertilizes in neat rectangular fields. The ‘good/best’ modern farmer uses big machines, ‘improved’ pastures and animals, monoculture crops, synthetic fertilizers, and he sprays chemicals.

K51. Because knowledge and information can be extracted from the natural world, problems can be analysed into parts that can be manipulated (as sense data are discrete), and so events that can be described can be controlled.

K54. Technology and science are all powerful and can solve any problems.
K49. Nature and land can be quantified, and data is only useful if it contributes to human well-being. This allows farmers to treat land like a factory – maximising yields per given time, area and input.


K59. To maximise farming productivity, nature must be rendered neutral, malleable, because it is the enemy and a machine capable of being moulded into monocultures.


K55. Modern technology allows farmers to ‘fight’, ‘beat’ droughts, and farmers need help to do this.

(F22,23,32,35,36,37,92,93,106,107,126,134,141,150,152,153,162,170,171,181).

K52. Technology, fertilizers and chemicals, plus big machines, will fix Australia’s poor, exploited and/or degraded soils. This nullifies land scarcity (and thus the threat of land degradation).


K59. The good/best farmer is a specialist, a reductionist in his role and skills (not holistic).

(F30,33,34,35,36,37,42,43,44,61,66,92,93,139,142,147,152,153,162,172,173,174, 175,181,182,183,184,187,188,190,193,194,195,196).
F62. Industrial ‘institutionalism means diversity and complexity in social-ecological systems is bad and a threat.
(F33,34,35,36,37,39,41,42,43,44,53,66,92,93,107,129,159,163,164,166,167,173,174,175,181,182,183,184,187,188,190,191,192,196).
APPENDIX FOUR. Emergence of an Agrarian Tradition

While some of the drive to selection and settlement in Australia’s first colonies was politically motivated to remove the squatters’ privileges (emanating from NSW and Sir John Robertson), another key driving factor was the ideology of agrarianism. Some of this was incorporated from the earlier-settled United States and their rational agrarianism (Waterhouse 2008). Agrarianism held that the progress of ‘civilisation’ required that ‘the shepherd should recede before the advance of the husbandman’ and so establish ‘a numerous, morally virtuous and entrepreneurial yeoman class upon the soil’ (Waterhouse 2008: 65).

The agrarian tradition or rural myth is a universal one, whereby agrarian and rural communities develop a feeling of ‘specialness’ or separateness that seeks to assert their values and the perceived virtues of an agrarian way of life. It is symbolic, and as in other contemporary nations at the time (the wheat-lands of the USA, Canada and Argentina, for example), the feeling led to the development of a powerful mythology of the Australian countryside.

Initially derived from the early economic and philosophical school in late 18th century France called the Physiocrats (‘those who assert the rule of nature’) the view amongst those imbued with the ‘agrarian myth’ was that agriculture was ‘special’, ‘unique’, or ‘privileged’: that it is the core of a society’s wealth and thus deserving of special treatment, and that farmers are not just ‘the salt of the earth’, but that workers in other occupations are parasites (particularly those in the city). Modern economists call this thinking ‘agricultural fundamentalism’, and it regularly surfaces in the rhetoric of agri-politicians. It was the Physiocrats who also left us the term laissez faire (Galbraith 1987).

Under parallel pioneering and settler conditions in the settled colonies of ‘Neo-Europe’ (see Crosby 2004), and driven by a proud class of yeoman farmers, the agrarian tradition became entrenched by the 20th century in all settler rural economies of Neo-Europe. In America, Inge delineated agrarianism’s basic tenets as belief that:

- Cultivation of the soil provided direct contact with nature;
- That such contact led to an agrarian acquiring the virtues of honour, manliness, self-reliance, courage, moral integrity, and hospitality;
• That such virtues followed the example of God when he created order out of chaos;
• That as a result of all the above, the farmer gained a sense of identity; of an historical and religious tradition; the feeling that he belonged to a concrete family, place, and region – which in combination were psychologically and culturally beneficial;
• And that farming offered independence and self-sufficiency, and a solid, stable position in the world order (Inge 1969).

All this applied to Australian agrarians, but without as much of the American religious zealotry. But common to both as each nation moved into the 20th century, was the self-righteous view that a ‘healthy’ farming life, close to the soil, was a wholesome buffer against the intrusion of a fragmented, imbalanced, alienated modern society and its inhuman scale (Harrigan 2004; Graham 1966).

In 19th century Australia the noble selector or ‘cocky’ and the sturdy pioneer were the heroes, and were in clear contra-distinction to the squatter or pastoralist: ironically captured by Steele Rudd in the late 1890s in the caricature figures of ‘Dad’ and ‘Dave’, ‘Mum’ and ‘Mabel’.

The result was an agrarian mythology that became aligned with class distinction and political power (the emergent Country Party).

As seen in Chapter 5 and Appendix Four above, in the determination by various colonial governments (widespread ‘state-activism’) to instigate and encourage an intensive agriculture of yeoman-style, smaller farmers, there were extensive changes to land settlement legislation. This began with colonial parliaments in the 19th century, and then continued throughout the 20th century under respective state governments. Federally, this attitude was typified by Prime Minister Bruce’s 1920s catch-cry: ‘Men, Money, Markets’.

Underpinning the settlement discourse phase of the early 19th century was land settlement that followed the pioneering-squatting phase: that process which provided ‘the means whereby rural Australia became tethered to the Empire’ (Atkinson 2008: 13). The main political issue of the 19th century in colonial Australia – the ‘unlock the lands’ movement involved converting the squatters’ purloined holdings across Terra Nullius into legally titled, surveyed and owned blocks of land. This was played out via a series of land settlement Acts in each colony, beginning with the Robertson Land Acts in NSW from 1861. The object of the various colonial Land Acts was to open colonial wastelands (‘Crown Land’) to selection by small farmers without much capital (the yeoman ideal of a self-sufficient farming people of peasant proprietors). While squatters were partly able to subvert this process in the rest of the 19th century, the result nevertheless was the establishment of a huge raft of settlers for both grazing and mixed farming – and especially in the next discourse phase, that of industrial monoculture wheat production (Karr 1974; Powell 1970; Roberts 1970, 1924; Buxton 1967).

We saw in Chapter 5 that many of the settlement schemes initiated by various pieces of both 19th and 20th century legislation proved costly in the financial, ecological, and social dimensions. This is because such schemes foundered on (1) poor planning, and poor policy and its legislative execution (for example, farm sizes that were too small for a ‘self sufficient’ farming existence; a dependence in some areas on irrigation and expensive capital infrastructure that had to be borrowed); (2) on placing farmers in drought-prone, ecologically unsuitable country for farming; (3) inept and ongoing government interferences, such as the
1931 ‘Grow More Wheat’ campaign; and (4) a global downturn in rural commodity prices through much of the 1920s and then after the crash of 1929.

Complicating these issues were the Euro-centric personal constructs of implanted yeoman-farmers in relation to the Australian landscape. As Proudfoot pointed out, first there was a perception of fear of the unknown, of ‘gloomy’ woods unbroken by any expression of ‘civilisation’, such as a farm, along with the alien and reversed nature of the country (black swans, bees with no sting, woody ‘pears’ and so on; Proudfoot 1979). Then came the drive to ‘improve’ and ‘perfect’ this alienating landscape and the ‘wastelands’ through agriculture and settlement.

An unforeseen consequence of the failure of settlement schemes and the farmer’s entrenched constructs was the political development of agrarian socialism (Appendix Four), with deleterious political, financial and social (and thus knock-on environmental) consequences for rural Australia at the end of the 20th century (for the wheat story, see Overington 2007; for the wool story, see Massy 2011).

A common problem of land settlement legislation was the provision of ‘living areas’ that were too small in all but the very best of seasons, leading to over-cropping and/or over-grazing by farmers in an attempt to remain viable. The Victorian Royal Commission of 1925 blamed too small a farm size in country unsuited to agriculture for the high failure rate among settlers (Waterhouse 2008). This was seen in regions like the semi-arid Western Division of NSW (Condon 2002); in the repeated World War I and II soldier settlement schemes; and in other schemes of closer settlement and pioneering. These policies reflected again the Anglo-European constructs of the policy-makers: that a land tenure policy which drove a ‘more and smaller is better’ ethos was conceived under a system of land tenures that had been developed in more humid climates and with richer soils (Heathcote 1983; Williams 1975).

The official abandonment of Goyder’s Line in 1879 (but a few years after its instigation) and the resulting economic and ecological disasters in South Australia’s semi-arid lands is testament to this (Mercer et al. 2005; Meinig 1961). Another example is that until only recently, state drought policies led to the compensation of farmers for drought. This reflects the Anglo-European construct of drought being perceived as an abnormality rather than a regular feature of the environment. Until well into the 20th century other examples of
damaging legislative provisions occurred, as for example with the opening up of Western Australia’s wheat-lands and the Esperance sand plain, where to retain rights to the land it was a legal requirement to annually clear minimum areas of virgin vegetation (10% a year over ten years, in the case of the Esperance region).

The second problem area in the field of land legislation was the issue of leasehold. This type of land tenure and its impermanence also did not encourage a long-term and nurturing land management approach, especially in country of long seasonal cycles but where land managers/owners (invariably burdened by the abacus of debt) were constrained by the unremitting annual cycle of the city financial calendar. The experienced South Australian back-country pastoralist Jock Pick in 1944 blamed short-term leasehold arrangements and compulsorily-set, over-optimistic stocking requirements for much of the environmental damage in what he called ‘Australia’s dying heart’. The ‘system of State ownership in a land of individualists as Australians pride themselves on being’ has proved a disaster when ‘wedded to a system of private responsibility’ he said, adding: ‘[n]o man will properly care for rented land any more than he will for a rented house’ (Pick 1944: 29).

Finally in this catalogue of harmful effects of land tenure are the constructs involved with freehold tenure. As seen in Chapter 5 concerning the process of enclosure, this post-Enlightenment capitalist development, in removing communal rights, led to controls of ownership over a piece of land and so its conversion into ‘severalty’: where the owner had sole control over the use of, and access to, the land (that is, of privatisation). This led to the massive disjunction in human affairs of the commodification of land as objectified asset and the enshrinement of individual rights. Nature was de-sacrilised in the process. Bradsen states that the flaw in Garret Hardin’s seminal article ‘The Tragedy of the Commons’, is that it focuses on the ‘area’ of land as common not the fictional people, who in fact do not act ‘in common’ but as selfish individuals with no sense of obligation, and this is the tragedy: that without obligation individualism is anarchy (Bradsen 2000). In other words, as Lerch points out, what Hardin is describing is ‘not a tragedy of common property structures but rather a tragedy of open access regimes’ (Lerch, undated: 5).

That is, the major social development of enclosure and privatisation constituted the real tragedy, as, from an ecological point of view, it can be argued that the ultimate sanctioning of privatisation led to divorcement from the land, and, as Bradsen and others articulate, the
enshrinement of ‘no obligation’ in regards to that land – and particularly in the settler nation of Australia. Dividing an area (the commons) into individual plots, says Bradsen, ‘does not remove unrestrained individualism’ (Bradsen 2000: 282). Regarding European land-use in Australia, this privatisation and enclosure of land was the antithesis of the sustainable, regenerative management of ‘1788 Australia’ (to use Bill Gammage’s concept), because indigenous land-use was not just part of a value system but it had organised restraint through binding obligations, or ‘law’: binding as a matter of religion and therefore ‘underpinned by a sense of shame’ (Gammage 2011; Bradsen 2000: 283-284).

Bradsen explains how 20th century legislation in Australia regarding land-use moved away from the critical sense and imperative of obligation and shame. He shows how the common law did not develop to deal with land degradation, and because of its process of evolution, via an adversarial system, which prevents it dealing with, or evolving, novel rules for new problems and situations. In this vacuum the onus should have shifted to statute law, but, explains Bradsen, this came down on the side of ‘staunch individualism’ regarding land-use in the 20th century, which was linked to ‘developmentalism’ (Bradsen 2000). The failure of statute law (of legislation) is critical, because such legislation codifies some of the rules and standards required by a society, and it thus codifies attitudes (Heathcote 1983).

This is graphically illustrated by a recent study of land degradation in Australian land tenure systems. A clear result is that while leasehold land contains a higher proportion of land deemed vulnerable to degradation, in the words of the authors, ‘[t]he only tenure class with a discernible severe level of degradation is the mainly freehold tenure class’ (Malafant et al. 1999: 459). A key reason for this, Malafant et al. argue, is that a high proportion of degradation occurs on ‘moderately unsuitable agricultural land’: land where there is a tendency to ‘stretch’ the use of such land types. And this occurs, they allege, because, in Hall’s words, ‘the majority of European-based agricultural societies have always seen the land as something to be conquered and made productive’ (Hall 1992, cited by Malafant et al. 1999: 460).

In the wake of the constitutional and legislative process of Federation (a blend of British and American influences), Australia chose a path mid way between state socialism and America’s ‘robber baron’ approach of laissez faire. And yet, in matters of development and land legislation, the pendulum swung decidedly towards the latter and in favour of individualism
and ownership rights, building on the long and deep history of British common law that favoured private property rights (see for example, Kelly 1994). When Australia (at the same time and for the same reasons) experienced its own 1930s Great Plains dustbowl event in the Mallee, Australian state legislators, given the enormous publicity about the American disaster, followed the American example. That is, while eschewing the dangers of inadequate leasehold provisions (and moving from a development model to a soil conservation model), they effectively swung instead even more towards individualism. This meant further away from any incultion of obligation and shame. As Bradsen outlines, this was seen in ‘the broad framework of responses to land degradation….erected from the 1930s on’ (Bradsen 2000: 293).

As Bradsen went on to explain, ‘[b]eginning in New South Wales in 1938, legislation was enacted in most Australian jurisdictions in the middle of this century applying to all land, including leasehold land, which effectively made non-damaging land use and management optional…The opportunity to develop the obligations associated with the tenure system was ignored …Indeed, it would seem that the introduction of the US approach, by fostering an individualistic, obligation-free ethos in the use and management of all land, not only hindered the development of a sense of obligation on freehold land, it weakened the sense of obligation already existing under the tenure system…From this time on programs in Australia struggled to find their way…there was no obligation’ (Bradsen 2000: 278; and see Bradsen 1988).

Therefore, in areas of soil conservation this approach focussed on research and extension (that is, at creating awareness and concern) rather than statute law that imposed an ethic of ‘obligation’ and ‘shame’. Repeated studies into the ongoing state of land degradation reveals that such a ‘softly softly’ approach has failed – as there was no incentive or institutionally-directed or enforced imperative to change. Bradsen even argues that such an approach incultated the attitude that soil conservation was optional, and as industrial agricultural and productivist expansion exploded in the 1950s, soil conservation went off the radar (Bradsen 2000). Bradsen concludes that the lesson of this 20th century failure by government, policymakers and thus in statute law, is that ‘programs that rely on individual action where there is no obligation to act will not be effective’: that is, they will not change farmers’ constructs (Bradsen 2000: 282). Thus Bradsen concluded that until very recent times (for example see Industry Commission 1998), if at all, these federal and state legislative and policy developments entrenched ‘the reliance on non-obligatory responses’ (Bradsen 2000: 295).
Underpinning the developments Bradsen outlined above is the issue of presumptive entitlement in Australian land legislation. As Reeve outlines (and based on the work of Daniel Bromley), ‘private ownership of land as an institution can be regarded as a collection of entitlements that define what actions the land owner may or may not undertake on their land’. That is, ‘landowners presume the right to undertake particular actions, until such times as changing social norms, or common or statute law requires otherwise’ (Reeve 1997: 83-84).

The background to all this in English jurisprudence is that ownership of land, legally, means ‘not to own but have right’, which means ownership consists of a complex of rights. These include ‘the right to possess, to manage and control, to profit from, and to transfer’ (Schapper.1997: 105). However, as freehold tenure of land property derives from society as the state, this means, in effect, that ‘ownership is a right of general use, not that of unlimited use’ (Fitzgerald 1966, cited in Schapper 1997: 105).

The problem, however, is that embedded in presumptive entitlements is an expectation of favoured treatment by the state. The result, as Bromley and Hodge point out, is that ‘farmers in the industrialized nations deal with their governments from a position of strength – such strength arising from unquestioned property rights in land…’ (Bromley & Hodge 1990: 199).

In short, private freedom and land possession and ownership, due to ‘tragedy of the enclosures’, means an open access regime which allows utilisation and exploitation of resources which cannot be prevented by others. When combined with pioneering notions of a limitless resource, this parcel of attitudes (of constructs) had, and still has, devastating consequences. This was illustrated in 1875 by testimony before a South Australian Commission. This person stated that ‘[s]o long as virgin soil is to be obtained at [one pound] per acre, so long will the average South Australian farmer prefer to spend the money in the purchase of new land, rather than in the improvement of what has been impoverished’ (South Australian Parl. Paper No. 77, 1875, quoted in Meinig 1962: 118).

The upshot of all the operations of presumptive entitlements and its reinforcement of long-held constructs in regard to land-use is that natural capital resources (land, soil, vegetation, water and so on) can be exploited under what effectively is an open access regime. This is because ‘the rights of land ownership confer a presumptive entitlement to consume the resource’ (Reeve 1997: 85). This is further complicated because as agriculture becomes more intense and more dependent on technology, the ecosystems are not just more endangered, but
their nature is crucially changing as they move from being buffers between landowners and their use of land to transmitters of harmful effects (whether it be across boundary soil and water salination or erosion effects, or harmful chemicals, or lack of essential nutrients in food).

Thus the impact of lock-in of legislation and policy that negated any inculcation of obligation and/or shame, but instead reified developmentalism, served to reinforce a basket of inherited constructs in regard to exploiting Australia’s resources amongst farmers. The result, in concert with powerful bulldozer technology after World War II, was pioneering destruction and land abuse into the 21st century. For example, the Brigalow scrub has been almost completely destroyed in northern NSW and up into central Queensland (the Brigalow Belt South), and massively compromised in the northern semi-arid Queensland tropics (the Brigalow Belt North). Nearly six million ha. of central Queensland suffered almost total Brigalow eradication between 1960 and 1992 – out of ten million total of Brigalow dominant extent, and totalling an estimated 3 billion trees conservatively (Nix 1994).

Typifying planned and legislated destruction was the Queensland Brigalow and Other Lands Development Act of 1962: a government-sponsored closer settlement scheme requiring all Brigalow and related scrublands in a four million ha. area to be cleared and burnt (Nix 1994). Broadscale Brigalow clearing only ceased at the end of 2006. However, similar wide-scale clearing of the semi-arid savannahs of northern Queensland was accelerating at the end of the 20th century; a conservative 3 million ha., and largely unnoticed. This, according to Haworth, was because ‘as with most events beyond the Great Divide, it has elicited little comment from the media or population of urban Australia’ (Haworth 1997: 167).

Similar legislative requirements to clear existed with the pioneering of the Esperance sandplain and Western Australian wheat belt (the Avon). Other areas to suffer 19th century-style pioneering in the second half of the 20th century include: the Geraldton sand plain; the 90 Mile Desert area in the Naracoorte coastal plain bioregion of South Australia; the unheralded and below-the-radar destruction of both Eucalypt woodland and rich native grasslands on the black soils of northern NSW (the Darling Riverine Plains) for cereal and cotton cropping; and other ‘below-the-radar’ tree clearing and native pasture destruction sanctioned by the legislative lock-in. In the Darling Riverine Plain, for example, the NSW Government’s own
estimate was that between 1977 and 1985, tree cover had decreased by 70% just in the cotton belt of the Darling/Barwon/Condamine catchment area (Haworth 1997).

When Australia moved into successive phases of ‘closer’, ‘soldier’ and other government-initiated settlement schemes from the late 19th century, the power of the state and its legislation to influence land-use constructs is clearly demonstrated above. Beyond the legislatures, however, the state (as with its political influence in land settlement favouring British and urban capital) also came to have influence on personal constructs relating to land-use through supporting such connected philosophical platforms as ‘developmentalism’ and ‘progress’.

The European theorist Toennies separated a society’s codified attitudes – the Gesellschaft system – from that of traditional attitudes and actions inherent in a society – the Gemeinschaft system (Toennies 1957). By the time of 20th century Australia, the process of pioneering, settlement and then Federation had reinforced the governing ethos of ‘statist developmentalism’. This meant the ‘state’ had a central role in guiding and controlling development, and where the ethos, as Eckersley explained, was predicated on narrow definitions of progress and development, and where, as Walker rammed home, such narrow definitions were then applied uncritically to ‘ecological system[s] in which climate, soils, flora and fauna [and one could add indigenous people] were all incompatible with the implicit model of development’ (Eckersley1998; Walker 1999; Mercer et al. 2005). In short, the assertion of the priority of private property rights in land and water in Australia, as in most liberal democracies, led to natural capital being considered a free good: that, in economic terms, the externalities were ignored, the future discounted, and risk underestimated (Eckersley 2004; Garnett 2001).

This state-backed development ethos, explicated in ‘closer’ and other settlement laws from the late 19th century, in turn reinforced the pioneering ethos of the settler. That is, there was a mutual reinforcement of Gesellschaft and Gemeinschaft. Enshrined therefore, as Bradsen pointed out, was the ‘landholder ethos’: ‘that development of the land is good’, indeed, ‘fundamental to the settlement of Australia’. With this was aligned ‘the mutual attitude of staunch individualism’ amongst Australian farmers: an individualistic, self-help ethos that spurned any help from social institutions (except under the 20th century political development of agrarian socialism) (Bradsen 2000: 288; Massy 2011). As is demonstrated above, and as
articulated by Bradsen and others, this tendency was only enshrined through the 20th century by developments (or lack of developments) in both common and statute law, and through such issues as the construct of presumptive entitlement (as Reeve exposed – 1997). Besides a deeper embedding of constructs to do with the assertion of individual rights over the environment, the result was a concomitant lack of inculcation of constructs to do with obligation and shame (Bradsen 1988; 2000).
APPENDIX SIX. Thematic Discourse Analysis: The Power of Historical Antecedents in the Embedding of Personal Constructs Relating to Australian Land-Use

From the discussion and analysis in Chapter 5, I chose three examples so as to illustrate how discourse and power work via the social construction of reality in influencing the formation of land-use constructs, and dating to the period of the British Imperial Invasion/Conquest of Australia.

The Social Construction of the Map and Cartography

Devolving from the Enlightenment and scientific and agricultural revolutions (and subsequent industrial revolution), there came a raft of values, world-views and attitudes concerning objective knowledge, humanism and a strong moral imperative. As Cosgrove (2001) pointed out, these served to bring all of humanity to the level of civilisation enjoyed by the most advanced in Western Europe. But to do this one had to cognitively control the world, to ‘enclose’ it. The map and associated cartographic and mathematical tools and constructs allowed this. Indeed, such mental enclosure tools were not unlike fences across a landscape.

In discourse terminology, socially constructed representations of the globe or territory have agency because they shape understanding and further action in that world or territory. Cosgrove interprets the process of ‘mapping’ and ‘territorialized experience’ as organizing not just the imagination but also cultural worlds and identity ‘around assumed sociospatial centrality’ (Cosgrove 2001: x-xi). According to this view, and regarding the colonization of Australia, the signification of space (territory) meant the entire continent of Australia became available for the de novo re-construction of society (Cosgrove 2001: 196).

Maps meant that, by naming things, land and other resources could then be ‘appropriated for the European globe’. This Enlightenment development represented a huge shift in human conception, because it meant that both the mind and global space or a territory and its resources could be parcelled and divided into enclosures with the help of fixed compass
points, lines, coordinates and all the paraphernalia of an imposed cartographic geometry. All these abstract networks carried enormous symbolic power.

As Cosgrove pointed out, the map became ‘the archive and classificatory grid of the earth’s contents’ (Cosgrove 2001: 191-192). This quantification of nature and land not only further changed the fundamental relationship between humans and the earth-nature, but it meant every resource was potentially available for ‘enclosure’, description and sale. Cartographic lines did not respect the integrity of the landscape.

Surveyors were the agents who formalised the role of maps as powerful tools of exploitation. Invariably their cartographic lines had little or no reference to aboriginal peoples, and generally little reference to the land itself (to its integrity, nature and function). Instead, surveyor’s lines on maps were the ‘dictators of a new agrarian topography’ that introduced a ‘space discipline’ (Harley 1988: 285); their cartographic lines and their will and dominance being ‘mill-stamped on the surface’ of the landscape (Rose 1972: 73).

By being a powerful tool of a dominant society (or an elite within such a society) in the exertion of power, maps are thus a form of privileged language: a cartographic language that is directly translated into historical practice (especially in the age of imperialism; Harley 1988). Such a language was iconographic: utilizing powerful symbolic imagery. That is, by interpreting the symbolic level, maps quickly become exposed as tools of political power ‘reproduced, communicated and experienced’.

As Australia began to be enclosed by lines of claimantcy following its ‘discovery’, mapping, settlement and division, it is clear the surveyor was not just representing the ‘environment’ in an abstract, symbolic sense, but instead he was powerfully representing ‘the territorial imperatives of a particular political system’ (Harley 1988: 279). Power was being deployed and knowledge was a form of power (Poster 1982). And because ‘authoritative resources’ were controlled by a state in the exercise of power, maps therefore comprised ‘an undergirding medium of state power’ (Giddens 1981: 5). So maps, as much as ‘guns and warships’, were the weapons of imperialism.
Chapter 5 (Section 5.6) showed that the social construction of landscape was integral to the formation of crucial personal constructs about land, nature and the environment in Australia (and thus to an approach to land-use): that the Australian land, its biota, and its climate was totally alien to the European eye, virtually ‘a new planet’. The portmanteau of Anglo-European personal constructs thus came to influence new personal constructs not just relating to exploitation of the land and its indigenous people, but also to denialist interpretations and relational language. The latter concerned soils, the weather and climate (especially droughts), and attempts at re-moulding Australia in a European image (for example, including the introduction of familiar European plants and animals, and of ‘improved’ agricultural varieties), and attempts at tidying ‘unruly’ nature.

The key reason for this Eurocentric behaviour was that Anglo-European settlers had a socially constructed belief and cognitive perception of what a landscape is and should be. What had occurred, as with mapping and cartography, was a similar signification of space as a way of organising the imagination, cultural worlds and identities: but this time in regard to landscape and beliefs about what a landscape was and should be (Cosgrove 1984; 2001). Such social constructions, therefore, also had agency because they too influenced the shaping of understanding and further action in the new landscapes. In turn, such culturally constructed views shaped the pioneers’ and settlers’ ‘seeing’. This in turn moulded relationships and meaning within the landscape. This construction of ‘truth’, therefore, is powerful in both its moral and ideological charging and explains much about the deeply embedded nature of constructs regarding the land and land-use, especially under a new regime that privileged the market economy and which constituted a huge shift from a moral to a political economy (Cosgrove 1984).

The symbolic representation of landscape thus became itself an iconography: a language of powerful symbolic imagery that, like metaphors in spoken and written language, shaped people’s cognition, understandings, knowledge and perception – indeed the apprehension of meaning.
**Construct Derivations in the Pioneering-Settlement Phase in Australia.**

We also saw in Chapter 5 that there were many other constructs packed into the powerful, socially-constructed mental baggage carried to Australia after 1788. This meant the pioneering and early settlement phases had a huge impact on embedding deeply held constructs regarding Australian land-use. A crucial construct was the philosophical belief and its associated ethics and values which held that humans were free to exploit nature (and indigenous peoples) as they wished (for example, see the key constructs in ‘Theme 1’ in Section 6.2).

As equally powerful as the ‘free to exploit nature’ construct, but also linked to it, was the raft of constructs linked to capitalism, land privatisation, profit-exploitation and such (see key constructs K20, K45, K24, K39, K40 and a number of others). It is the process of land settlement and the political, philosophical and capitalist power behind it that particularly reveals the linkage of knowledge and power in discourse.

The core driver of this phase was Britain’s industrial revolution. This was initially manifested in the exploitation of the Australian environment for England’s wool textile industry, and a consequent transition in Australia, and incorporation into, a capitalist world order (Massy 2007). To achieve such an agrarian transition in Australia required the capitalisation and enclosure of land, via ‘the social organisation of the landed economy and its relation to industrialization’ that was played out in ‘the political resolution of the agrarian question to the long-term advantage of urban capital’ (McMichael 1984: xiii). This duly occurred when land reforms, followed by a huge influx of predominantly British urban capital, led to a cementing of the institutional development and integration of capital markets in both London and the colonies (the ‘projection of the British metropolitan estate’ – McMichael 1984), thereby subordinating pastoralism to a colonial urban economy, with the umbilicus to England being cheaply produced raw wool fibre for its industrial machines (Massy 1990 and 2007; McMichael 1984).

The other side of this coin, as Hornborg (2006) revealed, was how colonial raw resource production ‘saved’ usage of British land and labour, leading to an unequal exchange of energy (what Clark labelled the ‘entropic costs’ of industrial metropoles; Clark 1997), and
thus the industrial centre’s appropriation of time and space, with severe accompanying environmental impacts in the exploited colonies.

As Australia moved into the next phases of ‘closer’, ‘soldier’ and other government-initiated settlement schemes from the late 19th century, the power of the state and its legislation became manifested via other modes in influencing particular land-use constructs. Specific legislative developments *per se* in their influence of land-use practices, attitudes and constructs is presented in Appendix 5, but the state (as with its political influence in land settlement favouring British and urban capital) also came to have influence through supporting such connected philosophical platforms as ‘developmentalism’ and ‘progress’.
APPENDIX SEVEN: Thematic Discourse Analysis of Rural Media and Corporate Advertising and Text Material (Additional to Material in Chapter 6)

Theme I: ‘To Dominate nature; anti-nature; simple nature’.


Construct K1 and K16.

The good farmer, young and modern, uses chemicals and big machines to grow good crops and pastures, and he too can be heroic, a champion, because he is safe, clean, professional and trustworthy. (Note: sponsor of the ‘spray champion’ is the giant trans-national agro-chemical company *Syngenta* – the ‘leading crop protection company’, ‘joining forces’ with co-sponsor of the competition is Rural Press); chemical application is ‘best practice’, and ‘farm chemicals are a vital tool for modern agriculture’.

(Linked to constructs K3, 10-12, 18, 26, 28, 34-39, 41, 46, 47, 50, 51, 57, 59, 62).
Example 5: 'The Power of One' *(The Land 22/7/2010).*
Construct K1 – man in control, power over nature.
Bryce Courteney pugilist imagery of power and heroism fable; ‘power’ to ‘control’ evil/bad nature which causes ‘disease’.
(Linked to constructs K2-14, 18, 25, 26, 34-38, 41, 44, 47, 49, 50, 54-59).

Example 6: Giant tractor, man in charge, dominating *(The Land Tractors and Farm Machinery Liftout, 20/5/2010, page 1).*
Construct K1 – man in control, power over nature.
‘Gaining traction’, to dominant nature (note the deep wheel tracks), and use of new technology to compensate previous damage and not to ‘waste valuable horsepower’.
Example 8: ‘Peeling back the layers to improve efficiency’ (*Landmark’s ‘Talking Points’ Autumn 2011, p.12*).

Construct 13 – The soil and land is indestructible, an inert (non-living) storage-bin for plant nutrients (closely linked to K4, 19).

The soil is inert, able to be dominated and controlled by scientific analysis, machines, and ‘precision farming’ so as to ‘provide nutrient and amelioration recommendations’; the soil can be ‘efficient’ or ‘inefficient’ at ‘extracting’ nutrients; high yield potential is the aim. Man, technology, and technical jargon is heroic/good.

(Linked to Constructs K112,25,26,28,34-41,44-47,49-62).

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**Plant Nutrition.**

peeling back the layers to improve efficiency.

In 2009 and 2010, selective soil sampling conducted by Landmark across a range of paddocks in South Australia revealed some surprising and insightful results.

Fourteen paddocks were tested in 2009 with a total of 70 separately bagged soil samples, either from high yield potential or low yield potential zones. In 2010, 11 paddocks were tested with a total of 48 separately bagged soil samples.

The table below reveals where paddock zones had a history showing higher yield potential. The blanket approach to fertiliser application (that has occurred since farming began), has resulted in levels of phosphorous that border on deficient.

In the zones where historical data indicated there was lower yield potential, the phosphorous levels were significantly higher. In the low yield potential areas, the results highlight P had not been fully utilised by the growing crops.

In essence, the lower yielding crop areas had not been as efficient at extracting P and farmers had been wasting money delivering P that was excess to requirement. On the other hand, in the high yield potential areas there was room to grow more yield if the crops had access to more P.

For all grain growers involved in the soil sampling, it has become apparent that being able to vary phosphorous application rates at seeding to meet the zones requirements just makes good sense.

To create a variable rate (VR) phosphorous recommendation for those growers for 2011, Landmark Precision Farming Agronomist, Leighton Wilksch used a combination of data layers. They included:

- the preceding year’s yield map – to gauge relative phosphorus removal
- all other available yield maps to show trends of yield variation, plus
- he carried out further selective soil sampling to give a true figure of available phosphorous.

Leighton says all can be important in making a VR recommendation.

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Mapping and interpretive software can readily identify soil sample points and can easily log them for future reference. Although the cost of annual sampling may be more due to the increased volume of samples, the return on money spent is well worth the investment.

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According to Landmark Precision Farming Agronomist, Leighton Wilksch, selective soil sampling can give a much clearer indication of soil variability than conventional bulk sampling and can be a
Example 9: ‘Spray Awards 2010 – Sustainable, Productive, Responsible (The Land 12/8/2010, p.34);

Construct 16 – The good farmer ploughs, turns over the soil, tills, and sprays chemicals (closely linked to K62).

Spraying chemicals can be ‘sustainable’, ‘productive’ and ‘responsible’ – an extraordinary piece of framing by a giant trans-national chemical company (Syngenta); and (Linked to Constructs K1 to 13, 16 to 19, 25,26, 28 to 30, 34 to 41, 43 to 57, 59, 61, 62).


Construct 26 – the good farmer ploughs, turns over the soil, tills, and sprays chemicals.

You can be a champion, a hero, a good/best farmer if you spray chemicals.

(Linked to Constructs K1 etc. as above in Example 9).

Construct K1 - man is in control, outside and above nature, which was created for him, and he has control and power over the land; K16 – the good farmer sprays chemicals.

The re-framing here says spraying chemicals is sympathetic to nature; is benign; is ‘natural’: after all (a) mother and baby elephants ‘spray’; (b) chemicals work for you like horses – but where horses are machines, yielding ‘horse-power’; and (c) failing use of a baby, advertisers use dogs to hit the sympathy chords, and here the iconic, faithful, lovable Kelpie ‘working’ dog, ‘born to perform’, is equated to benign, helpful use of spray technology.

(Linked to Constructs K1-13,16,18,19,25-30,34-41,43-62).
Example 12: ‘Get up and grow with Raxil Pro’ (*The Land 23/2/2012, p.63*).

Construct K4 – The land is a machine.

Steel springs under the crop plants in the soil; ‘for crops that bounce out of the ground’ – appealing to the machine-minded modern farmer; a new insecticide seed treatment to kill off fungus in the soil – to help ‘crops get off to a healthy start’ and ‘appear greener and more vigorous’.

Linked to Constructs K1-13,16,18,19,25,26,28,34-41,43-62).


Construct K11 – Nature/the land is untidy/unruly and needs taming/ordering, tidying up; and K51 – a healthy landscape is a ‘productive’ landscape.

Key here is the power of Australia’s main state government both backing weed ‘eradication’ and the use of chemicals to do so: if you use chemicals you get accredited to do so – an enforced compliance system on farmers

6.4.2. Theme 2: Mal-Adaptation to the Australian Environment

Example 17: ‘Achieve eats wild oats and ryegrass for breakfast’ \textit{The Land, undated 2010}).

Construct K26 - as above in examples 14 to 16.

Martial language - ‘Weed’ grasses are enemies, the herbicide ‘Achieve’ will vanquish them. (Linked to Constructs as above in example 13).

Construct K26 - as above in examples 14 to 17.

Nature can be defeated, beaten, declared war on with big, powerful, ‘Grim Reaper-like’ war machines, and the use of chemicals – and with ‘man’ in charge (note the ordinarily dressed but rather sinister figures in half-shadow, the black visage of the tractor and other dark imagery).

(Linked to constructs as above in examples 14 and 15).

Construct K26 - as above in examples 14 to 18.

To ‘protect’ crops from evil/bad nature, which causes ‘ill health’, ‘infestation’ (and to give them ‘good health’ so as to avoid yield loss), one can accept the kind invitation of an ‘offering of opportunity to ‘provide protection’ by ‘controlling aphids’, with the use of the insecticide ‘Gaucho’.

(Linked to constructs as above in examples 14 to 16).
Example 20: ‘The pasture is always better on the GAUCHO side’ (Bayer catalogue 2011).
Construct K26 – as above in examples 14 to 19.
Weedicides improve drab, unruly, unproductive nature (left side of picture).
Gauchos – logo of a man riding a horse, intimation of world’s best horsemen, heroic, independent, in control of ‘nature’ and ‘horsepower’.
(Linked to constructs as above in examples 14 to 17).
Example 21: ‘Shirley’s Superphosphate’ (Reproduced in *The Land* 27/1/2011: p.87).

Construct K22 – Droughts are abnormal aberrations in Australia; K60 – modern technology allows farmers to ‘fight’, ‘beat’ droughts.

Advertisement on cover of first edition of *The Land* in 1911, for Australia’s first superphosphate product, of which the main theme is that by ‘supering’ one can beat drought and other ‘problems: ‘**I defy you** and all other troubles’. At the same time one gets excellent yields.

(Linked to constructs K1 to 13, 16, 18 to 22, 25,26, 28, 30, 34 to 41,43 to 59, 61, 62).
Example 22: ‘Treat your land to some more stock’ (*The Land* 21/10/2010, p.8).

Construct K 34 – the land is a chattel, a utility, a factor of production, a commodity. Bank advertisement, advancing the idea of economic decisions (including borrowing ‘against’ your land and animals, against their equity) determines land-use decisions. (Note: photo shows semi-arid country with landscape dysfunction at around 70% bare ground). (Linked to Constructs K1 to 14, 18, 28, 36, 38, 41, 44,45, 47 to 51, 58).
Example 24: ‘Syngenta’s Logran – 8% more yield’ *(Australian Farm Journal February 2004, p.43)*.

Construct K34 – as in examples 23 to 25 above.

Spraying a weedicide delivers ‘great value’, especially when ‘tankmixed with *trifluralin* or *Stomp* to control chemically induced ‘Group B resistant ryegrass situations’. Note the aggressive, dominating nomenclature of *Stomp*.

(Linked to Constructs K1-13,18,25,26,34,36,38,39,41,43-59,62).
6.4.4. Theme 4: Technocentricism/Scientific-centricism


Construct 57 – Technology and science are all powerful; K1 – man is in control, outside and above nature.

(Linked to Constructs K2-13,16,18,19,25,26,28,34-39,41,43-59,61,62).
Example 27 (a) to (c): Giant size, strength and Power (a – The Land 20/5/2010, pp4-5; b & c – Goldacres 2012 catalogue).

Construct K57 – as in example 29 above; K34 – the land/nature is a chattel etc.

With enormous volume capacity and ‘most advanced spraying technology’, to spray-out and dominate the landscape (‘biggest spray job), and to ‘cover more ground’ (up to 3000 acres a day); with ‘superior levels of performance’, and to minimise downtime (efficiency – ‘less labour, less time, less final costs’; quantifiable time) and get ‘back in the paddock faster.

Techno-language using nature: John Deere’s ‘Crophawks’ – a predator; Agroplow’s ‘multistream’ – not for clean, cool, running water, but for herbicide spraying.

Techno-language - competitive, primal: a ‘land of giants’; ‘world’s biggest, locally-made machines’ or ‘air-seeder ever’, or ‘integrated broadacre precision seeding and fertilizer rig’, or ‘world’s biggest chaser bins’; ‘smashed’ or ‘held’ ‘the world record’; ‘world’s most powerful tractor’; ‘to the delight of many ‘grunt’ aficionados’; ‘a world first’, etc.

Techno-language for aficionados and newness: ‘world’s most powerful tractor, the challenger 470kw can produce 470 kw (630hp) at a pinch’; ’40 tonne capacity Grain King model incorporating steerable and fully suspended triple axles’; ‘Lexion 590R…the only class nine grain harvester in the world’; ‘boast a power rating of 385 kw (516hp)’; ‘New Holland has revealed its new CR 9090 Elevation combine harvester equipped with a 13 litre turbo compound technology that powers the latest New Holland 9060 tractor’; and so on. (Linked to Constructs K1-13,16,18,21-26,29,30,38,39,41,43-51,53,54,57-59,61,62).
Example 29: space-age technology to apply more and multiple chemicals (Goldacres catalogue 2011).

Construct K57 – as in example 31 above.

Dark, nature imagery in a chemically sterilised world: the controlling console is called ‘Raven 4400 – a bird metaphor (Raven = carrion eater of the dead).

(Linked to Constructs K1-13,18,19,25,26,29,30,34,38,41,43-47,49-59,61,62).
Example 30: Seeing The Light *(The Land 1/3/2012, p.61).*

Construct K57 – as in Example 34 above; and K54 – as in Example 34 above.

PA Language: ‘Although Darin Skinner does not use RTK to guide his sprayer he has become used to driving the *high clearance coupe* down 50cm corn rows as he dribbles nitrogen into the fast-growing corn crop based on *readings* from an *OptRx sensor.*

(Linked to Constructs as in Examples 33 and 34 above).

Example 32: Land your nutrients in the Drop Zone Precisely – Granulock advertisement *(The Land 1/3/2012, p. 66).*

Construct K57 – as in Example 36 above; K19 – soil is a static storage bin/bucket; and K26 – nature is ‘the enemy’.

The precision concepts of the new CA and PA are obvious, but are also subliminally linked to the martial language (‘Drop Zone’) of war/aggression on nature and soils.

(Linked to Constructs K1-13,16,18,19,25,26,28,34-36,38,39,41,43-62).
Example 33: ‘Managing herbicides to avoid resistance’ (*Landmark Talking Points Autumn 2011, p.20*).

Construct K54 – progress is underpinned by science; K1 – ‘man’ is in control/outside of nature; K11 – nature needs taming; K26 – nature is the enemy.

‘Implement integrated weed management (IWM), via ‘best practice herbicide use’ (n.b. photos – desired is no life on right, no green, but all dead); you can be ‘Spray wise’ and ‘survive’ weed populations.

(Linked to Constructs K3,4,10,12,13,18-20,25,26,28-30,34-40,43-62).
Example 35: Proven to Control even resistant Ryegrass (*The Land* 2010).
Construct K54 – progress is underpinned by science.

Here the advertiser is using reverse psychology to attack competitors: the scientist is pictured as a nerd – a common attitude/stereo-type held by many farmers of scientists; and yet the same scientists have delivered a *new* and superior chemical to kill resistant ryegrass in monoculture crops (a resistance caused by previous scientifically developed chemical ‘tools’).

(Linked to Constructs K1-13,16,18,19,25,26,34-41,43-53,57-62).

![Image of a scientist standing in a field with a newspaper]

Construct K54 – Progress is underpinned by science; K60 – modern technology allows farmers to beat droughts.

Green, wet land is being drought-proofed due to science, technology and big machines.


![Image of a farmer near a tractor and hay]

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Construct K57 – A good/best’ modern farmer uses big machines...monocultural crops and chemicals and fertilizers.

Syngenta (one of the world’s largest trans-national farm chemical and product suppliers) launching a national spray champion that purports to foster sustainability and responsibility – and ‘proudly’ also sponsored by The Land newspaper. i.e. the next stage of excellence in farming involves who is best at pouring chemicals onto the landscape – so ‘put your expertise in farm spray application to the challenge’; the winner receives a SPRAY Awards prize package valued at $15,000 (one presumes of chemicals and technical elements), plus a 12 month subscription to the Agricast Weather and Spray Window Forecast website.

The list of 12 entrance questions all involve highly technical questions related to sophisticated spray technology and techniques.

(Linked to Constructs K1-13,16,18,25,26,28,34-39,41,43-62).
APPENDIX EIGHT: The Twelve Case-Studies of Transformation: Their Origins, History, and Interconnections.

Sections 6.1 to 6.5 delineated the superordinate personal constructs that undergird the dominant discourse of industrial agriculture – and within the context of George Kelly’s *Personal Construct Psychology*. This platform allowed us to tease out and distil the personal psychological constructs that undergirded the contesting discourse in Australian agriculture: that of transformative agriculture.

As explained in Chapter 4 (Methodology), my main source material for this thesis comprised 79 interviews across twelve case-studies, and amounted to over 2,000 pages of transcripts. As seen in Chapters 5 and 6, supporting material was derived from other relevant discourse material. It was as a result of my preliminary home-work and then extensive field-work that the twelve case-studies emerged. Ten of these comprise a group of synoptic case-studies as part of a regenerative agricultural discourse. They are clearly distinct from the dominant discourse of industrial agriculture. There is also a transitional discourse between the two main discourses. This comprises ‘integrated productivists. The twelfth discourse is the dominant one: industrial-productivism.

*Case-Study #1: Biological Agriculture (Soil)*

**Description:** I begin with healthy soil because not only is this factor integral to preventing land degradation but it is the key biological state that underpins both transformative agriculture and the other nine regenerative agricultural practices below, plus case-study # 11 (integrated productivism). Healthy soil is what distinguishes these cases from the dominant discourse. Furthermore, as soil is the substrate from which all our food is derived, there is an ever-swelling concern and emphasis on the impacts of chemically-based industrial agriculture and their denatured soils and thus potential or apparent consequences for human health due to the stripping-out (because of the loss of biological activity and/or the addition of harmful chemicals) of beneficial nutrients and elements essential to human health (Jehne 2012; Falconer et al. 2007; Crawford et al. 2005; Young & Crawford 2004).
By ‘healthy soils’ in non-arid environments is meant a soil with stable physical and chemical soil structure; one that is biologically active, rich in diverse microbial life; containing healthy balances and diversity of microbial organisms that are working in symbiosis with plant roots to exchange important nutrients for each, and also rich in macro-cellular life and activity. Besides many positive physical and chemical attributes, such healthy soils are highly hygroscopic, fix large amounts of carbon, and have actively functioning mineral and water cycles, whilst being self-cleansing of chemical pollutants. In semi-arid to arid soils they retain soil structure and have the capacity to respond rapidly to rain events through rapid soil hydration and awakened biological activity without structural damage. In all types of environments healthy soils sustain deep-rooted plants, shrubs, trees and biological diversity above and below ground.

In the field of transformative agriculture, *biological agriculture* means a focus on the use of natural management and energy inputs and systems, and/or the addition of biological inputs (not fossil fuel-derived), to generate the active formation and maintenance of healthy, living soil so as to produce crops and pastures, including in animal production systems.

**History of Biological Agriculture in Australia:**
What is different about this practice is that since the advent of industrial agriculture in the 19th century, and particularly since the use of fossil-fuel based energy for tillage and derived fertilizers and chemicals, industrial agriculture emerged as the dominant paradigm and practice globally. The contesting innovators of biological agriculture turned to both the long-practiced indigenous knowledge of biological agriculture that underpinned pre-industrial agriculture, and especially to founding thinkers in the contesting tradition. These included such international founding writers and practitioners as F.H.King (1911), Rudolf Steiner (founder of Biodynamics, 1924), Sir Albert Howard (founder of modern biological agriculture, 1943, 1972), Lady Eve Balfour (founder of the modern organic agriculture industry, 1976), and more recent writers on the subject coming from different perspectives, such as M.Fukuoka (1978). With an awakening in Australia of the perceived danger of industrial agriculture from the 1930s, there was an early move to Steiner’s Biodynamics, while such thinkers as Elynne Mitchell (1946) and P.A.Yeomans (1954, 1958, 1978) began articulating the thinking and concerns of such founders as Howard, Balfour et al.
It was out of this tradition that the modern leaders of an actively contesting biological agriculture tradition emerged. These include such figures as Dr. Christine Jones and Maarten Stapper – both of whom were CSIRO scientists who independently turned their backs on that organisation’s commitment to an industrial agriculture pathway. The growing move to biological agriculture in Australia has been cross-fertilized in particular by an active American contesting tradition – either by its leading writers and thinkers (such as Wendell Berry (1977), J.I. Rodale (1946, 1984) and Wes Jackson (1980, 2010), or by active trans-Pacific visits by either Australians to the USA or by such scientists from there, such as Drs. Arden Anderson and Elaine Ingham.

Within this case-study there is a growing emphasis on the linkage in biological agriculture connecting healthy soils to human health. Chemically-based industrial agriculture is seen as causing the loss of vital chemical components and nutrients essential to both balanced health and disease prevention. A plethora of Australian, American and other writers and practitioners now operate in this field: popular ones including Dr. Arden Anderson and Jerry Brunetti in the USA and Graham Sait and Dr Carol Hungerford in Australia.

**Case-Study #2: Holistic Grazing Management (ruminant animals)**

**Description:** This practice is listed second after biological agriculture to emphasise its importance in the whole field of transformative agriculture. This is for two reasons. First, as part of the methodology and design of the thesis, ruminant animals are an essential component of each case-study in this thesis. But second, and more importantly, evidence continues to mount that to develop long-term, sustainable (let alone regenerative) agricultural systems based around healthy soils, then an active ruminant animal component appears essential in nearly all cases. *Holistic Grazing Management* means the use of energy from animals as an accelerating catalyst of ecological succession in landscapes for livestock production systems, and focussed on high mob density, rotation and planned rest periods.

There is currently confusion in the literature and popular press over the definition of this contesting practice. Much of this confusion appears to stem from reductionist agricultural scientists and journalists attempting to pigeon-hole the practice but without either a practical or theoretical understanding of the fully holistic and integrated nature of the practice and its ecological nuances and interrelationships. Hence there are appellations such as ‘time-
controlled grazing”, ‘short-duration grazing’, ‘cell grazing’, ‘intense rotational grazing’ and so on (Richards & Lawrence 2009; Joyce 2000; McCosker 2000; Sparke 2000; Stinner et al. 1997; Earl & Jones 1996). I have defined this practice as holistic grazing management because the word ‘holistic’ both goes back to its theoretical origins under innovator Alan Savory, but especially because it involves the practice and required understanding of a truly holistic, integrated and complex management system that, as it interacts with and changes natural systems, is not prescriptive and controlled but is highly reactive, fluid and adaptable (Savory 1988; Smuts 1936). The word ‘management’ connotes disciplined exercise of such environmental factors as timing of grazing and their duration, animal density, knowledge of vegetation compositions and successional processes, and of animal rest period and recovery: all implying active and skilled practical management built on sound ecological knowledge but with an holistic, interactive and integrated flexibility. This approach of holistic grazing management has been found to work in synergistic fashion with all the transformative case-studies discussed here, and also with Case-study #11 – integrated productivism.

History: Using ruminant animals to enhance soils, whether to build soil fertility alone or to prepare for a cropping cycle in a rotational system, has been known for millennia – and was brought to a sophisticated level in Europe from the Middle Ages on via strategic ‘folding’ of sheep flocks (Massy 1990, 2007). Holistic grazing management was developed by Zimbabwean wildlife biologist Alan Savory over a period from the 1950s to the 1980s in southern Africa where he worked as both game warden, research officer, natural resource manager, farmer, farming advisor and educator, and fighter in the famous Selous Scouts during the Rhodesian civil war (Savory 1988; Savory & Butterfield 1999). Despite scientific training, Savory was influenced by Jan Smuts’ work on holism (Smuts 1936), and he realised he was an holistic and not reductionist thinker. Another strong influence was the pioneering French agronomist in rotational grazing, André Voison (1960, 1961). Based on years of observation and feed-back from southern African ruminant animal managers, Savory realised, first, that both farming and game reserve management practices were the cause of land degradation (that is, it was to do with the personal psychological constructs behind management); and second, that ecological and soil health in Africa was found where the large herds of migratory ungulates and ruminants passed: that is, where there was high animal density, mass injections of energy, mass recycling of plant material and nutrients, short but intense grazing and long rest or recovery periods. From this the practice of holistic grazing management evolved in Zimbabwe, South Africa and Namibia, before spreading to the USA
in the 1980s and then Australia by the end of the 1980s. This followed the establishment of the Centre for Holistic Management in 1984 in Zimbabwe, and a subsequent off-shoot for education in New Mexico. Holistic Management thus evolved to take a conscious holistic approach involving decision-making, ecological management, financial and organisational management, and personal management.

When Savory was in partnership with Alan Parsons, he was brought to Australia in 1990 by the future leading holistic educator Terry McCosker (a Queensland-based agricultural scientist who evolved into a leading holistic thinker and specialist transformative agricultural educator). But at the time Parsons and Savory annulled their partnership. McCosker, working with Parsons and later alone, formed his Resource Consulting Services (RCS) – the pioneering and leading innovative extension/diffusion organisation in holistic grazing management in Australia from the early 1990s. In turn, Savory then brought and developed his Holistic Management organisation to Australia from the early 1990s also, thus providing two schools with slightly different emphases around the base approach. The Holistic Management organisation, using a group of local educators, has continued to restrict itself to teaching Holistic Management in Australia, whereas McCosker’s RCS went on to become the leading education/diffusion organisation, constantly innovating as it sought to seed-in other streams relevant to holistic grazing management – and a number of which helped galvanise other contesting practices (such as biological agriculture, subtle energy-based practices, human health linkages via healthy soils, and so on). In 2006 RCS morphed into two separate bodies: a predominantly Queensland-based RCS and a wider and southern-based Principle Focus.

Case-Study #3: Water Management and Soil Rehydration

**Description:** This case-study of practices involves the use of human machinery or energy to alter the flow of water in the landscape so as to restore the original landscape’s hydrological cycles and soil health, and to re-hydrate soil profiles in animal production systems (for example Yeomans-Keyline farming and derivatives and Peter Andrews’ Natural Sequence Farming or variants). Altering water flow can involve a variety of mechanical engineering mechanisms (e.g. specially sited dams, across-contour tillage methods, contour interception and re-direction banks or swale-type channels, or more simple, man-made bio-mimicry blocks in water-courses) to delay/retard water flow and allow silt deposition and consequent
restoration to original, pre-European and pre-landscape degradation status. The object of most methods is to work with the more normal patterns of Australian (as opposed to a more regular and gentle European) precipitation - of large, irregular, short time span rainfall events – and to capture, deflect or mitigate the damaging nature of these under a widespread industrial agricultural system.

**History:** In the late 1940s and 1950s P.A. Yeomans (1904-1984) developed his ‘keyline’ approach to capturing and re-directing water in Australian landscapes. This involves the use of engineering intervention – across-contour channels and tillage and dame storage. Yeomans was previously influenced by such biological agricultural pioneers as Sir Albert Howard, Lady Eve Balfour and other thinkers in the area like André Voison and Louis Bromfield. He saw a healthy soil as key to profitable Australian agriculture. Recognising that much rainfall in Australia occurs in sharp, rapid events where most of the rain runs off (damaging the landscape in the process), Yeomans sought, via his approach, to retain most of this water in the soil and landscape. Via his methods he showed that soil formation could be accelerated in broadscale Australian agriculture through the stacking of methods (Yeomans 1954; 1958; 1978; Voison 1960, 1961). Yeomans was also the first to introduce the practice of ‘design’ to the landscape use of Australian farms – helping to spawn in turn the practice of Permaculture (see Case-Study #10).

Yeomans’ ‘Keyline’ approach is practiced today, including via Permaculture practitioners and such landscape designers as Ron Watkins of Western Australia, who worked with Yeomans before progressing his own design approach to include biodiversity and other components in the landscape.

More recently Peter Andrews (2001, 2008) has popularised a parallel technique to that of ‘Keyline’ with his ‘Natural Sequence Farming’. This is also designed to rehydrate the landscape, and focuses on delaying or interrupting water flow in eroded streams and gullies so as to re-create what he believes was the original form of most Australian streams: chains of ponds, often set higher than surrounding valley floors, that trapped and held Australia’s scarce water in the landscape, and thereby enhancing soil rehydration and consequently healthy landscape and ecological function.
In arid and semi-arid regions variants of the above techniques – generally called ‘water ponding’ - have been developed by a number of innovators. The idea is to regenerate degraded landscapes by making small, longitudinal earthworks or mini-swales along contours and depressions. These serve to trap and hold moisture, creating new environments for ecological succession and the regeneration of more desirable vegetation species.

**Case-Study #4: Subtle Energies (including Biodynamics)**

**Description:** this approach includes practices involving Rudolf Steiner-derived Biodynamics in broad scale animal production systems, but also includes parallel techniques working with *subtle energies*. By ‘subtle energies’ is meant ‘those energies beyond those presently acknowledged in physics’ (Tiller 1999), and the term refers to energy frequencies in the cosmic, earth and living organisms’ systems which cannot be measured by conventional instrumentation but which can affect organisms at a cellular level. Much of this knowledge in fields like geomancy dates back millennia, and is part of the old organic knowledge system.

**History:** Various Rudolf Steiner followers and advocates of Biodynamics brought this thinking to Australia. Perhaps the most influential person in spreading Biodynamics was Russian emigrant Alex Podolinsky, who came to Australia in the early 1950s (Porter 2008; Schilthuis 2003; Lovel 1994; Podolinsky 1985). By Biodynamics is meant the suite of organic agricultural practices popularised by Steiner from 1924 (Steiner 1924). This focuses on sustainable use of a farm’s own resources, and, via various tillage, organic fertilizers, and home-made ‘preparations’, to regenerate soil via humus formation and enhancing soil microbial activity, soil structure and healthy root systems. From resultant biologically active soil comes healthy food.

In this thesis it is the broader landscape practice of using ‘subtle energies’, in conjunction with biodynamics, that are the key focus. As mentioned above, knowledge of subtle energies goes back millennia, and can be found in many cultures across the globe, where religious rituals, pyramid sitting, Druid practices and so on are based around the capacity to detect energy flows in the landscape, cosmos, and into animal and human body systems. The latter is the basis of many Eastern healing practices, for example, and is behind China’s energy body flow knowledge and acupuncture. But while such knowledge is accepted in a number of Asian and ‘Eastern’ cultures, in the contemporary ‘Western’ world it is regarded sceptically.
In the latter it is best known in the human and animal health industry. Only now is such knowledge beginning to be applied to agriculture so as to enhance the health and vitality of landscapes, and of animals, plants and humans within them. Beyond Steiner-Biodynamic practitioners using cosmic energy fields to regulate their planting times and biological micro-organism preparations (‘preps’), a more conscious fusion of Steiner beliefs with subtle energy practitioners began in the 1980s and 1990s with the advent of such biodynamic specialists as American Hugh Lovell, who began playing an active education role in Australia. A key move in this field was when the Resource Consultancy Services (RCS) group in 2002 brought to Australia the US eco-agriculture consultant, Dr. Phil Wheeler, who first introduced the full concept of subtle energies. Since then RCS has initiated education visits by similar practitioners, such as the Scottish geomancer Patrick McManaway in 2010. Beyond practices to do with field broadcasting towers at the confluence of energy leylines in the landscape and designed to distribute biodynamic preps, and linked to psychological ‘intent’ in the landscape, practitioners like McManaway are introducing into broad-scale agriculture concepts along geomancy lines of land acupuncture to deflect negative energy fields, or to enhance the positive in regards to soil, landscape and animal health. This work is at the extreme conceptual spectrum of transformative agriculture, and, whilst now practiced across broadscale agricultural operations and on large farms by full-time committed commercial agriculturalists, is way outside any industrial or traditional agricultural paradigm.

Offshoots of the energy work amongst transformative agriculturalists also touch on the field of psycho-energetics: the directed focus of human attention and other processes ‘requiring the involvement of emotional, mental, spiritual, and other inadequately understood domains of nature’ (Tiller 1999). That is, this work became linked to energy fields and work in human healing – such as kinesiology, radionics and The Dawson Method. The latter (known as ‘vibrational kinesiology; http://www.plexusbio-energy.com/dawson-programme.htm - accessed 21.08.2010), was evolved by an innovative holistic grazing manager and eclectic transformative agriculturalist from Tasmania, Peter Downey. It is based on the work of Cameron Dawson and was adapted and extended by Downey. The method uses knowledge of human and psychic energy fields to effect healing (and based on ancient Western and Eastern knowledge cultures in this area). This work is seen as one component of a fully holistic approach in transformative agriculture.
Case-Study #5: Native Grassland Regeneration and Management

**Background:** Since the beginning of European agriculture in Australia, non-European Australian native grasses – being alien and foreign to the new settlers – were regarded as worthless and of no relevance to European and subsequently industrial agricultural systems. Except amongst ‘inside country’ managers and a few pastoral managers in the sparsely-settled, semi-arid and rangeland zones where native grasses and shrubs were the only viable vegetation resource (however modified), this prejudice was subsequently reinforced with the growth and spread of the different phases of research and extension by state and federal bodies from the late 19th century. By the post World War II period and the rapid spread of chemically-based industrial agriculture (especially from the 1980s) as state and federal R&D and extension bodies declined and were replaced by the mounting power and resources of transnational chemical, ‘pharma’ and seed companies, the trend against native grasses became even more pronounced. Evidence of this is graphically demonstrated by the repeated observation by both interviewees and surveys which reveal an abysmal lack of knowledge about native species (e.g. identification and habits) versus those of ‘improved’ or introduced industrial grass species (e.g., Garden et al. 2000).

The emergence of a group of practitioners favouring native grass species was a major contestation against what they saw as a myopic, Euro-centric and misplaced industrial agricultural view that was biased towards the dominant industrial agriculture approach based on ‘improved’ or ‘introduced’ exotic pasture species and synthetic fertilizer applications. The basis of these contesting grassland practitioners is a specific approach expressly favouring progressive ecological succession of adapted, local native grass species as the basis to livestock production systems.

**History:** Despite the powerful currents of the dominant paradigm of industrial agriculture mentioned above, there was an increasing contesting voice from the 1970s that argued for locally-adapted native grasses as a resilient and useful, if not essential, component in grazing systems. Such workers as Professor R. Whalley led this development, followed by an emerging but small number of native plant botanists – such as Judi Earl and Christine Jones out of the UNE; David Eddy and Sarah Sharp out of the ACT/NSW; and Anne Prescott and Millie Nichols out of South Australia, and others. This vanguard was subsequently supported.
by specific programmes through such bodies as *Greening Australia, The Nature Conservancy,* the *Australian Conservation Foundation,* and *The World Wildlife Fund.*

This emerging interest amongst professional botanists then coalesced with a group of transformative agricultural innovators and early adopters who were involved in holistic grazing management, biological agriculture and/or pasture cropping – the latter’s ecological and vegetation base being originally dependent on C4 native pasture species. The upshot, due to the initiative of people like Darryl Cluff and Colin Seis, was the formation in 1987 of an organisation called *Stipa:* the native grasslands society of Australia – which took its name from a common genus of Australian native grasses. This organisation then coalesced with an emerging group of contesting scientists/botanists like Christine Jones, Judi Earl, Anne Prescott and Millie Nichols and company, and with an increasing number of farmers adopting in particular holistic grazing management, but also pasture-cropping and other contesting case-study practices.

Interviews in this case-study comprised innovators and early adopters involved either in *Stipa* or in a specific focus on native grasslands. Also interviewed was a subset of traditional Riverina and semi-arid grassland managers: people whose ecological base was native grass and shrub-lands, but who were not holistic grazing management practitioners. I was probing here for differences between the two groups and to ascertain if a lack of ecological literacy was a factor in non-adoption.

**Case-Study #6: Edible Shrubs in Livestock Production Systems**

**Background:** Because ruminant animals co-evolved with natural systems in the undomesticated state, they graze and browse on a mixture of grasses and shrubs to obtain a variety of nutritional and medicinal food components (Provenza 1995, 1996, 2000, 2003a & b, 2008). However, modern industrial agriculture is predicated on a grassland (or horizontal) grazing system, and particularly one grossly simplified (in regards to a diversity of species) – if not predominantly monocultural. Practitioners of this transformative agricultural system are challenging the industrial system as they seek to introduce a deeper rooted, vertical or shrub component to grazing systems. This is done for a variety of reasons: for a greater diversity of nutritional sources; to complement or fill-in ‘holes’ in yearly grazing systems; to build in drought resilience; to tap and distribute deeper-sited minerals and nutrients; and for other
purposes, such as shelter, natural anthelmintic administration, and to create synergies in ecological succession in pasture-cropping and holistic grazing management systems.

**History:** since the first European settlement of saltbush and bluebush country with livestock in the semi-arid and rangeland zones from the 1840s in NSW and South Australia in particular, it has long been known that such shrubs provide valuable nutrition – especially in dry or drought times (Buxton 1967; Massy 1990, 2007). However, despite South African silviculture work with Australian saltbush from the 1930s, it was not until the late 1980s and into the 1990s that any work – private or public – was done by Australian workers with Australian native shrub species. The private work was done by entrepreneur Andy Siepel, who also re-imported from South Africa the selectively bred Australian saltbush cultivar DeKoch. The next development was collaborative native shrub research (particularly with saltbush – *Atriplex spp.* – and bluebush – *Maireana spp.*) by state R&D bodies (particularly at the Waite Institute in South Australia), and by such workers as Clive Malcolm of the Department of Agriculture in Western Australia. Then, in 2001 came the federally funded CRC for Plant Based Management of Dryland Salinity, also working on saltbush and other species. In 2007 this evolved into the CRC for Future Farm Industries, where a key programme, the *Enrich Programme*, continued the development of earlier work by examining 100 native shrub species for a variety of traits. This work gained funding in 2012 for national commercial trialling.

In regard to exotic edible shrub species, there was work dating back to the 1960s on *tagasaste* (white-flowering tree lucerne) – as both a nitrogen-fixing legume and edible shrub species and useful adjunct to shelter-based tree-breaks in the more intensive farming and grazing regions of Australia, but this had not proceeded to conscious nutritional work.

In the meantime a range of individual farmers were evolving shrub-based grazing systems – particularly with *Tagasaste* and saltbushes. The former was pioneered in particular by Bob Wilson of Lanacelin in the Geraldton sand-plain of Western Australia from the 1980s, where annual pasture-based systems on sandy soils led to both severe nutritional holes in the long dry seasons (November to May), and thus to severe soil degradation. As these systems were being evolved, and via people like CSIRO scientist Dr. Dean Revell (leader of the *Enrich Programme*) and some individual farmers, linkages were made to American Professor Fred
Provenza and his work on co-evolved nutritional shrub-pasture grazing systems, and on the animal-plant interactions connected to this.

**Case-Study #7: Agroforestry.**

**Background:** Since early work from the 1940s on the benefits of tree-breaks particularly for livestock shelter in production systems (but also for shade), there has existed a belief for decades in Australia that trees are either an adjunct to a grazing system (tacked on for specific uses) or else that small areas of monoculture plantings (particularly *Pinus radiata*) might serve as a long-term harvestable industrial forestry resource. That trees could be fully integrated into an agricultural system for a plethora of uses, including as being integral to landscape function, was rarely considered: given that the reductionist thinking that lay behind both industrial agriculture and forestry seemed incapable of viewing the two land-use systems as capable of being fully integrated for synergistic reasons. Consequently, agro-forestry in Australia until the 1970s and 1980s saw either poorly designed tree-breaks, with little native components, or else poorly-managed monoculture block plantings of predominantly exotic species. The recent craze for blue-gum plantings in Western Victoria (and due to badly designed and failed taxation incentive policies such as Managed Investment Schemes) only emphasised this thinking. What had been omitted was the use of managed tree planting and silviculture as an indivisible and integrated component of livestock production systems.

**History:** The shift to a transformative, integrated agricultural use of agro-forestry sprang largely out of four areas: (1) from the 1970s on, individual farmers either sympathetic to the need for greater biodiversity and native trees and shrub species on over-cleared and/or degraded or challenged (e.g. Eucalypt dieback in New England) agricultural land; (2) also from the 1970s on, innovative farmers in Tasmania who refined the long-cycle management of Eucalypt harvesting in extensive timbered country that linked to their more intensive livestock production lands; (3) from the 1980s the *Otway Forestry Group*, which evolved from Melbourne University agro-forestry innovator and educator Rowan Reid, and which has spawned highly integrated agro-forestry and the *Master Treegrowers Programme*; and (4) from the 1990s, recent developments in specific carbon-fixing programmes or fuel-based or other commercial agro-forestry programmes (such as Blue Mallee plantings) that have morphed into more biodiverse plantings.
Case-Study #8: Managing for Biodiversity

**Background:** This land-use practice within grazing systems evolved generally as a reaction to land degradation, to historical over-clearing, and to a perception that ongoing environmental deterioration would occur without greater diversity of native grasses, trees and shrubs and their associated biota. As distinct to agro-forestry – though closely related – this approach is where landholders, for either commercial and/or strong ethical/value reasons, place a high emphasis and a specific focus on planting or regenerating native tree, shrub and grassland species to encourage rich floral and faunal biodiversity so as to enhance livestock production systems.

**History:** There has been a long history in Australia of farmers and gardeners sympathetic to the planting of native plant species – and popularised by such pioneering garden designers and native plant pioneers as William Guilfoyle, Thomas Shepherd, Thistle Harris, Florence Sulman, Walter Burley Griffin and his wife Marion Mahony, Edna Walling, Ellis Stones and Gordon Ford (Hambrett 2004). However, it was not until the 1970s that a more general shift amongst urban and farming garden and plant consumers alike led to the development of pragmatic and cost-effective silviculture and propagation techniques and the commercial availability of native species in specialist nurseries. For farmers, the Victorian Conservation League nursery was an early pioneer. From this time a number of innovators across Australia refined propagation, design, planting and direct-seeding techniques that facilitated broad-scale biodiversity plantings in a range of environments.

Case-Study #9: Pasture-Cropping and Variants

**Background:** Since the domestication of grass-type, annual-cereal species over 11,000 years ago in the Eurasian fertile crescent, cultivated crop growing has intensified in terms of both tillage mechanisation and energy use, the addition of outside fertilizers, minerals and so on, and environmental modification of soil and associated biological and ecological systems. From the 1930s onwards this process escalated decade by decade with the increasing intensification of industrial agriculture, which has seen an almost exponential escalation in the use of fossil-fuel, synthetic fertilizers, petro-chemical derived herbicides and pesticides, plant varieties dependent on herbicide use, ever larger machinery, and now genetically modified or transgenic crop varieties dependent on herbicide applications.
Pasture-cropping seeks to reverse this intensified, fossil-fuel industrial cropping trend that leads to ever-escalating ecological, epidemiological and energy-use problems. The technique involves the use of direct-drill machinery to plant cereals with either minimal herbicide and industrial fertilizer use (pasture-cropping) or else no herbicide or industrial fertilizer use (no-kill cropping) in conjunction with reduced fossil-fuel use, into dormant native perennial grasslands (and now increasingly into exotic perennial grasslands). Holistic grazing management with sheep and/or cattle is integral to energy injection, nutrient recycling and overall landscape function in this farming practice.

At the cutting edge of innovating early adopters, the aim is to achieve what has not been done in cropping in modern agriculture: to be able to crop in healthy native pasture systems. In the context of 11,000+ years of domesticated agriculture, it is clear that pasture-cropping/no-kill cropping is a millennium breakthrough.

**History:** Over recent decades since the advent of minimum-till machinery (and sometimes in earlier times with conventional tillage machinery), and particularly in marginal or suboptimal seasons, farmers have tried the odd experiment of drilling cereals into uncultivated ground with minimum industrial inputs. No one took this further until the 1980s when two separate experiments led to these revolutionary techniques. These experiments both occurred in the mixed farming-grazing Central West region of NSW. The first – pasture-cropping – occurred near Gulgong in 1993 when two friends (Darryl Cluff and Colin Seis) discussed trialling the concept of drilling cereals into C4 winter-dormant grasses. After successful trials, it was Colin Seis who went on to evolve and refine the technique. Further adaptations followed via the iteration of Seis and early adopters, to the extent today where the best practitioners, over a cycle of seasons, have average crop yields comparable to high-input industrial farmers but with vastly reduced inputs and thus costs. Holistic grazing managers now use the method to synergistically stimulate ecological succession in native grasslands. The pasture-cropping technique has now spread across most states, including its use with exotic perennial grasses and even in annual systems.

The no-kill cropping variant technique was developed by Bruce Maynard near Narromine, NSW, at the same time as ‘Pasture Cropping’, and has evolved more as an opportunistic/ephemeral system for cereal crop production, with a focus more on a cereal
component in livestock grazing in winter months and whose synergistic acceleration of ecological succession in grasslands is a key focus.

**Case-Study #10: Permaculture Design Principles**

**Background:** The practice of Permaculture is more a whole of farm or landscape design approach than one practice *per se*. However, a number of broad-scale farming and/or grazing operations use this as their overall planning and operation approach, and so it was deemed of sufficient innovative/transformative importance to be studied in this thesis. What the case-study illustrates about transformative agriculturalists is that once embarked on one of the case-study approaches studied in this thesis, invariably most come to realise the holistic inter-relationship of other components, and so begin a journey of both ongoing learning and the practical incorporation of one or several of these other components. To do this most effectively, a number of farmers have used Permaculture design principles as their main design and operational framework. That is, they use refined versions of the Mollison-Holmgren Permaculture approach to food and animal production. This was developed by Bill Mollison and David Holmgren in the mid 1970s. In the context of this thesis it means the use of principles derived from the operation and organisation of diverse, stable and resilient ecological systems so as to consciously design and enhance productive agricultural ecosystems and their communities (Smith et al 2007; Holmgren 2002; Mollison 1988).

**Case-Study #11: Integrated Productivism (Livestock and Cropping)**

This is an emerging new transitional practice that involves an ecological turn in industrial productivism. As indicated in the Case-Study #2 section above on the history of holistic grazing management, the use of animals to enhance soil fertility and health (especially in a crop rotation cycle) has been known for millennia. Using ruminant animals specifically as a way of natural nutrient recycling and fertilizing is incompatible with modern cropping systems: at best in less intensive operations sheep may be occasionally used for stubble and weed ‘control’. As Int.## 56 stated: ‘Convention would dictate…the exclusive arrangement, that livestock are kept out of the farming region…the conventional focus is towards a high-input, zero tillage, controlled traffic, variable-rate technology…and involves high inputs of synthetic fertilizers.’ Such systems also have repeated, shallow-rooted annual crops on often shallow and not necessarily intrinsically rich soils.
However, in the course of my research and travels across wide areas of Australia, it became clear that in a few regions, and within specific industrial practices, a number of industrial agriculture cropping operators at the very top end of professional management with combined high productivity and who had begun to hit some major ecological problems as a result of their intense practices, have sought more balanced ecological amelioration approaches through the use of livestock within their cropping systems.

By *integrated productivism* I mean a practice in transition between the very highest levels of industrial agricultural production and a more sustainable agriculture. Int.# 66 calls this approach ‘walking the middle road’: between high input, high production and low inputs (organics etc.). Int.#67 calls their intensive cropping approach ‘broadacre horticulture’, where ‘we need to use ecology and not chemistry…We’ve forgotten how to use ecology. We’ve lost a skill base…Everything old is new again.’

I noticed the emergence of *integrated productivism* in two areas in particular. The first was in the northern Midlands of Tasmania, just south of Launceston, where an innovation node of progressive, high-production farmers have collaboratively iterated to initially develop high-production mixed farming and multi-crop systems based on intensive, centre-pivot irrigation systems. On encountering ecological problems (e.g. rising water tables, salinity, deterioration in soil structure and crop yields, increasing soil sodicity and plant diseases, weed invasion, and herbicide-resistant weeds), this group has collaboratively begun to evolve corrective or ameliorating methods using integrated livestock rotations on deeper-rooted perennial grass rotations. Research-based work and the study of global systems puts this group, in my opinion, at the forefront of such highly productive integrated cropping-livestock systems – as none comparable have been found internationally (see, for example, Nuffield scholarship work by Bradley 2010; Paulet 2011; and Warburton 2011).

The second area of *integrated productivism* I researched occurs in the maximum intensity grazing system called Technograze, which was evolved in New Zealand in the 1970s by Rangitikei farmer Harry Wier (Charlton & Weir 2001). The technique was brought to Western Victoria and South Australia’s Mt. Gambier region soon after. Originally evolved for intensive bull-beef production, the practice involves intensive electric fence management of animals on small (often irrigated) pasture plots in a rotational system. Again, following
ecological problems, elements of holistic grazing management were adapted to achieve a more balanced system. The cropping phase relies more on introduced exotic grass species than cereal grain or grazing species.

Overall, and especially as exemplified in northern Tasmania, this case-study appears to be a major evolution in the turn to a sustainable ecological agriculture, but without the revolutionary or overtly challenging transformative components of other case-studies that seem both to serve as too high a cognitive barrier for many high-production industrial agriculturalists, and which have fully turned to the new-organic from the mechanical. As one of the pioneers of this approach, Int.# 67, stated: it was ‘an ecological and economic’ decision to evolve to an integrated approach.

Case-Study # 12: Industrial Agriculture.

As defined in Chapter 2, this case-study comprises the dominant or hegemonic practice in modern agriculture: the practice against which the various transformative agriculture cases are seen as contesting (except perhaps for integrated productivism). A number of the leading proponent-practitioners of this approach were interviewed so as to provide their counter-perspective and to gain a further insight into personal constructs and language.
APPENDIX NINE: Innovation Nodes

In the course of my research, and because I covered most bio-regional and agro-ecological regions in southern Australia, along with most of the leading innovators in the key transformative agricultural case-studies, I became aware of three nodes of innovation. I define such a node as a local region where a group of practitioners, in ongoing iterative and mutually supportive fashion, proceed in a phase of ongoing innovation and adaptation in a particular practice or practices, and from a starting position begun by one or a few innovators.

The three cases in point comprise: (1) the central west region of NSW, in the Gulgong-Wellington area, where an iteration between the originators of pasture-cropping and holistic grazing management has led to an ongoing innovation and adoption cycle in both practices; (2) the northern midlands of Tasmania where a group of high production, centre-pivot irrigating croppers and livestock producers have pushed their management systems towards an evolving integrated livestock-cropping system of ecological productivism; and (3) the Otway Ranges Agro-Forestry group of south-western Victoria, based on the work of Rowan Reid.

While the issue of a seemingly spontaneous artistic or cultural fluorescence at different times and places in history has long fascinated historians (such as 16th century Renaissance Italy, the 17th and 18th century scientific revolution in England and France, the English agricultural revolution of the 18th century, the cultural flowering in Vienna in the early 20th century, the Frankfurt school of philosophy in the mid 20th century and so on), localised agrarian innovation nodes do not appear to be a well-studied or recognised area.

On probing this concept, and from a range of interviewees in the three key areas, I have noticed the following factors that appear to contribute to the emergence of these innovation nodes. First, in the Wellington area there seems to be a number of converging contributing factors. (1). It is one of the oldest specialist cropping regions in Australia, mixed with hilly, timbered country unsuitable to tillage for cropping or intense grazing, and so retaining some excellent native perennial pasture; (2) because of the location of the region, at the respective margins but also the mingling of the sub-tropical and temperate zones, such native grasses contain both C4 species (winter-dormant, summer active) and C3s (the reverse, but more able
to be ephemeral). The existence of C4 grasses allowed *pasture-cropping* to be developed, while the ready presence of both grass types allowed a rich perennial diversity that is the basis of highly functional *holistic grazing systems*; (3) *pasture cropping* and *no-kill cropping* evolved in an area that was also one of the early adopters of *holistic grazing management*; (4) these early adopters were often on contiguous properties; of similar age (30s and 40s) and often of similar/shared secondary and tertiary education; had family friendship histories going back a number of generations; and (5) because of the higher adoption rate of *holistic grazing management* and other practices, a number of the diffusion organisations had educators and/or innovators based close by. This in turn led (6) to ongoing, usually self-directed, mutual support organisations being formed; because of the high uptake, energy and synergy of a number of transformative agricultural practices, a critical mass of an iterative innovation-early adoption-innovation cycle seemed to gain traction – aided by both well-funded and supportive CMA and *Landcare* groups, and recently by a Sydney University team and other workers specially studying this regional adoption through the *Communities in Landscapes Project*. The nearby major city of Dubbo also has a bookshop that specifically caters for the transformative agricultural movement.

The second innovation node is in the northern Tasmanian Midlands, where a number of similar human and physical factors appear to operate: (1) the presence of a good physical environment (soils, temperate climate and abundant irrigation water), which favoured some of the highest agricultural productivity in Australia; (2) the densely settled nature of the region allowed high farmer-urban-tertiary institution or government departmental interactions; (3) similar to Wellington, a long-settled agricultural region with family friendship histories going back a number of generations; (4) a group of similar aged farmers (30 to 50) on contiguous properties, most educated at the same secondary and tertiary institutions; (5) many of these farmers did RCS or similar courses, but also subscribe to leading productivist extension groups such as *Southern Farming Systems*, and a few acted as leading boundary-pushers via Nuffield scholarships and other mechanisms.

The third innovation node is the Otway Forestry Group, which also had a number of similar features to the above two: (1) a region with excellent physical features for both agroforestry and agriculture (coastal-influenced Mediterranean climate; high rainfall and good soils; rich stands of remnant vegetation); (2) high value land with pressure to have greater diversity of high value enterprises; (3) a closely- and long-settled area close to Melbourne and its
universities, where a number of farmers have family history and local cultural connections going back generations, but also where newer settlers escaping to a rural life have brought higher education levels and new thinking; and (4) the settlement/re-location in the area of the key innovative-catalyst in integrated agro-forestry in Australia (Rowan Reid).

The result of these serendipitous, or confluence of, factors in each case has led (and unlike in other less densely settled, or newer agricultural areas) to higher than normal levels of innovation, adoption and persistence of practices, but also ongoing levels of a constantly evolving innovation-adopt-ion-iteration cycle.

For example, Interviewee # 62 in the Wellington area: ‘It’s what Gladwell talks about …Wellington’s one of those spots where it’s the right time and the right place, where we have a strong community aspect with the right people.’ (Gladwell 2008).
GLOSSARY

*Adaptive Landscape Genomics* (new theory development): An holistic approach to the animal-plant-ecosystem/environment and management, where there is a specific emphasis on, and recognition of, the plastic adaptation, evolution and selection of animals and plants best suited to their environment via such mechanisms as epigenetics and non-additive gene function.

*Adaptive Theory*: This attempts to combine an emphasis on prior theoretical ideas and models which feed into and guide research while at the same time attending to the generation of theory from the ongoing analysis of data (Layder 1998).

*Additive Gene Functions*: A kind of gene expression in animals where, in this type of inheritance, there is no sharp distinction between genotypes, just many gradations between the two extremes. Such gene action is assumed to be comprised of the small, incremental additions of many genes, as opposed to the major impact of one or a few major genes or gene functions (as in epigenetics), and which can be termed non-additive gene function.

*Adoption*: The taking-up of an innovation.

*Affective*: The other component in human brain function that complements the cognitive: and which involves emotions, feelings, intuition, deep memory, the beyond-conscious.

*Affective Experience or Learning*: Where emotions and feelings play an important role in human behaviour and functioning, and is connected to the beyond-conscious development of thoughts and actions.

*Agency*: In sociology refers to the capacity of individuals to act independently and to make their own free choices. In contrast, structures are those factors of influence (such as social class, religion, gender, ethnicity, customs) that determine or limit an agent and his/her decisions (Wikipedia/org/wiki/agency-sociology. Accessed 20/11/2012).
**Agrarian Myth:** A belief concerning a powerful mythology of the countryside which holds that agriculture is ‘special’, ‘unique’, or ‘privileged’; that it is the core of a society’s wealth and thus deserving of special treatment (Graham 1966).

**Agricultural Productivism:** A commitment to an intensive, industrially-driven and expansionist agriculture with state support, and based primarily on output and increased productivity (Lowe et al. 1993).

**Agroecology:** The application of ecological concepts and principles to the design and management of sustainable agroecosystems (Gliessman 1998).

**Allelopathy:** A biological phenomenon where an organism produces one or more biochemicals (allelochemicals) that influence (either positively or negatively) the growth, survival, and reproduction of other organisms. Allelopathy can be an important factor in determining species distribution and abundance within plant communities.

**Anthropocentrism:** The belief that nature belongs to humans, not humans to nature.

**Anthropogenic:** Human-caused.

**Antinomy:** The antithesis to another pole; a binary opposite. These reflect the way the human mind has a propensity to organise phenomena in opposite pairs. For George Kelly, it means that every personal psychological construct is bipolar by nature: that it is dichotomous.

**Autopoiesis:** (‘self-producing’ or ‘self-defining’). A mechanism by which a system continually produces its own components which are then involved with the same production processes (Reynolds 2005).

**Belief System:** A set of mutually supportive beliefs. The beliefs of any such system can be classified as religious, philosophical, ideological or a combination of these. Some philosophers hold that beliefs are always a part of a belief system, and that belief systems are difficult to completely revise (Wikipedia/Belief_System. Accessed 01/08/2013).
**Beyond-Conscious:** A term to describe something more than sub-conscious (the beyond conscious, cognitive, rational operations of the brain), and which includes deep memory, intuition, affective experience (emotions and feelings etc.) (see chapt. 9).

**Biodiversity:** The variability among living organisms from all sources. This includes terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are part: including diversity within species, between species and of ecosystems. (UN Convention on Biological Diversity, 1992).

**Biomimicry:** A new science or approach to knowledge and to viewing and valuing nature. This approach studies nature’s models and then imitates or takes inspiration from these designs and processes to solve human problems (Benyus 1997).

**Bio-Power:** Michel Foucault’s term for the mechanism of ‘normalization’ in society. That is, how a society is pervasively organised under the guise of improving the welfare of the individual and the population, but where it is a coherent political technology that is effectively largely hidden and also largely self-imposed or accepted. i.e., how individuals can acquiesce to those apparently holding society’s ‘truths’, ‘knowledge’ and ‘expertise’; how citizens can therefore unthinkingly allow themselves to be controlled through the ‘experts’, so as to conform and behave in certain ways (Foucault 1979; 1980b).

**Brittleness:** A concept propagated by Alan Savory and his Holistic Management system which allows environments to be classified on a one to ten scale: a rainforest being non-brittle at one, and a desert being brittle at ten. Brittleness is different to fragility, and is not totally rainfall linked. Some wetter environments, because of their lesser ecological resilience, may be more brittle to a particular management regime than drier environments (Savory & Butterfield 1999).

**CAFO:** Concentrated Animal Feeding Operation.

**Capacity Building:** Externally or internally initiated processes designed to help individuals and groups associated with rural Australia to appreciate and manage their changing circumstances, with the objective of improving the stock of human, social, financial, physical and natural capital in an ethically defensible way (Macadam et al. 2004).
**Case-Study:** An exploration of a ‘bounded’ system or a case (or multiple cases) over time through detailed, in-depth data collection involving multiple sources of information rich in context (Cresswell 1998).

**Cognitive Dissonance** (a term used in modern psychology): Describes the feeling of discomfort or disequilibrium when we simultaneously hold two or more conflicting cognitions: ideas, beliefs, values or emotional reactions (and manifested in such states as frustration, anger, hunger, dread, guilt, embarrassment and anxiety). This leads to a motivational drive to reduce dissonance by altering existing cognitions; or adding new ones to create a consistent belief system, or alternatively by reducing the importance of any one of the dissonant elements: a drive that can be manifested in puzzling, irrational and even destructive behaviour. (Wikipedia.org/wiki/Cognitive-dissonance; accessed 20/11/2012).

**Communities of Practice:** That place where learning occurs through social participation in the practice of a knowledge community. This involves social learning by individuals through observing others and by their social interaction in a group, and where there is iterative feedback between the learner and their environment.

**Conservation Agriculture:** A newly emerged industrial agriculture approach, ostensibly designed to enhance biological processes above and below ground, and incorporating the principles of (a) continued minimum mechanical soil disturbance; (b) maintaining permanent organic soil cover; and (c) diversified crop rotation.

**Contempo-Centrism:** Belief involving a focus on the present and a discounting of the future.

**Critical Inquiry:** Research that does not merely seek to understand but to also challenge, even change the constructed meanings that culture bequeaths us (Crotty 1998).

**Diffusion:** The process by which an innovation is communicated through certain channels over time among members of social systems (Rogers 1995). It involves both the planned and the spontaneous spread of new ideas and results in a kind of social change: an alteration that occurs in the structure and function of a social system.
**Discourse:** A particular conceptualization of reality and knowledge that attempts to gain hegemony, or that defines what is considered true/false and right/wrong. A shared way of understanding the world, that helps to construct meanings and relationships; it helps to define common sense and legitimate knowledge, and ‘each discourse rests on assumptions, judgements, and contentions that provide the basic terms for analysis, debates, arguments and disagreements (Dryzek 1997).

**Dowsing:** A technique to ‘divine’ or detect energy flows, metals, or other objects and materials beneath the earth, such as ground-water or currents of earth radiation (Ley lines). Usually conducted with steel or metal rods or wire, but also can be tree branch material.

**Ecological Footprint:** A measure of the amount of resources taken to maintain each human on the planet.

**Ecological Literacy:** An understanding by farmers and others of soil, the role of biodiversity, of landscapes and landscape function, and other ecological knowledge, and thus of the causes of land degradation.

**Economic Utilitarianism:** Where land-use decisions are based on economic criteria only, with a focus on productive capacity and economic return.

**Ecosystem Services:** The crucial components of natural capital provided by ecosystems. e.g., agriculture consumes such services as pollination, biological pest control, nutrient cycling and hydrological services; it provides such services as regulation of water quality, maintenance of soil structure and fertility, support for biodiversity and cultural services, and carbon sequestration.

**Emergent Properties:** The way novel and coherent structures, patterns and properties arise out of a multiplicity of relatively simple interactions in a complex self-organizing system.

**Enclosure:** The annexing and enclosing of land from the commons as owned, private property. Whilst this occurred over many centuries, it came to a climax in the 18th and 19th centuries. The end result was the destruction of the medieval peasant community – the
yeoman farmers – and the creation of the chequer-board pattern of the modern English landscape.

**Energy Towers:** Vertical towers (sometimes called ‘reagent wells’), made of various material (but often some forms of metal or ceramics), cited on the intersection of subtle-energy ley-lines, and from the top of which are placed biodynamic preparations. The belief is that the concentration of earth energy where the towers are cited spreads widely across the farm these elements as a form of field-broadcasting by balancing both the soil and atmospheric energy sources. Statements of field-broadcasting by balancing both the soil and atmospheric energy sources. Statements of intent can also be placed in such towers, focussing the mind-energy.

**Epigenetics:** The study of heritable changes in gene expression or cellular phenotype caused by mechanisms other than changes in the underlying DNA sequence. This refers to functionally relevant modifications to the genome that do not involve a change in the nucleotide sequence (such as DNA methylation). These changes can remain through cell divisions for the remainder of the cell’s life and may also last for multiple generations (wikipedia.org/wiki/Epigenetics; accessed 20/11/2012).

‘**Episteme**:’ Originally from the ancient Greek to mean ‘knowledge’ or ‘science’, but in this thesis the word refers to Foucault’s term. This is an expansion of Kuhn’s concept of ‘paradigm’ which is confined to science and the beliefs and assumptions that result in the organisation of scientific worldviews and practices. By contrast, episteme means the historical a priori that grounds knowledge and its discourses and thus represents the condition of their possibility within a particular epoch. Foucault’s ‘episteme’ is not merely confined to science but to a wider range of discourse. ‘Epistemes’ are something like the ‘epistemological unconscious’ of an era, where the configuration of knowledge in a particular episteme is based on a set of fundamental assumptions that are so basic to that episteme as to be invisible to people operating within it (Wikipedia.org/wiki/Episteme. Accessed 20/11/2012).

**Epistemology:** What it means to know; the validity of knowledge, which embodies an understanding of what is entailed in knowing (Crotty 1998; Layder 1998).
**Ethnography:** A description and interpretation of a cultural or social group or system, and which occurs where the researcher examines the group’s observable and learned patterns of behaviour, customs, and ways of life (Cresswell 1998).

**Experiential Learning:** Seen as a combination of experience, perception, cognition and behaviour, and where knowledge is continuously derived and tested-out in the experiences of the learner (Kolb 1984).

**Evidence-Based Agriculture:** (based on evidence-based medicine): The argument that the adoption of new knowledge, practices, technologies and innovations in agriculture should be based on published, peer-reviewed scientific and economic research.

**Food Security:** The ability of the world to provide healthy and environmentally sustainable diets for all its peoples (Godfray et al. 2010).

**Frames:** Mental structures that shape the way we see the world. Frames are known through language (Lakoff 2004).

**Framing:** In the social sciences this refers to a set of concepts and theoretical perspectives on how individuals, groups, and societies organize, perceive, and communicate reality. Framing thus refers to the social construction of a social phenomenon often by mass media sources, political or social movements, political leaders, or other actors and organizations. Framing can refer to a schema of interpretation, a collection of anecdotes and stereotypes, that individuals rely on to understand and respond to events (Wikipedia: Framing_(social_sciences): accessed 01.08.2013).

**Gaussian Curve:** A symmetrical, characteristic bell-shaped curve representing the normal distribution (or frequency) curve.

**Grounded Theory:** Whereby theories are ‘grounded’ in data in the field, especially in the actions, interactions, and social processes of people. Ideally, ‘grounded theory’ was envisioned to generate a theory closely related to the context of the phenomena being studied (Glaser & Strauss 1967).
**Heuristic:** Experience-based techniques for problem solving, learning, and discovery. Heuristics are strategies using readily accessible, though loosely applicable, information to control problem solving in human beings and machines; such as mental short-cuts to speed up the process of finding a satisfactory solution. Examples are ‘trial and error’; rule of thumb; educated guesses, intuitive judgements, common sense (Wikipedia.org/wiki/Heuristic. Accessed 20/11/2012).

**Historical Lock-in:** A consequence of path-dependence, where deeply held attitudes, values or world-views and also institutional instruments (such as legislation) either reinforce existing deleterious environmental behaviour and attitudes or else exclude other options (even in the face of evidence to the contrary). Behavioural lock-in can mean irreversibility due to learning and habituation (David 1985).

**Holism:** The antithesis to Cartesian ‘reductionism’ (the idea/belief that a complex system can be explained by reduction to its fundamental parts). Holism, in relation to social-ecological systems, means the idea that the component parts of a system do not, alone, determine or explain the system’s properties.

**Human Ecology:** The science of relationships between living organisms and their environment, with a perspective for problem solving that is focussed on interactions between human societies and the environment (Marten 2001).

**Human Edible Return:** Equals human-edible outputs divided by human-edible inputs.

**Humanism:** A supreme faith in human reason, and an almost irrational faith in the limitless power of humans, and of science and technology (Ehrenfeld 1978).

**Ideology:** The manner of thinking characteristic of a class or individual, and the ideas at the basis of some economic or political theory or system. Can also connote ‘meaning in the service of power’ (Thompson 1990).

**Incommensurability:** Thomas Kuhn’s concept that proponents of competing paradigms are prone to misunderstanding and misinterpretation; and because they ‘talk past’ one another, as
they find one another’s conceptual positions and policy recommendations incomprehensible or absurd (Bednarz 2011; Kuhn 1973).

**Industrial Agriculture:** The dominant, state-supported agricultural approach that is based on fossil-fuel based energy and its derivatives and associated technologies, and which is founded on the maximisation of production and maximisation of profit.

**Innovation:** An idea, practice or object that is perceived as new by an individual or another unit of adoption (Rogers 1995). This can be, for example, in technology, ideas, management or systems.

**Innovativeness:** The degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than other members of a system (Rogers 1995).

**Interpretivist Tradition:** This looks for culturally derived and historically situated interpretation of the social life-world (Crotty 1998). It is an attempt, by focussing on the meanings and values of acting persons, to understand the actions of participating people: to illuminate the intentional aspects of human behaviour (Weber 1970; King, Keohan & Verba 1994).

**Jackaroo:** A young man gaining practical experience on a sheep or cattle station, in order to acquire skills needed to become an owner, overseer, manager etc. (Macquarie Dictionary).

**Knowledge Culture:** Distinct, self-contained knowledge platforms or constructions of reality, each with their own knowledge content, modes of collecting evidence, tests for truth, language, and ways of rejecting the others or defending their version of ‘truth’. These cultures are hypothesised to include personal (individual), local (community), specialist (expert), institutional (strategic), and holistic, which, when combined in transformative fashion, make up the collective knowledge culture (Brown 2008). This thesis proposes two further knowledge cultures: family and transcendent.

**Landcare:** A federally supported national social movement in Australia, formally begun in 1989, whereby a network of community-based Landcare groups address both local and
national land degradation issues with the aim of ensuring the sustainability of agriculture and rural communities.

**Land Degradation:** Decline in the biological productivity or usefulness of land resources for their current, predominant, and/or future intended uses caused through the use of the land by humans. It implies a decline in the biophysical environment and also a loss of intrinsic value (Conacher & Conacher 1995; Gretton & Salma 1996).

**Landscape Function:** The way a healthy landscape functions as a self-organizing system to develop and maintain diversity, complexity and resilience. Landscape function hinges around the energy or solar cycle, the water cycle, the mineral cycle, and the function of biodiversity in a landscape or ecosystem. The healthy functioning of all cycles hinges on having a healthy soil and active photosynthetic capacity in plants.

**Learning (Adult learning or Andragogy):** An act or process by which behavioural change, knowledge, skills and attitudes are acquired. i.e., it involves a change in the individual reflected in the changing, shaping or controlling of behaviour.

**Ley Lines:** In their original conception, these are alleged alignments of a number of places of geographical and historical interest, such as ancient megaliths, natural ridge-tops and water-fords. However, in terms of biodynamics and the use of subtle energy in transformative agriculture, these are identifiable (by dowsing) lines of earth energy that run across the landscape. They can be positive or negative, and the positive ley-lines are used in spreading biodynamic preparations.

**Mallee (or The Mallee):** A general region in Victoria, Australia, of low-rainfall to semi-arid, generally sandy country where the dominant eucalypt vegetation is the Mallee: a low-growing, multi-stemmed, hard-wooded timber. Associated with marginal cropping country.

**Mechanical Metaphor:** The mechanistic world-view that evolved from the 16th century in Western society that reconstructed nature as dead and passive, to be dominated and controlled by humans (Merchant 1980).
**Mental Models:** An explanation of someone’s thought process about how something works in the real world. It is a representation of the surrounding world, the relationships between its various parts and a person’s intuitive perception about his or her own acts and their consequences. Mental models can help shape behaviour and set an approach to solving problems and doing tasks. Thus a mental model is a kind of internal symbol or representation of external reality, hypothesized to play a major role in cognition, reasoning and decision-making (Wikipedia: Mental_models: accessed 01.08.2013).

**Methodology:** The strategy, plan of action, process or design lying behind the choice and use of particular methods and linking the choice and use of methods to the desired outcomes (Crotty 1998).

**Mind-Pool of a culture:** Where the culture of any given society is characterised by a vast array of artefacts; products which represent the ways in which individuals and groups have sought to express and record meaning. These artefacts represent a store-house of society’s strongest and most enduring system of public meaning (the mind-pool; Harri-Augstein 1977).

**New-Organic:** A combination of some of the elements of the original organic metaphor and thinking of the indigenous, ‘primitive’, animistic, pre-scientific and pre-Enlightenment era, with newer elements that have evolved with recent scientific and ecological knowledge in biology, ecology, complex systems and other areas.

**Normal Science:** The traditional approach of Western science, based on discovering an objective reality which is assumed to be out there waiting to be discovered (i.e. that assumes its practices are purely objective); that science therefore knows what the world is like; and that scientific knowledge is not subject to social construction and is value free.

**Normalization:** Because power is often hidden or unrecognised in society, Michel Foucault revealed how modern ‘norms’ work in society so as to socialize its members into that society. The mechanism for this process of ‘normalization’ he called ‘bio-technic-power’ or ‘bio-power’.

**Oligotrophic:** An ecosystem, environment or soil that offers little to sustain life; or an organism that can survive in such environments, or the adaptations that support survival.
Commonly describes environments with low nutrient levels (e.g. the sandplains and lateritic soils of Western Australia). (Wikipedia: Oligotroph – accessed 01.08.2013).

**Ontology:** The study of ‘being’, the nature of existence, the structure of reality (Crotty 1998).

**Operational Closure:** The hypothesised cybernetic property in regard to our nervous system, where outside influences cannot directly control it, but only trigger it to change itself in ways determined by its own self-regulating processes (Fell 2000; Varela 1979).

**Organic Metaphor:** The pre-16th century metaphor in Western and wider society (including indigenous and pre-industrial societies) which possessed the image of an organic cosmos with a living female earth at its centre (Merchant 1980).

**Ovine Johne's Disease:** A chronic, incurable bacterial disease of sheep (also known as sheep-wasting disease). Infected sheep gradually lose weight and die. The disease is slow-spreading, difficult to detect early, causes high production losses, and can kill around 10% of sheep a year in a flock if left unmanaged.

**Palimpsest:** Writing material or manuscript on which the original writing has been effaced to make room for a second writing.

**Paradigm:** The entire constellation of beliefs, values, techniques, and so on shared by the members of a given community (Kuhn 1962). This can result in the organization of scientific worldviews and practices. It differs to Foucault’s *episteme*, because the latter is not merely confined to science but to a wider range of discourse.

**Path Dependence:** Where what has happened at an earlier point in time will affect the possible outcomes of a sequence of events occurring at a later point in time. i.e., those historical sequences in which contingent events set into motion institutional, attitudinal, and behavioural patterns or even chains that have deterministic properties (Sewell 1996; Liebowitz & Margolis 1989).

**Personal Psychological Constructs or ‘constructs’:** Articulated by George Kelly as part of his *Personal Construct Psychology*, these are the personal psychological predictive tools that
enable humans to represent the environment to themselves, to construe their reality. That is, personal constructs enable people to look at the world through transparent patterns or templates that they have created themselves and attempt to fit over the realities of which the world is composed. Personal constructs thus allow humans to make sense of an often inchoate world: to create meaning.

**Polyculture:** In agriculture means the use of multiple crops in the same space, and so as to imitate the diversity of natural ecosystems so as to avoid large stands of single crops, or monocultures, and thus the increased risk of disease. It can include multi-cropping, intercropping, companion planting, beneficial weeds, and alley cropping.

**Post-Normal Science:** An approach pioneered by Silvio Funtowicz and Jerome Ravetz. That, in seeing aspects of ‘normal science’ as part of the creation of social-ecological wicked problems, called for the incorporation both of ethics and values in the practice of science, and also of extended peer communities involving fresh ‘outsiders’.

**Progress** (the idea): The Enlightenment concept that civilisation has moved, is moving, and will move in a desirable direction. It is predicated on an ever-increasing accretion of new knowledge about our world and environment (Bury 1932).

**Punctuated Equilibrium:** An alternation between relatively long periods of stability-equilibrium – when stable infrastructures permit only incremental adaptations – and brief periods of qualitative, metamorphic change or revolutionary upheaval (Gersick 1991).

**Qualitative Research:** Multi-method in focus, involving an interpretive, naturalistic and largely inductive approach to its support matter; involves studying things in their natural settings, and attempting to make sense of or interpret phenomena in terms of the meanings people bring to them (Denzin & Lincoln 1994). For this thesis it also involves attempting to form a complex holistic picture, to create a complex narrative that takes the reader into the multiple dimensions of a problem or issue, and to display it in all its complexity (Cresswell 1998).

**Reflection-Reflexivity:** That state of mind that allows an individual to recognise their understanding of themselves and their surroundings; or the capacity of being able to
understand the ‘game’ itself while playing it, and an awareness that our own and others’
learning and action is dynamically linked through social structures (Kaufman 2010). In this
thesis it also includes allowing the creative aspect of the beyond-conscious to actively
function in the process.

**Regenerative Agriculture:** An active rebuilding or regeneration, in an open process, of
existing agro-ecological systems towards previous, full or imagined health (including of
degraded landscapes and social-ecological systems). It can therefore mean the enabling or the
expression of nature’s capacity for self-organization and the evolution of greater complexity
and emergent properties.

**Resilience Thinking:** This is focussed on the sustainability of social-ecological systems, and
arose out of *soft systems thinking*. It applies to the way complex-dynamic social-ecological
systems function and react in the face of disturbance, and particularly addresses one of the
key drivers of non-sustainable human behaviour: that some of humanity’s deleterious
treatment of the Earth and its systems is derived from a basic misunderstanding (or
misconception) of how the world works.

**Riparian:** Of or occurring on the bank of a river or stream.

**Self-Organising System:** A system that increases in complexity without any guidance or
management by outside sources: meaning that the dynamics of a system can tend by
themselves to increase the inherent order of a system.

**Sheep Mulesing:** The usually non-analgesic surgical treatment of sheep to prevent blow-fly
‘strike’. Mulesing involves the surgical excision of wool-bearing, wrinkled skin from the tail
and breech area of sheep, which prevents blow-flies laying eggs and thus maggot infestation
of subsequent wounds.

**Signification:** The act of signifying (see below).

**Signified (see Signifier below):** The concept, the meaning, the thing indicated by the
signifier. It need not be a ‘real’ object but is some referent to which the signifier refers. Thus
the thing signified is created in the perceiver (where it can vary between people and contexts) and is internal to them. It is because of signifiers that we can share concepts.

**Signifier:** (from semiotics and critical theory; from ‘the sign’): It is the pointing finger, that which indicates (signifies), points to and identifies the second part of the matched pair, the signified. It is in the interpretation of the signifier that meaning is created.

**Social Construction:** The construction of meaning by human beings as they engage with the world they are interpreting (Crotty 1998).

**Social Learning:** The collective action and reflection that occurs among different individuals and groups as they work to improve the management of human and environmental relationships (Keen et al. 2005).

**Soft Systems Thinking:** An approach and powerful intellectual tool pioneered by Peter Checkland, to address problem-solving in the real world by attempting to understand complex processes and interactions. As opposed to a ‘hard’ systems approach (of mathematics, engineering and cybernetics), a soft systems thinking approach takes into account the subjective element of human understanding and its role in identifying aspects of a situation as being ‘a system’. That is, in a ‘soft’ approach the systemicity is transferred from the world to the way of investigating the world (Bawden 1991).

**Soil Organic Matter (SOM):** The organic matter component of soil. It can be divided into three general pools: living biomass of microorganisms, fresh and partially decomposed residues, and humus: the well-decomposed organic matter and highly stable organic material. Surface litter is generally not included as part of SOM (Wikipedia: Soil_organic_matter: accessed 01.08.2013).

**Structural Coupling:** How the process of perception, cognition and other phenomena arises from the systemic operation of a living organism that is coupled to its environment (Maturana & Varela 2000).

**Subordinate Personal Psychological Construct:** The secondary or subsidiary non-structural and non-organizing personal constructs in a person’s psychological system.
**Subtle Energies:** Energies beyond those presently acknowledged in physics (Tiller 1999), and refers to energy frequencies in the cosmos, earth and living organisms’ systems which cannot be measured by conventional instrumentation but which can affect organisms at a cellular level. These can be used in both enhancing agricultural practices and also in human healing.

**Superordinate Personal Psychological Construct:** The main dominant structural and organising personal constructs in a person’s psychological system. In an area like land-use, these comprise the key cognitive drivers.

**Sustainable Agriculture:** Where agro-ecological systems exhibit resilience and persistence by being capable of maintaining their productivity and usefulness to society indefinitely, and which are resource conserving, socially supporting, commercially competitive and environmentally sound (Ikerd, in Duesterhaus 1990; Gliessman 2007; Pretty 2008).

**Systems Thinking:** An approach using mental models that allows us to grapple with the dynamics of highly complex-dynamic systems.

**Techno-Centrism:** A belief that more complex, energy-intensive technologies, aligned with humankind’s inventiveness, will solve all problems and will deliver all human needs.

**Thematic Discourse Analysis:** The analysis (via subjective and/or objective methods) of a range of discourse material so as to discern key themes. These in turn can reveal, for example, the origin of people’s personal psychological constructs; or of embedded ideology and how a society’s ‘truths’, paradigms and discourses are determined. Using a Foucauldian approach to examine issues of knowledge-power, this can mean the analysis of diverse historical and contemporary language, material and practices so as to expose the origins, evolution and hidden functioning of bio-power and its micro-practices in society through the analysis of such things as language, symbols and metaphor.

**Transdisciplinarity:** A principle for an holistic unity of knowledge beyond disciplines, and involving the collective understanding of an issue created by a range of knowledge cultures (including the personal, the family, the local, the strategic, the transcendent, and leading to
the collective), not just specialised contributions to knowledge. Integral to this approach is
the use of the imagination.

**Transformation:** A switch to a distinct new system where a different suite of factors become
important in the design and implementation of response strategies (Marshall et al. 2012).

**Transformative Learning:** A form of experiential learning in adults, usually in a community
of practice, that leads to a major life-changing shift, or to paradigm and world-view change or
shifts. Learning to purposively question one’s own assumptions, beliefs, feelings and
perspective in order to grow or mature personally and intellectually. Manifested in obvious
change in the individual as a result (Mezirow 1995).

**Typology:** The systematic classification of types of social phenomena as they fall within a
particular category.

**‘UGRs’ (Unwritten Ground Rules):** These define acceptable and expected work and other
behaviour, and are derived from the expectations and norms that are usually unspoken and
unwritten in organizations and societies, and which influence behaviour and attitudes of
members of a group (Simpson & Cacioppe 2001).

**Wicked Problem:** Frustratingly complex, multi-dimensional problems that are often found at
the boundaries of natural and social systems. Because they are full of paradoxes and are
generated by the societies that created them, resolution to their multiple nature requires
changes in those societies producing them. Moreover, these social-ecological problems can’t
be handled in a linear fashion but instead require a transdisciplinary response.

**World View:** The fundamental cognitive orientation of an individual or society encompassing
the entirety of the individual or society’s knowledge and point-of-view, including natural
philosophy, fundamental, existential, and normative postulates; or themes, values, emotions,
and ethics. The term is a calque of the German word *Weltanschauung*, which refers to a wide
world perception. Additionally, it refers to the framework of ideas and beliefs through which
an individual, group or culture interprets the world and interacts with it.

**Yeoman Farmers:** Owner-occupying family peasant farmers, or small-holding farmers.
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